# THE ELEMENTS OF OPERATIONAL DESIGN

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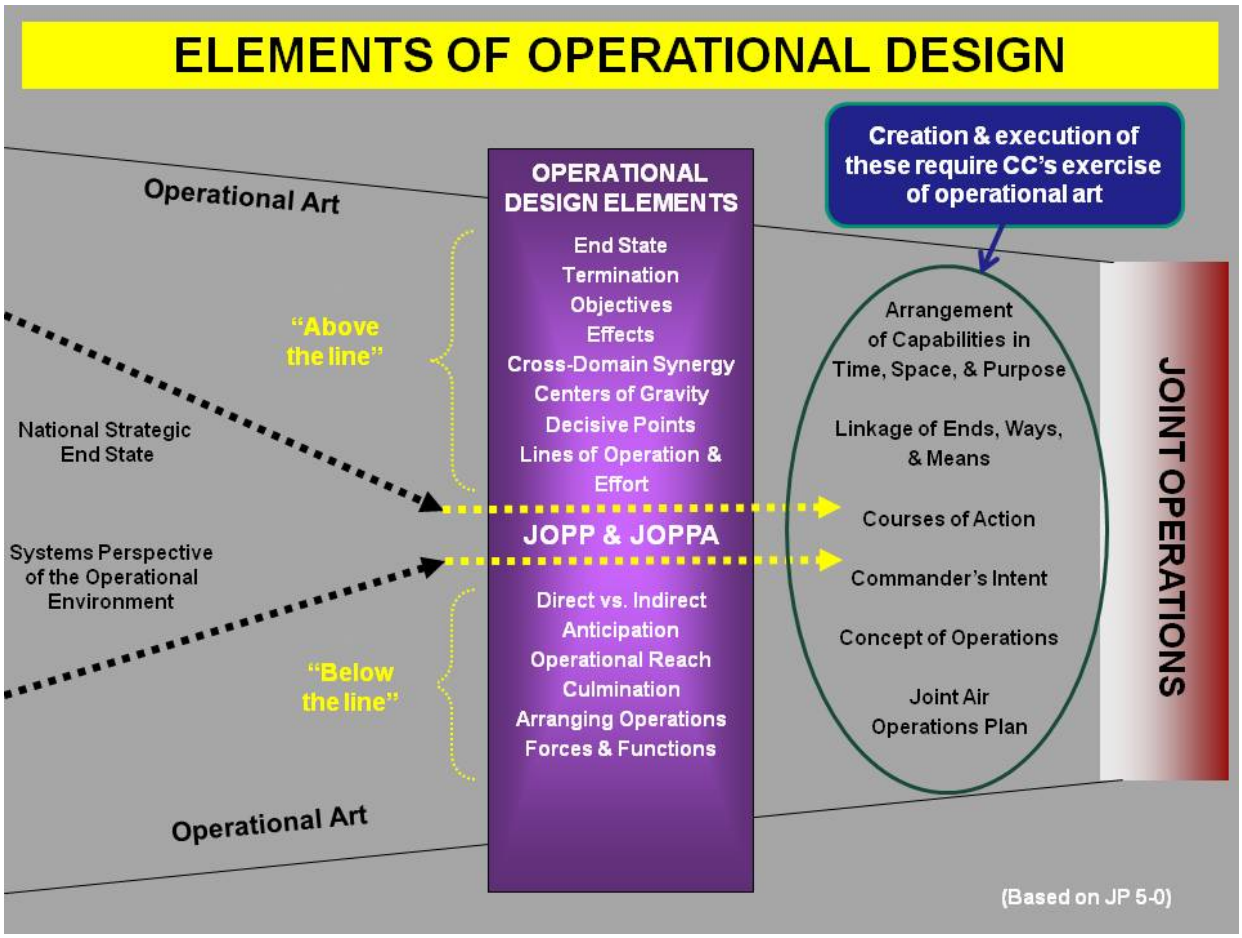
Operational design is the first level of strategy implementation and rests upon operational art, which is defined as the "cognitive approach by comanders and staff–supported by their skill, experience, creativity, and judgment–to develop strategies, campaigns, and operations to organize and employ military forces by integrating ends, ways, and means" (Joint Publication (JP) 3-0, *Joint Operations*). Operational design is an element of operational art, as shown in the "Elements of Operational Design." Operational art uses the commander's vision and intent to determine broadly what should be accomplished in the operational environment; it is guided by the "why" from the strategic level and implemented by the "how" at the tactical level. In applying operational art, the commander draws on judgment, perception, creativity, experience, education, intelligence, boldness, and character to visualize the conditions necessary for success before committing forces.

