

**Systemic Operational Design (SOD):
Gaining and Maintaining the Cognitive Initiative**

**A Monograph
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Abstract

SYSTEMIC OPERATION DESIGN: GAINING AND MAINTAINING THE COGNITIVE INITIATIVE. by MAJ Ketti C. Davison, 76 pages.

This monograph began as an investigation to determine if either Effects-Based Operations (EBO) or Systemic Operational Design (SOD) should replace the traditional Military Decision-Making Process (MDMP). It soon became clear that the approaches do not accomplish the same functions, are not applicable at the same levels, and are not mutually exclusive. The Military Decision-Making Process originated as a tactical decision-making process, and remains the most appropriate of the three approaches at that level. It deals with the physical threat on the ground with a decisiveness enabled by an organization of hierarchical authority. Effects-Based Operations is suitable only at the operational level. It takes the time to model the threat as a holistic system and contemplates the desired behavior changes various actions on that system would produce. It exceeds the physical realm of the tactical and explicitly translates strategic directives into tactical effects. Systemic Operational Design is a holistic approach that introduces the discrete element of design in order to inform planning. It is abstract and conceptual. It creates a cognitive map and continually updates it by the learning that occurs through action. Fusing Systemic Operational Design with the Military Decision-Making Process might be the best way ahead for operational planning and design.

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INTRODUCTION

If I always appear prepared, it is because before entering on an undertaking, I have meditated for long and foreseen what may occur.

Napoleon Bonaparte

Purpose and Scope

The purpose of this monograph is to demonstrate that Systemic Operational Design (SOD) is a more adaptive approach to designing military operations at the joint operational level than the Military Decision-Making Process (MDMP), the Joint Operation Planning and Execution System (JOPES) and Effects-Based Operations (EBO). Systemic Operational Design gains and maintains the cognitive initiative by enabling the operational commander to recognize and exploit emerging opportunities through its unique process of iterative design.

The scope of this monograph will be limited to comparing two current, one emerging, and one potential, models for joint operational planning and design. Each of these processes begins with some type of threat modeling. The current planning models are the Joint Operation Planning and Execution System and the Military Decision-Making Process. Both current planning models use Intelligence Preparation of the Battlespace (IPB) to model the threat. Effects-Based Operations, the emerging model for joint operational planning, utilizes Operational Net Assessment (ONA) in order to model the threat holistically. The potential process of Systemic Operational Design explicitly incorporates design as well as planning, and models the threat through the Rival as Rationale discourse. Recent experiences in Afghanistan and Iraq demonstrate the importance of iterative design at the operational level by highlighting the need to link tactical operations to longer-term national goals and objectives in a dynamic environment.

Environment

The threat is constantly changing and adapting. Therefore, the joint approach to operational planning and design must be capable of adapting in an environment characterized by change. The contemporary operational environment (COE) is the operational environment that exists in the world today, and which will exist until a peer competitor arises.¹ The National Security Strategy (NSS) recognizes that the intelligence systems, which were designed around the priority of gathering information about the Soviet bloc, must now cope with the challenge of following a far more complex and elusive set of targets.² The National Defense Strategy (NDS) acknowledges that the nation has entered “a time of unconventional challenges and strategic uncertainty” and confronts fundamentally different challenges than those faced by the American defense establishment in the Cold War and previous eras.³ According to the National Military Strategy (NMS), an array of traditional, irregular, catastrophic and disruptive capabilities and methods threaten U.S. interests.⁴ In order to meet the increasing demands, operational planning and design must allow commanders to understand enemy intent, predict threat actions, and detect adversary movements, in order to provide the commanders the time required to generate options.⁵ The operating environment has changed, is changing and will continue to change. Uncertainty defines the contemporary operational environment. The planning and design models used by joint forces at the operational level must be able to adapt to that uncertainty.

“The very nature of interaction is bound to make it unpredictable.” Clausewitz

¹U.S. Department of the Army. *FM 7-100, Opposing Force Doctrinal Framework and Strategy* (U.S. Government Printing Office, 2002), viii.

²U.S. Department of Defense. *National Security Strategy* (U.S. Government Printing Office, 2002), 30.

³U.S. Department of Defense. *National Defense Strategy* (U.S. Government Printing Office, 2005), v.

