From Tactical Planning to OPERATIONAL DESIGN

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THE PURPOSE OF THIS ARTICLE is to encourage dialogue that may lead to the development of a coherent framework for operational design, which our doctrine needs but currently lacks.[1] We have a proven planning process that the force widely accepts. There is no compelling reason to replace it at the tactical level. At the operational level, however, there is a need to augment it through explicit design. Planning solves problems; design ensures that the problems being solved are the right ones. This article discusses the most prevailing planning process, the Military Decision-Making Process (MDMP); the emerging techniques associated with so-called "effects based operations" (commonly referred to as EBO); and an approach that may potentially inform future doctrine—systemic operational design (SOD). I shall compare the conceptual foundations, decision-making models, and applicable organizational structures of the three approaches.

Operational thought is constantly adapting and evolving to suit the context in which it is applied. The recent evolution of military thought has closely followed the evolution of systems theory. As the understanding of systems continues to evolve, so must military thought.

Three models represent the successive theoretical shifts in systems thinking. They reflect a progressive understanding of systems, beginning with the concept of the systems as a mindless mechanical tool, then as a uni-minded biological being (that is an entity making unilateral decisions), and finally as a multi-minded socio-cultural system.[2]

The three military decision-making models reflect a parallel progression in the evolution of systems thinking. Initially, rational military decision-making supported solving well-structured problems such as those found in a mechanistic system. Decision-making primed by recognition subsequently evolved to address problems occurring in natural settings with which the decision-maker had experience. An intuitive decision-making process then emerged to cope with those situations for which decision-makers had no previous experience.

Working from these basic models, advances in systems thinking and decision theories have triggered subsequent developments in organizational structures. The hierarchical model that enabled commanders to act decisively at the operational level gave way to a network organization that emphasized lateral information sharing. The networked organization laid the foundation for transition to a learning organization that continually updates its thinking and enables the adaptation and innovation required for the best outcomes.

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PAINTING: The Mongols were the undisputed masters of operational innovation and adapted readily to changing conditions. Their ability to swarm on their enemies proved overwhelming. (Illustration from early 14th century manuscript.)

Continued evolution of operational thought is vital to gaining and maintaining the cognitive initiative and maintaining effectiveness in the rapidly changing operating environment.

MDMP

The prevailing planning process, the MDMP, amounts to a mechanistic view of mindless systems. The mechanistic view of the world that evolved in France after the Renaissance maintains that the universe is a machine that works with a regularity dictated by its internal structure and the causal laws of nature. The elements of mechanical systems are "energy-bonded" in that they reflect Newtonian mechanics; laws of classical physics govern the relationships among the elements.[3] Concepts based on this mechanistic view pervade current military doctrine, as evidenced by terms such as center of gravity, mass, and friction. The mechanistic perspective focuses on physical logic and is entirely appropriate—at the tactical level. It becomes incomplete, however, at the more conceptual operational level, where the political objectives of war are at least as important as the physical disposition of forces.

The MDMP is a rational decision-making process. It proceeds by well-ordered steps conducted in an objective, reasoned, and logical manner. The commander must clearly state the end-state he wishes to achieve at the outset of the planning process. The staff develops a number of alternative courses of action to achieve that end-state. The commander selects the most efficient means of achieving his end-state from the alternatives presented to him. This type of rational thinking provides an orderly approach to solving well-defined problems. It has also led to significant accomplishments in the areas of science and technology.

Yet the problems the operational commander faces are seldom well defined and are complicated by time pressures, vaguely understood requirements, and often-conflicting goals. Dynamic conditions that characterize natural settings affect all of these factors. Rarely is there enough time or sufficient information to make a systematic rational approach work outside of a laboratory.