Operational art requires broad vision, the ability to anticipate, and the skill to prepare, plan, execute, assess, and adapt. Commanders use operational art to consider not only the employment of forces, but also their sustainment and the arrangement of their efforts in time, space, and purpose.

The figure, "Elements of Operational Design" illustrates the elements and how they fit into the larger context of operational art. The elements of design shown in the central box are fully described in JP 5-0, *Joint Operation Planning*, and so are not covered in detail here, with several important exceptions. Those elements depicted "above the line" in the figure are of overarching importance to an understanding of strategy and design (like the end state), or are sufficiently different from the Airman's point of view (like centers of gravity [COGs]) to warrant discussion from an airpower-specific perspective and are thus discussed in this volume (See COG Analysis Methods).

Elements "above the line" will most likely be determined by commanders and strategists early in the design process, often as part of "problem framing." "Below the line" elements (like timing and tempo) *may* help inform design and broad course of action (COA) decisions, but they are also often determined during more detailed, lower level planning, since planners may require more detail concerning "ways, means, and risk" to "flesh out" a strategy and fully exploit these design elements. Refer to JP 5-0 for discussion of elements "below the line."[1]

[1] Note: There is no "above" or "below the line" distinction made in joint doctrine, nor are "cross-domain synergy" or "lines of effort" listed as elements of joint operational design. Joint doctrine simply presents a




**The Elements of Operational Design**

## Problem Framing

**Operational design begins with "problem framing"—establishing the context of a situation within which the commander should act in order to realize the operation's aims, by examining the problem from many different perspectives**. This is not the same as problem solving, which planners do at lower levels to create solutions to medium- and well-structured problems within the conceptual framework created by the commander and strategists. Problem framing entails determining the overall boundaries and aims of the operation, much as an architect does for a building project. This entails continuous dialog with both the operation's "sponsors" (national leadership) and the problem solvers (operational-level planners) to help develop sponsor-approved aims that are realistic (validated by planners at lower levels).

Open, collegial dialog among the commander, "sponsors," other government agencies, and non-governmental organizations (NGOs), staff strategists, and planners is very

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list of elements, providing no guidance concerning which are of most concern to strategists. The distinctions made in this publication are offered only to clarify and enhance understanding of the relevant concepts for purposes of creating strategy.

**NOTIONAL PROBLEM FRAMING QUESTIONS**

- "How does element or system X relate to Y?"
- "When you say X, are you implying Y?"
- "Can you give a logical example?"
- "All your reasoning depends on the idea that X exists; why have you based your reasoning on X instead of Y?"
- "Why do you think the relationship you propose is true? What is your evidence?"

**Notional Problem Framing Questions**

important during this process. As operational design progresses into planning, the process becomes more formalized and the models strategists and planners work with become more empirical as they engage in COA development, analysis, and wargaming. Operational design, however, focuses upon providing basic, overarching structure to the problems that planners may have to solve "further down the road." The "collegial dialog" should help establish the basic context of the problem to be solved and the logical relations between its elements. Commanders and their staffs should be able to answer the kinds of disciplined questions depicted in the figure, "Notional Problem Framing Questions," which probe basic reasons and evidence for an emerging framework, "setting the stage" for breaking the problem down into medium- and well-structured components that planners can "solve."

As commanders and their staffs work through framing problems, they face several tasks that help provide structure to their efforts and make it easier to break ill-structured problems into smaller "chunks" of medium- to well-structured problems. These tasks are depicted in the figure, "Problem Framing Tasks," and consist of the following:

- **Determine the strategic context and systemic nature of the problem(s)—** Examine the reasons the problem came to exist, its history, and try to extrapolate how it will likely develop. Examination should include analysis of all actors—friendly, adversary, and neutral—and encompass all IOPs, as well as unique aspects of the operational environment that may play a role (like distinctive terrain, climate, and cultural aspects).

- **Synthesize strategic guidance—**Determine what guidance from

**PROBLEM FRAMING TASKS**

- Determine the strategic context and systemic nature of the problem(s)
- Synthesize strategic guidance
- Identify strategic trends
- Identify gaps in knowledge and assumptions about the problem(s)
- Identify the operational problem
- Devise and gain approval for the initial mission statement

**Problem Framing Tasks**

national leadership, the combatant commander (CCDR), etc., already exists concerning the desired strategic end state. In some cases, guidance from national leaders will not be logically coherent and military commanders, including the joint force air component commander (JFACC), may need to help clarify such guidance, as was the case during the "design phase" leading up to Operation DESERT STORM). Answer questions like, "are vital national or multinational interests at stake?," "Are the strategic aims consistent with previously established policy and strategy?," etc. Attempt to create clear *boundaries* to the problem and a coherent, logical end state that represents continuing strategic advantage.