⁴U.S. Department of Defense. *National Military Strategy* (U.S. Government Printing Office, 2004), 3.

⁵*Ibid.*, 4.

CURRENT DOCTRINE

Strategy is a system of makeshifts. It is more than a science. It is bringing knowledge to bear on practical life, the further elaboration of an original guiding idea under constantly changing circumstances. It is the art of acting under pressure of the most demanding conditions... That is why general principles, rules derived from them, and systems based on these rules cannot possibly have any value for strategy.

Graf von Moltke

Joint Planning: Systematic and Linear Approaches to Planning

Joint operations planning is a sequential process performed simultaneously at the strategic, operational, and tactical levels of war.⁶ At the operational level, it links the tactical employment of forces to strategic objectives through operational art. Operational art determines the employment of major forces in order to influence the enemy disposition before combat, governs the deployment of those forces, and arranges battles and major operations to achieve operational and strategic objectives.⁷ There are two planning processes at the joint operational level: the Joint Operation Planning and Execution System (JOPES) and the Military Decision-Making Process (MDMP). The Joint Operation Planning and Execution System and the Military Decision-Making Process share the same basic approaches and problem-solving elements. The Joint Operation Planning and Execution System provides an iterative planning process for plans that require interaction between the supported commander, Chairman, Secretary, and President. The Military Decision-Making Process underpins the Joint Operation Planning and Execution System and provides a generic, logical process that commanders and planners can apply at any level.⁸

⁶Chairman of the Joint Chiefs of Staff. *Joint Publication 5-0, Doctrine for Joint Planning Operations* (U.S. Government Printing Office, 1995), 9.

⁷*Ibid.*, 20.

⁸Chairman of the Joint Chiefs of Staff. *Joint Publication 5-0, Draft Doctrine for Joint Planning Operations, 3rd Revision* (U.S. Government Printing Office, 2005), 55.

The Joint Operation Planning and Execution System includes five operational processes: threat identification and assessment, strategy determination, course of action development, detailed planning, and implementation. These processes govern both deliberate and crisis action planning. Threat identification and assessment uses Intelligence Preparation of the Battlespace to describe threats to national interests, establish the specific nature of the threat, and determine threat capabilities and intentions. Strategy determination begins with an analysis of existing strategy guidance in conjunction with the intelligence estimate, and results in suitable and feasible military objectives to counter the threats. Intelligence Preparation of the Battlespace develops and refines the intelligence estimate that guides and focuses the determination of military objectives. Course of action development addresses alternative ways to achieve military objectives. Detailed planning provides a thorough, fully integrated schedule of mobilization, deployment, employment, and sustainment activities based on the approved course of action. Implementation includes execution of the plan and monitoring of actual events. The five operational processes are cyclic and continue throughout implementation.

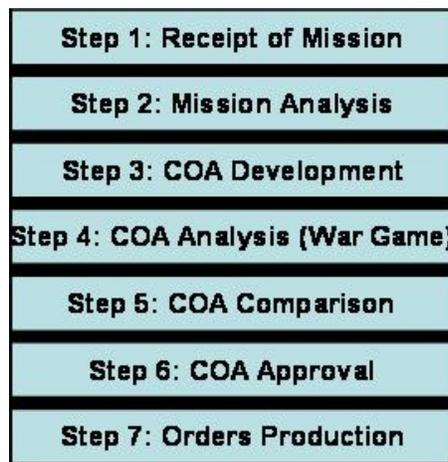


Figure 1: The Military Decision-Making Process

The Military Decision-Making Process underpins planning at all levels and missions across the full range of military operations. The Military Decision-Making Process is an orderly, analytical planning process, which establishes procedures for analyzing a mission, developing, analyzing, and comparing alternative courses of action, selecting the best course of action, and producing a plan or order.⁹ The Military Decision-Making Process at the joint level consists of seven steps: initiation, mission analysis, course of action development, course of action analysis and wargaming, course of action comparison, course of action approval, and plan or order development. The key consideration for a commander during mission analysis is the national strategic end state: that set of national objectives and associated conditions that define strategic success from the President's perspective. Receipt of a planning directive initiates the Military Decision-Making Process. The commander and staff then conduct mission analysis to assess the scope of the assigned mission, the desired effects and military objectives, and the operational environment it relates to mission accomplishment. During course of action development, the staff focuses on the key information necessary to make decisions and assimilate the data from mission analysis. The staff generally develops no more than three courses of action to focus their efforts and concentrate valuable resources. Wargaming provides a means for the commander and staff to analyze each tentative course of action against threat courses of action previously identified through Intelligence Preparation of the Battlespace. Course of action comparison evaluates the strengths and weaknesses of each course of action in order to identify the one with the highest probability of success against the most likely and the most dangerous threat courses of action. The commander selects a course of action based upon the staff's recommendation and his own experience and judgment. During plan or order development, commanders and their staffs