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The MDMP was originally developed for use in a hierarchical organization. (Hierarchy refers to the distribution of authority based on organizational position, such as the commander of a military unit.)[4] Authority and vertical communication combine to permit highly placed individuals to receive information from all individuals at lower levels. The highly placed individuals are also well placed to exert control over their subordinates. The tight control associated with a hierarchical structure, however, is one of its greatest operational-level drawbacks. The only persons with a full perspective of the organization's current situation are those positioned where the information comes together, at the top. Consequently, the ones with the most knowledge tend to be the planners, not the executers. The military exhibits this shortcoming when its rational decision-making model, the MDMP, encourages the separation of course of action development and course of action implementation.[5]

Higher commanders and planning staffs formulate courses of action, but subordinate commanders implement them. The commanders tasked with implementing a course of action are not privy to all the factors that went into developing it. The planners responsible for developing the course of action are not as familiar with the subordinate units' capabilities and strengths as the unit commanders are. This separation of duties is fraught with communication problems that greatly reduce the chance that the optimal course of action will be the one developed. The separation can also affect the commitment of commanders who must implement a plan that they were not part of developing. The rational decision-making model used by the military's hierarchical organization rests on a linear communications process that places more emphasis on ideas flowing from top to bottom than on those flowing from bottom to top. Yet, in the contemporary operating environment, those with the most current situational awareness are at the bottom of the hierarchy. The recognition of these shortcomings led to the development of a new operational approach.

Holistic Planning, Networked Organization, and Uni-Minded Systems

Systems thinking akin to so-called "effects based operations" reflects the second stage of systems theory, a biological view of a uni-minded system.[6] The biological thinking that led to the concept of an organization as a uni-minded system initially emerged in Germany and Britain. The disparate parts of a uni-minded system react in a predefined manner to events in their environment, while a single command center, acting like a brain, controls the operation of the system as a whole. Concepts based on this biological model permeate EBO, as demonstrated by the effect-node-action-resources process that acts on a part of the system to trigger the desired behavior change of the whole. EBO applies the elements of national power against the threat's political, military, economic, social, informational, and infrastructural systems to cause the threat to behave in a pre-determined manner.[7] The assumption that these parts will react to events in their environment in a predictable way is one of the key tenets of EBO. Such "effects-based" thinking is wholly dependent on viewing organizational complexities as though they were uni-minded. However, most emerging threats are not centrally controlled systems, but complex adaptive systems.

Complex adaptive systems are systems that contain agents or populations that seek to adapt to improve their fit to the environment.[8] Most complex adaptive systems have distinctive interaction patterns that are neither random nor completely structured.[9] EBO attempts to exploit these patterns of interaction by identifying and acting on key nodes, or relationships between nodes, in order to bring about the desired behavior. The effect-node-action-resources process relies on identifying cause-and-effect relationships. However, establishing even short-term causes and effects in a complex adaptive system is difficult due to the nature of its interactions. A system is complex when it has many autonomous agents that interact with each other in many ways.[10] A system is adaptive when it responds to interactions with its environment by spontaneously self-organizing and seeking to turn whatever happens to its advantage.[11] Complex adaptive systems operate in a state of continual change as new information is learned and assimilated. EBO-like systems thinking seems to demand the impossible: predicting future behavior in a continually learning, changing, and adapting system.

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Long-term prediction of complex adaptive systemic behavior is complicated further by the inevitable rise of emergent properties. Emergent properties are properties the whole system has that the separate parts do not. Emergence occurs as complex adaptive systems respond to environmental changes through evolutionary adaptation. The system's emergent structures constantly adjust and readjust in response to input from the environment because they are open systems. Analysts cannot understand emergent properties by examining the system's separate parts, so predicting which emergent structures will arise from interacting parts in an open system that exhibits novelty and complexity is not feasible for all practical purposes.

Taking action to produce a predicted "effect" ignores a complex adaptive system's potentially sensitive dependence on initial conditions. This is the same phenomenon that makes determining long-range weather forecasting impossible.[12] Prediction requires an ability to identify the true principal driving forces in the system, as well as how these forces will affect the outcomes of interest. What makes prediction especially difficult is that the forces shaping the future do not add up in a simple, system-wide manner. Instead, their effects include nonlinear interactions among the components of the system. The conjunction of a few small events can produce a big effect if their impacts multiply rather than add. The effect of events can be unforeseeable if their consequences scatter unevenly within the system. In such an environment, current events can

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Adapting to change means employing operational assets in sometimes unexpected ways. Recognizing emergent anomalies can lead to redefining problems and designing solutions on the fly.

dramatically change the probabilities of many future events. Small changes in complex systems have wide ranging and unpredictable consequences that EBO cannot consider. That shortcoming is EBO's crippling weakness.