- **Identify strategic trends—**Describe how the strategic situation is expected to evolve over time—what trends yield outcomes favorable and unfavorable to friendly interests? What can be done to arrest or encourage trending? This effort should begin to suggest broad COAs. If systems are transformed, what behaviors might emerge?

- **Identify gaps in knowledge and assumptions about the problem(s)—** Speculation on COAs and system-wide effects should suggest gaps in knowledge and provide the basis for later determination of commander's critical information requirements (CCIRs). CCIRs include priority intelligence requirements,[2] friendly force information requirements,[3] and, in many cases, host nation information. Gaps in knowledge also suggest key assumptions that need to be made about the problem(s) to provide a coherent framework for design and for the JFACC's decision-making. Assumptions can encompass political factors, adversary behavior, forces required, time limits, etc. This is a critical step in the design process. Assumptions endow a design with focus, as well as the ability to identify the greatest risks to an operation. For example, Allied operations analysts and air planners during World War II assumed (correctly) that ball bearings were an essential industrial bottleneck for the Axis war economy. However, they incorrectly asumed the Germans neither recognized this weakness nor prepared to counter the effects of Allied attacks. Ultimately, Allied bombers did succeed in heavily damaging German ball bearing factories, but their efforts—attained at a huge cost in Allied lives and aircraft—did not significantly impede the Axis war effort.

- **Identify the operational problem(s)—**Thinking through the steps above should give commanders and staffs enough information to identify the problem's critical factors, along with the problem's logical boundaries and a framework for viewing the critical factors. This should entail assessing the desired strategic end state from higher leadership's guidance (or, in some cases, synthesizing and recommending it, where none has been explicitly established). Commanders and strategists then use that assessment to determine the military end state and termination criteria. Correct

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[2] Intelligence requirements, stated as priorities for intelligence support, that the commander and staff need to understand the adversary or other aspects of the operational environment. (JP 2-01, *Joint and National Support to Military Operations*)

[3] Information the commander and staff need to understand the status of friendly force and supporting capabilities. (JP 3-0)

identification of the operational problem, its boundaries, and key assumptions also helps guide selection of broad indicators and measures of success. These help focus intelligence, surveillance, and reconnaissance (ISR) operations and help further determine CCIRs.

- **Devise and gain approval for the initial mission and intent statement—**Frame the mission with a clear, concise statement of the purpose to be achieved and the essential tasks to be accomplished—who, what, when, where, and why. The statement of commander's intent should explicitly state the military end state and how it fits into the larger context of the national/international strategic end state. Finally, these statements should be explained to and approved by national leadership or other relevant higher commander.

The "Cognitive Map of Operational Design" [4] depicts a summary "cognitive map" of the alignment of operational design's key elements. It depicts how actions at the tactical level lead to effects, which can be usefully depicted using lines of effort (LOEs).[5] LOEs lay out critical desired effects, decisive points (DPs), and other events along a timeline that relates these to COGs, commander's objectives, and the operation's end state in a manner that shows relationships between all the elements, but is easy to comprehend. Creating

**Another Framing Approach***

An alternative design methodology has gained acceptance in some quarters, having the advantage of greater simplicity and clarity (at the possible expense of comprehensiveness):

- **Framing the operational environment**: Defining, analyzing, and synthesizing the characteristics of variables within the operational environment, such as the political, economic, social, and military context.

- **Framing the problem**: Determining the difference between the situation operational environment analysis described and the desired state.