⁹Ibid, 54.

must be continually aware of the strategic objectives and associated effects that dominate the campaign planning process at every juncture.

The threat modeling approach that drives both the Joint Operation Planning and Execution System and the Military Decision-Making Process is Intelligence Preparation of the Battlespace (IPB). Intelligence Preparation of the Battlespace is a sequential, analytical approach that predicts the most probable threat courses of action based on historical patterns of operation. Intelligence Preparation of the Battlespace is a four-step process that results in threat courses of actions that drive the development of friendly courses of action. Intelligence Preparation of the Battlespace's systematic approach applies to the full range of joint military operations in which it analyzes information about the battlespace environment and the adversary. The steps of Intelligence Preparation of the Battlespace define the total battlespace environment, describe the battlespace's effects on threat and friendly courses of action, evaluate the capabilities of any threat forces that may operate in that battlespace, and determine potential threat courses of action. Intelligence Preparation of the Battlespace drives the joint operational planning process by determining those threat courses of action that the friendly courses of action are developed to counter. The friendly courses of action are wargamed against the predicted threat courses of action. The outcome of this wargame determines which friendly course of action the commander selects for execution. Throughout each step, Intelligence Preparation of the Battlespace's predictions determine the friendly force's strength, composition and disposition. If the predicted threat courses of action do not reflect the actual threat on the ground, the friendly plan will be unsound and much staff effort will have been wasted.

The Intelligence Preparation of the Battlespace process effectively deals with conventional threats that have well-established doctrine, such as the Soviet Armed Forces during the Cold War. During the 1980s, intelligence analysis was methodical and rote; it was less about

analyzing enemy capabilities, and more about identifying enemy dispositions and matching them to the Warsaw Pact doctrine that conferred enemy intentions.¹⁰ While still valid at the tactical level, Intelligence Preparation of the Battlespace lost most of its utility at the operational level after the fall of the Soviet Union as new and disparate threats emerged. When used in conjunction with the Joint Operation Planning and Execution System and the Military Decision-Making Process, Intelligence Preparation of the Battlespace has two major challenges. First, Intelligence Preparation of the Battlespace must assess enemy capabilities accurately enough and in sufficient detail to enable the friendly plan's ability to counter them. Second, Intelligence Preparation of the Battlespace must predict enemy intentions early enough for the friendly plan to account for them. Failure to predict accurately the enemy's capabilities occurred in Operation Iraqi Freedom in relation to the regime's possession of Weapons of Mass Destruction (WMD), and with Al Qaeda with its ability to conduct an attack on the scale of 9-11. Failure to predict accurately the enemy's intentions occurred in Korea with the involvement of the Chinese, World War II with the surprise attack on Pearl Harbor, and in Operation Iraqi Freedom (OIF) with the unanticipated rise of insurgents. Intelligence Preparation of the Battlespace has a long history, but not necessarily a strong track record in predicting capabilities and intentions. Clearly, Intelligence Preparation of the Battlespace has difficulty accomplishing all that operational-level decision-makers expect of it.