Nonetheless, EBO-like systems thinking brings a crucial strength to operational-level planning: holistic understanding. EBO pioneers the first systemic, rather than systematic, method of studying and understanding threats in their environments and contexts. EBO considers not just the separate components of the threat system, but also properties that arise when the disparate parts come together. Looking at the entire system compensates for a key fault in the reductionist, systematic MDMP approach, which is "similar to trying to reassemble the fragments of a broken mirror to see a true reflection."[13] From a very early age, Western culture teaches learning by breaking apart problems (analysis) and fragmenting the world. While this psychological process may serve to make complex tasks more manageable, there is an enormous hidden price. The relationships between parts often go under-appreciated or vanish in the analysis. An understanding of how the consequences of localized actions affect the larger whole also often vanishes in the analytical process. EBO tries to remedy this problem by gathering and sharing a greater amount of knowledge to better understand the system as well as its components.

Effects-based thinking enables recognition-primed decision-making. Recognition-primed decision-making incorporates both rapid assessment of the situation and mental course-of-action evaluations.[14] Development of recognition-primed decision-making resulted from field research on the way experienced personnel made decisions in real-world settings. The research explains how experience allowed the decision-makers to react quickly and make sound decisions without having to explicitly contrast options. Decision-makers begin by recognizing the situation as one with which they have some type of experience in the past. Their previous experience enables them to develop an abstract mental model or prototype of the situation, set priorities, determine which informational cues are relevant, ascertain what to expect next, and call upon various ways of successfully responding. Experience allows the decision-maker to filter out unnecessary information and focus on the meaningful pieces. EBO's collaborative information environment permits rapid access to enormous amounts of data that the recognition-primed decision-maker can use his experience to sort out.

Recognition-primed decision-makers develop viable courses of action in an extremely short timeframe. In order for a decision-maker to make sense of an observation, he must have an idea of what might be seen and a framework of beliefs into which new observations, both confirming and disconfirming, may be interwoven.[15] He calls upon prior learning to structure his new perceptions and uses these new perceptions to advance learning in the form of theory construction and modification.[16] Experience facilitates the decision-maker's rapid understanding of a situation and enables him to develop contextually appropriate mental prototypes. Recognition-primed decision-makers implement the first viable course of action they develop rather than generating and comparing multiple ones. In fact, research indicates that only novices need to develop multiple courses of action and compare them in order to determine the best one.[17] Recognition-primed decision-making makes extensive use of mental simulations.[18] Mental simulation, or mental wargaming, occurs in the initial assessment of the situation, when generating expectancies, and while evaluating courses of action. Courses of action are mentally wargamed in the order they are developed. Mental simulations help explain the pieces of incoming information by arriving at a context that best accounts for them. They also enable course-of-action evaluation by previewing how a course of action will unfold and identifying obstacles it might encounter. Once the experienced decision-maker determines that a course of action is viable, he will gain very little by continuing to develop subsequent courses of action. By making vast amounts of collected information available to the decision-maker, EBO enables recognition-primed decision-making for known and well-developed threat situations.

Effects-based thinking moves towards a networked organization and away from a focus on an organizational structure based on hierarchy at the operational level. Units and agencies linked to each other through the collaborative information environment constitute a network organization. The network organization replaces vertical communication and control relationships with lateral relationships.[19] Formal ties are less important than informal partnerships. Network organizations encourage information sharing and inspire innovation.[20] However, there are several significant complications with network organizations. The sheer amount of information to disseminate may actually hamper situational awareness and decision-making unless appropriate filters are in place. Various components in a network organization may also pursue their own self-interests and agendas at the expense of others in the network, especially if they lack hierarchical ties, are separated from each other geographically, face competing priorities, and exhibit different senses of urgency. EBO's shift toward a network organizational structure replaces one set of communication problems with another. Fortunately, another approach is emerging.

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SOD

Systemic operational design, which may potentially inform future doctrine, reflects the most recent stage in the evolution of systems theory—the socio-cultural view of a multi-minded system. Social organizations exemplify multi-minded systems.[21] Neither the biological nor the mechanical models can explain the behavior of a system whose individual parts display autonomy. The critical variable is intention, or purpose; an entity is purposeful if it can produce the same outcome in different ways in the same environment, and different outcomes in the same or a different environment. The various interests of the purposeful parts (their intentionality) are constantly re-aligning in relation to each other and to the whole.