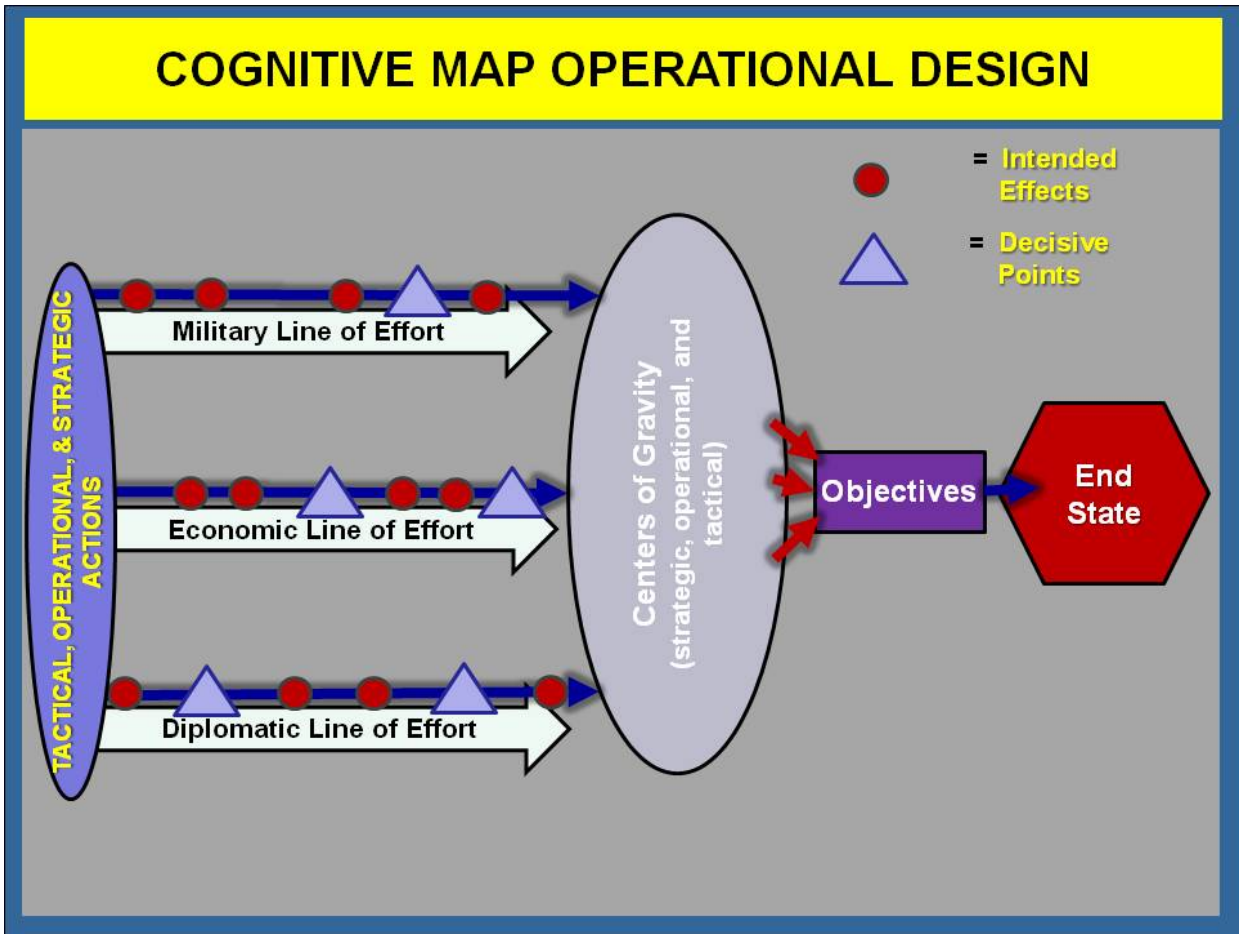
- **Developing an operational approach**: Consider broad general actions–the operational approach–that will "solve" the problem, or at least minimize adverse consequences and maximize friendly advantage.

The problem framing questions shown in Fig. 3.3 may be pertinent to this process as well. As with the process described in the main text, this process creates a design concept that includes the initial commander's intent and planning guidance.

* This process can be found, in considerably refined and elaborated form, in Army Doctrine Reference Publication 5-0, *The Operations Process*, May 12.

[4] Figure adapted from Jeffrey M. Reilly, *Operational Design*: *Distilling Clarity for Decisive Action.*
[5] In some planning literature and Marine Service doctrine, LOEs are still referred to as "lines of operation" or "logical lines of operation." Joint doctrine, however, now recognizes the distinction between lines of operation and LOEs and uses the latter in JP 5-0.

desired effects should lead to correct decisions at DPs, which are specific places, key events, critical factors, or functions that, when acted upon, allow commanders to gain a marked advantage over an adversary or contribute materially to achieving success.[6] Achievement of these along an entire LOE allows friendly operations to decisively affect COGs, which are sources of power that provide all actors within the operational environment (adversary, friendly, and neutral) with physical strength, freedom of action, or the will to act.[7]




**Cognitive Map of Operational Design**

Decisively affecting COGs leads to achievement of friendly objectives. When all objectives are achieved, by definition,[8] the end state should also have been achieved. Note that operations take place in the order described above. They are designed and planned, however, in the opposite "direction"—starting with the strategic and military end states as a product of operational design and "concluding" with detailed planning for

[6] JP 5-0.
[7] Ibid.
[8] Joint doctrine defines the end state as "the set of required conditions that defines achievement of the commander's objectives" (JP 3-0). The Air Force definition in DTM 12 of this annex further refines and illustrates the concept, but the joint definition is most applicable here.

tactical actions (along with assessment of those actions and all intermediate steps, performed by analysts, planners, strategists, and commanders at all levels).