Mechanistic Systems, Rational Choice, and Hierarchical Organization

The 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 shifts in systems theory as the understanding of the nature of

¹⁰Lawrence T. Brown, "The Enemy We Were Fighting Was Not What We Had Predicted." Monograph (School of Advanced Military Studies AY 03/04), 14.

organizations increased, beginning with the mindless mechanical tool, followed by a uni-minded biological being, to the current multi-minded organized complexity.¹¹ Both the Joint Operation Planning and Execution System and the Military Decision-Making Process reflect the 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.¹² The elements of mechanical systems are energy-bonded; laws of classical physics govern the relationships among the elements.¹³ Concepts based on this mechanistic view pervade current military doctrine, as evidenced by terms such as center of gravity and mass. In his 1687 landmark *Principia Mathematica*, Isaac Newton defined gravity as a centripetal force by which bodies are drawn or impelled, or any way tend, towards a point as to a center, and mass as the quantity of matter that is the measure of the same, arising from its density and bulk conjointly. Clausewitz described center of gravity as the hub of all power and movement on which everything depends, while Jomini asserted that the art of war consists of throwing the mass of an army upon the decisive points. Joint Publication 3.0, Doctrine for Joint Operation, 2001, defines centers of gravity as those characteristics, capabilities or sources of power from which a military force derives its freedom of action, physical strength, or will to fight. Joint Publication 1, Joint Warfare of the Armed Forces of the United States, 2000, lists mass as a principle of war whose purpose is to concentrate the effects of combat power at the place and time to achieve decisive results. The mechanistic influence on military theory and doctrine is clear. It is also outdated and obsolete.

¹¹Jamshid Gharajedaghi, *Systems Thinking: Managing Chaos and Complexity* (Butterworth Heinemann, 1999), 10.

¹²Ibid.

¹³Ibid., 12.

Traditional decision-making approaches view the process of problem-solving as proceeding in a mechanistic fashion from one stage to the next.¹⁴ The Joint Operation Planning and Execution System and the Military Decision-Making Process use traditional problem-solving methods. More specifically, they use stage models of problem solving. Stage models include four generic steps in sequence: define the problem, generate a course of action, evaluate the course of action, and execute the course of action.¹⁵ The components of a stage model are themselves reasonable; the difficulty lies in their assumption of linearity.¹⁶ Both the Joint Operation Planning and Execution System and the Military Decision-Making Process integrate new information on the threat, the environment, or friendly and coalition forces in two ways. The decision-making process may come to a halt and regress back to a previous step in order to incorporate the new information, or it may complete its current sequence to the end, and begin the next sequence with the new information. The first technique stalls the decision-making process and the second integrates important information too late. Linear problem-solving methods work well in laboratory settings in a controlled environment. However, problem-solving in natural settings is not linear, but interactive.¹⁷ The linear methodology of both the Joint Operation Planning and Execution System and the Military Decision-Making Process hinders their ability to adapt quickly enough in a dynamic threat environment.

Traditional problem-solving models are deterministic, ends-driven processes. The starting point for both the Joint Operation Planning and Execution System and the Military Decision-Making Process is a specific end-state based on a clear understanding of the problem. Upon receipt of a mission, commanders form their initial situational understanding using their

¹⁴Gary Klein, *Sources of Power: How People Make Decisions* (MIT Press, 1999), 127.

¹⁵*Ibid.*, 127.

¹⁶*Ibid.*, 130.

¹⁷*Ibid.*, 123.

experience, judgment, and initial staff inputs. From this, they develop an initial picture of the desired end-state and a construct for how to reach it. Unfortunately, most of the problems a commander is likely to face are ill-defined. The first step, clearly define the goal, can never be completed if the goal is ill-defined by its nature. This dilemma stalls the decision-making process in the first step and prevents the completion of the subsequent steps. Traditional decision-making is worse than useless; it can interfere in the solving of unstructured problems.¹⁸ Not only can problems be unstructured because of ill-defined goals, but they can also be unstructured if the initial state is not defined, the terminal state is undefined, or the procedure for transforming the initial state into the terminal state is undefined.¹⁹ Decision-making in natural settings is interactive because the goals determine how to assess the situation, and what is learned about the situation changes the nature of the goals.²⁰ Linear approaches are not designed to receive injects of information that cause a re-conceptualization of the problem, but instead drive towards an end. Standard advice on problem-solving strives for well-defined goals and can interfere with solving ill-defined problems.²¹

Both the Joint Operation Planning and Execution System and the Military Decision-Making Process are systematic, rational decision-making processes driven by threat courses of action. The Joint Operation Planning and Execution System and the Military Decision-Making Process are systematic in the sense that they proceed by well-ordered steps. They are rational in that the steps are 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, in accordance with a systematic rational approach, develops a number of alternatives to achieve that

¹⁸Ibid., 129.