Multi-minded systems are also information-bonded; they achieve guidance and control by agreement based on a common perception preceded by a psychological contract.[22] An example is riding a horse as opposed to driving a car. Who the rider is matters to the horse, and the rider can only enjoy a proper ride after he exchanges information with the horse.[23] The mutual influence represented in this analogy illustrates a socio-cultural view that permeates SOD. Social interaction in SOD evinces a process of injecting energy into a multi-minded system through action to learn more about, or discover, its purpose. Rather than relying on a presumed certain understanding or complete information, SOD recognizes that uncertainty is an attribute of complex adaptive systems and addresses it through continuous reframing. Whereas EBO's holistic approach focuses on disrupting nodes and relationships, SOD focuses on transforming the relationships and interactions between entities within a system. This different emphasis allows SOD to develop a rationale for systemic behavior that facilitates the system's movement in accordance with the designer's aim. SOD uses the term "operational" to signify its focus on the link between strategy and tactics. SOD develops concepts of operation

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Soldiers from a psychological operations company hand out flags and stickers in Afghanistan, 11 February 2008. The handouts help foster stronger relations between coalition forces and the Afghanistan people.

aimed at disrupting entire systems through systemic shock. It ensures that the tactical forms of action developed are consistent with the logic inherent in the strategic aim.

Systemic operational design occurs in the context of a learning organization (as adaptive to emerging information) and is driven by the design team. The commander selects members of his design team based on their ability to contribute to a rigorous discourse and continually update their thinking by remaining open to conceptual shifts. The discourses utilize a dialectic approach that examines the differences between the friendly context (thesis) and the rival context (antithesis), in order to develop a synthesis—a conceptual understanding of the system. This synthesis then becomes the starting point for the next dialectic. SOD is composed of seven sets of structured discourse: "systems framing, rival as rationale, command as rationale, logistics as rationale, operation framing, operational conditions, and forms of function."[24] These discourses provide the framework for continual learning and adaptation. They also permit the rapid incorporation of new information bearing on the problem. Each discourse informs the next in a fluid process that moves from the broad to the narrow and from the abstract to the concrete.[25] Three products result from the discourses: a literary text that explains the logic of the system, a visualization sketch that embodies the logic of the form of maneuver, and a conceptual map that communicates the holistic impression of the body of knowledge gained through the dialectic.

The concept of "design" to inform plans construction makes SOD stand apart from both the MDMP and effects-based thinking. Design focuses on learning, and planning concentrates on action. The design team sets the problem in context through critical questions that lead to rigorous thought. The planner then enables adaptive action to solve the problem set by the designer. Both functions are necessary, but neither is sufficient by itself. SOD does not replace the planning process; it incorporates the element of design to enlighten planning by being sensitive to the multi-minded quality of the environment.

Traditional operational planning approaches use existing approved templates, as abstractions, to solve current concrete problems. These templates lose their validity when the threat system adapts and exhibits new emergent properties. SOD iteratively creates new patterns that tune into the unique logic of the emerging context, avoiding the pitfalls of relying on an enshrined, albeit irrelevant, abstraction. It adapts to the changing operational environment through its cycle of design, plan, act, and learn. SOD accomplishes this through a series of discourses that lead to a holistic design of an operation that ensures the creation of a plan relevant to the current context.

Systemic operational design uses intuitive decision-making. Intuition is a natural outgrowth of experience and preparation; intuitive decision-making translates that experience into action by making inferences calibrated to empirical environmental similarities.[26] Where EBO applies recognition-primed decision-making to identify familiar patterns based on previous experience, SOD uses intuitive decision-making to spot anomalies from experience and develops inferences about appropriate action. SOD takes the lock-step out of effects-based thinking by rigorously recognizing and processing the need to adapt to likelihoods presented by anomalies. It takes advantage of intuitive decision-making to identify points of departure from previous experience. Intuitive decision-makers are able to recognize when an emerging context does not match their experience base, and calls for either a new approach or a reframing of the problem. They are quick to notice anomalies because they have a clear idea of what to expect and a refined sense of what is typical.