¹⁹Ibid., 129.

²⁰Ibid., 123.

²¹Ibid., 146.

specified 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 complex problems. It has also led to significant accomplishments, especially in the areas of science and technology.²² However, a systematic rational approach runs counter to how human beings make decisions in a natural setting. Time pressure, unclear goals and dynamic conditions characterize natural settings.²³ Rarely is there enough time or sufficient information to make a systematic rational approach work in a natural setting.²⁴

Intelligence Preparation of the Battlespace, like the Joint Operation Planning and Execution System and the Military Decision-Making Process, is a reductionist approach that analyzes specific elements within the threat system in order to predict its future behavior. The principle of analytical reduction that characterizes the Western intellectual tradition came from René Descartes. Descartes described analysis as the process of identifying the simple natures in complex phenomena, and analytical reduction as the process of dividing each problem into as many parts as might be possible and necessary in order to best solve it.²⁵ Reductive analysis is the most successful explanatory technique ever used in science.²⁶ Intelligence Preparation of the Battlespace uses reductive analysis to explain the complex phenomena of the threat system in terms of its simpler constituents. Intelligence Preparation of the Battlespace evaluates the threat by analyzing the intelligence data based on past operations and determining how the threat normally organizes each battlefield operating system for combat. However, a problem is usually

²²Ibid., 261.

²³Ibid., 4-6.

²⁴Ibid., 29.

²⁵Peter Checkland, *Systems Thinking, Systems Practice* (John Wiley & Sons, 1999), 47.

²⁶Ibid., 97.

perceived as such not because of the form which makes it normal, but because the content details which make in unique.²⁷

Intelligence Preparation of the Battlespace is dependent upon accurate information early in the planning process. It uses this information to extrapolate from past threat patterns of operation in order to predict future ones. Both the Joint Operation Planning and Execution System and the Military Decision-Making Process call for Intelligence Preparation of the Battlespace to make accurate predictions early in the planning process, based on previously collected information. This requires the intelligence analyst to come up with an almost instant diagnosis before sufficient hard information, and the broader background information necessary to gain perspective, become available to make possible a well-grounded judgment.²⁸ The circumstances under which accurate perception is most difficult are exactly the circumstances under which intelligence analysis generally takes place: dealing with highly ambiguous situations based on information processed incrementally under pressure for early judgment.²⁹ The problem of future prediction of an adversary's intent is particularly difficult because, at the time that intelligence personnel are being asked to determine it, adversaries may not yet have formed their intent, may be in the process of changing their intent, or may not yet have undertaken any detectable action that would provide indicators of their future plans. The dynamic interaction between adversary and friendly systems complicates the prediction of threat actions and may result in the paradox of warning. An intelligence officer, having detected certain adversary actions and correctly determined the adversary's intent, forecasts that the adversary is preparing to attack; the commander reacts by having friendly forces take appropriate defensive measures. The adversary commander detects these actions, however, and decides that attacking is no longer

²⁷Ibid., 74.

²⁸Richard Heuer, *Psychology of Intelligence Analysis* (Central Intelligence Agency, 1999), 25.

²⁹Ibid., 24.

a desirable course of action, and subsequently cancels the attack. Adversary actions produced a friendly reaction that resulted in a change to the adversary's intent. Unlike physical systems, social systems can react to predictions made about them.³⁰

The inherent bias of analysts to find what they are looking for also complicates Intelligence Preparation of the Battlespace's challenge of prediction. Once threat courses of action are developed, they act as a filter through which subsequently gathered intelligence is processed. The analyst judges new intelligence not on its own merit, but rather on whether it confirms or denies the predicted threat courses of action. Collection management to confirm threat courses of action may become a self-fulfilling prophecy. Perception experiments indicate that an early judgment adversely affects the formation of future perceptions, and that initial exposure to blurred or ambiguous stimuli interferes with accurate perception even after more and better information becomes available.³¹ The early but incorrect impression tends to persist because the amount of information necessary to invalidate a hypothesis is considerably greater than the amount of information required to make an initial interpretation.³² Starting with a wrong assumption early in the process affects the validity of the entire decision-making process. Organizational pressures reinforce this perceptual bias by favoring consistent interpretation; once the analyst is committed in writing; both the analyst and the organization have a stake in maintaining the original assessment.³³ Not being able to identify when a threat course of action is invalid threatens the entire operation because the friendly plan depends on the accuracy of the prediction of the threat course of action.

Extrapolating from historical patterns of operation in order to predict future ones assumes that the past determines the future. Deterministic models, while valid for mechanical systems,

³⁰Checkland, 70.

³¹Heuer, 24.

³²Ibid., 24

³³Ibid., 25.

cannot predict the behavior of complex adaptive systems because the entropy inherent in them causes history not to repeat itself. The type of knowledge the threat encounters, the extent to which that knowledge is learned, and the ability of the threat to employ that learning will all be unique to the specific context the threat is operating in. It is not realistic to expect an analyst to predict how the threat may act upon knowledge it may obtain through the conduct of operations. Complex adaptive systems are also sensitive to initial conditions. A small change in the initial conditions may result in large and unforeseeable changes in the whole system.

Intelligence Preparation of the Battlespace requires historical patterns of operation that may not be available. The threat has diversified exponentially since the fall of the Soviet Union. Many of these threats are newly formed, and therefore have no established patterns of operation. Other emerging threats are rapidly changing, influenced by the vast amount of information and ideas readily available due to globalization. As long as Intelligence Preparation of the Battlespace depends upon historical patterns of operation, it will not work well against threats that are new, unfamiliar, or capable of rapid change. Despite Intelligence Preparation of the Battlespace's limitations, it has several significant strengths. It is a simple approach, which takes little time to understand and apply. It also provides a structure for analysis that enables those without experience to acquire knowledge about an adversary. This structure encourages a thorough, in-depth and continuous study of known threats. Perhaps most significantly, Intelligence Preparation of the Battlespace offers a starting point for the analysis of unfamiliar threats.

The Joint Operation Planning and Execution System, the Military Decision-Making Process, and Intelligence Preparation of the Battlespace occur in the context of a hierarchical organization. Hierarchy refers to the distribution of authority based on organizational position,

such as the commander of a military unit.³⁴ Authority conveys specific powers to the position holder, based solely on that position. This power includes the right to direct, punish, reward, and encourage subordinates. Authority empowers position holders, such as military commanders, to influence those who are responsible to them based on the hierarchical structure. This influence primarily flows through communication downward to subordinates. Hierarchical organizations establish formally defined reporting relationships via vertical communication channels.

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 drawbacks. The only ones with a general 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 executors. The military exhibits this shortcoming where its rational decision-making model encourages the separation of course of action development and course of action implementation³⁵. In a military unit, this separation occurs through a hierarchical division of labor. Higher commanders and planning staffs formulate courses of action while subordinate commanders are charged with implementing them. The higher-level planners focus on analyzing the threats and opportunities in a given environment and generate a course of action that maximizes performance based on the unit's core competencies. The commanders tasked with implementing the course of action are not privy to all the factors that went into developing the selected course of action. 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.

Clearly, this separation of duties is fraught with communication problems that greatly reduce the

³⁴Mary Jo Hatch, *Organization Theory* (Oxford, 1997) 164-165.

³⁵Hatch, 110-113.

chance that the optimal course of action will be the one developed. The separation can also affect the commitment of the commanders who are expected to implement a plan that they were not a 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. This is in sharp contrast with the realities of the contemporary operating environment, where those with the most current situational awareness are at the bottom of the hierarchy.

Current doctrine's linear approach is of limited utility in confronting complex adaptive threat systems at the joint operational level. The current decision-making processes are counter-intuitive, mechanistic, and integrate new information too slowly. These problems allow new threats to act more quickly than the friendly forces can analyze, plan, and effectively respond. The current threat modeling process depends upon accurately predicting dynamic, nonlinear threat behavior. When the prediction made is inaccurate, the friendly plan counters the wrong threat. Current doctrinal approaches to decision-making and threat modeling do not adequately address the challenges wrought by the emerging threats of the contemporary operational environment. A new doctrinal approach must emerge.

“In war everything is simple, but it's the simple things that are difficult.”

Clausewitz

EMERGING DOCTRINE

Whether things will be better if they are different I do not know, but they will have to be different if they are to become better, that I do know.