Intuitive decision-making uses reframing to account for deviations from expected patterns. Reframing enables the intuitive decision-maker to perceive the problem differently. This change in perspective leads to a new interpretation that accounts for the anomalies. Intuitive decision-making works best when decision-makers actively search for violations of expected patterns and the potential difficulties these violations might cause.[27] Consistent with SOD, they seek to identify emergence within the system. Intuitive decision-making shifts the focus from comparing courses of action to assessing the situation. It occurs outside of sterile laboratory settings and is used extensively by experts who are not even aware they are making decisions. In studies, military planners have been shown to use intuitive decision-making continuously and implicitly.[28] It applies to environments characterized by time pressure, high stakes, experienced decision-makers, inadequate information, ill-defined goals, poorly defined procedures, cue learning, context, dynamic conditions, and team coordination.[29] SOD applies intuitive decision-making to maximize inherent human capabilities and tendencies, while mitigating human fallibilities. The emphasis is on being poised to act rather than being paralyzed by information, expectations (within the accepted analytic framework), and evaluations. Learning through action enables the intuitive decision-maker to gain experience even if the emerging context has unfamiliar properties. No other approach explicitly incorporates learning about deviations from expected patterns, which is precisely where learning is most crucial.

Systemic operational design differs from earlier approaches by harnessing the concept of emergence to drive the learning process. By actively searching for emergence, SOD provides a means for the organization to adapt to the constantly changing operating environment. SOD regards the use of force not only as a means to shape the operational environment, but also (and mainly) as a tool for asking critical questions, an instrument for clarifying ambiguities, a measure for disproving hypotheses, a mode of operational research, and a mechanism for organizational learning.[30] Because SOD reflects the latest developments in the evolution of systems thinking, it presents a more appropriate approach for adapting and innovating in an environment characterized by uncertainty and change. ***MR***

NOTES

1. This article is based on Ketti Davison, "Systemic Operational Design (SOD): Gaining and Maintaining the Cognitive Initiative," monograph (School of Advanced Military Studies, AY 05/06).
2. Jamshid Gharajedaghi, *Systems Thinking: Managing Chaos and Complexity* (Butterworth Heinemann, 1999), 10.
3. Ibid., 12.
4. Mary Jo Hatch, *Organization Theory* (Oxford, 1997), 164-65.
5. Ibid., 110-13.
6. Gharajedaghi, 11.
7. Joint Warfighting Center, JWFC Pamphlet 7, *Operational Implications of Effects-Based Operations* (Washington DC: GPO, 2004), 9.
8. Robert Axelrod and Michael D. Cohen, *Harnessing Complexity* (The Free Press, 1999), 7.
9. Ibid., 63.
10. Mitchell M. Waldrop, *Complexity* (Clearwater, FL: Touchstone Books, 1992), 11.
11. Ibid.
12. James Gleick, *Chaos: Making a New Science* (New York: Penguin Books, 1987), 253
13. Peter M. Senge, *The Fifth Discipline* (New York: Doubleday, 1990), 3.
14. Gary Klein, Sources of Power: How People Make Decisions (Cambridge: MIT Press, 1999), 24.
15. Valerie Ahl and T. F. H. Allen, *Hierarchy Theory* (New York: Columbia University Press, 1996), 13.
16. Ibid.
17. Klein, 21.
18. Ibid., 89.
19. Hatch, 191.
20. Ibid., 192.
21. Gharajedaghi, 12.
22. Ibid.
23. Ibid., 13.
24. Shimon Naveh, "Questions of Operational Art", (PowerPoint presentation given at the School of Advanced Military Studies, Fort Leavenworth, KS, 17 January 2006), 9.
25. William T. Sorrells, et al, "Systemic Operational Design: An Introduction," monograph (School of Advanced Military Studies, AY 04/05), 22.
26. Gary Klein, *The Power of Intuition* (New York: Doubleday, 2003), 4.
27. Ibid., 107.
28. Ibid., 99. Researchers analyzing five consecutive hours of a Battle Command Training Program planning session identified 27 distinct decision points. During only one of these points did the planners show any signs of comparing options.
29. Ibid., 4-5. "Cue learning" refers to the need to perceive patterns and make distinctions.
30. Naveh, 14.