Georg Christoph Lichtenberg

Effects-Based Operations (EBO): A Systemic Approach to Planning

An effects-based approach is emerging as the doctrine to replace the Joint Operation Planning and Execution System and the Military Decision-Making Process' task-based approaches. Effects-Based Operations (EBO) utilizes a holistic understanding of the operational environment in order to influence the behavior of the threat system. It translates strategic objectives into desired effects on the threat's Political, Military, Economic, Social, Information, and Infrastructure (PMESII) systems, and implements various elements of national power in order to achieve them.

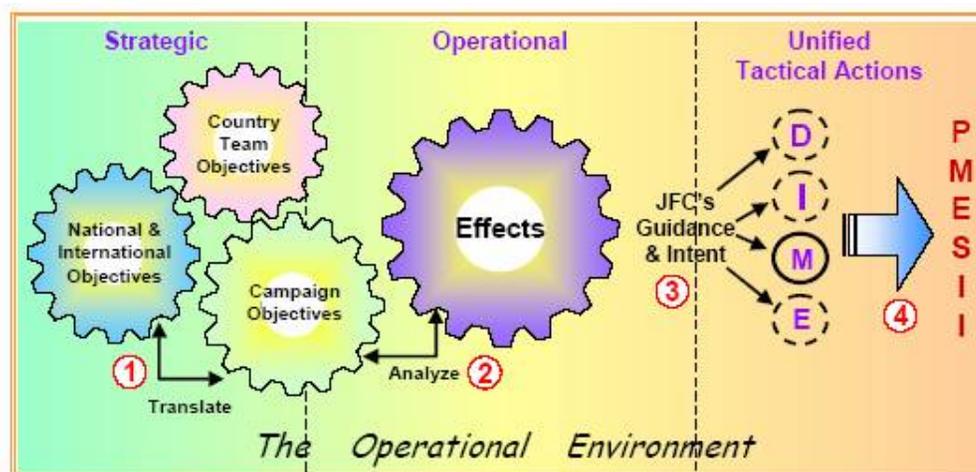


Figure 2: Effects-Based Operations³⁶

³⁶All EBO related figures are taken from the 2004 Joint Warfighting Center Joint Doctrine Series pamphlets on EBO, ONA, and SoSA.

Effects-Based Operations augments and enhances the Joint Operation Planning and Execution System and the Military Decision-Making Process by focusing on achieving desired effects rather than on accomplishing specific tasks. Moreover, Effects-Based Operations' System of Systems Analysis (SoSA) complements Intelligence Preparation of the Battlespace by producing a greater awareness of the entire threat system. Effects-Based Operations' four major components: knowledge base development, effects-based planning, execution, and assessment, are consistent with current planning processes but add embedded enhancements that reflect changes in the way commanders and staffs think about and conduct joint operations. The four functions of the Effects-Based Operations are mutually supportive and occur in parallel, instead of sequentially, during campaign execution.

Effects-Based Operations takes place in the Collaborative Information Environment (CIE). The Collaborative Information Environment strives to provide the right information to the right people at the right time, in an understandable and actionable configuration. It is a virtual aggregation of individuals, organizations, systems, infrastructure, and processes to create and share the data, information, and knowledge needed to plan, execute, and assess joint force operations.³⁷ The Collaborative Information Environment enables commanders to make well-informed decisions faster than the threat can react, and implement them at a tempo that allows the joint force to shape the situation, thereby achieving decision superiority.³⁸ Joint Interactive Planning (JIP) emphasizes shared mission planning, execution and assessment processes, and presentations. Collaboration promotes parallel rather than serial information processing. The Collaborative Information Environment accomplishes this by facilitating a shared situational

³⁷Joint Warfighting Center, *JWFC Pamphlet 7, Operational Implications of Effects-Based Operations* (U.S. Joint Forces Command, 2004), 9.

³⁸Joint Warfighting Center, *JWFC Pamphlet 5, Operational Implications of the Collaborative Information Environment* (U.S. Joint Forces Command, 2004), 1.

awareness among the decision-makers and planners that enhances unity of effort. Collaborative Information Environment capabilities are intended to transform joint collaborative planning from a relatively sequential, hierarchical process to a more parallel approach that allows collaboration by all relevant organizations regardless of their location.

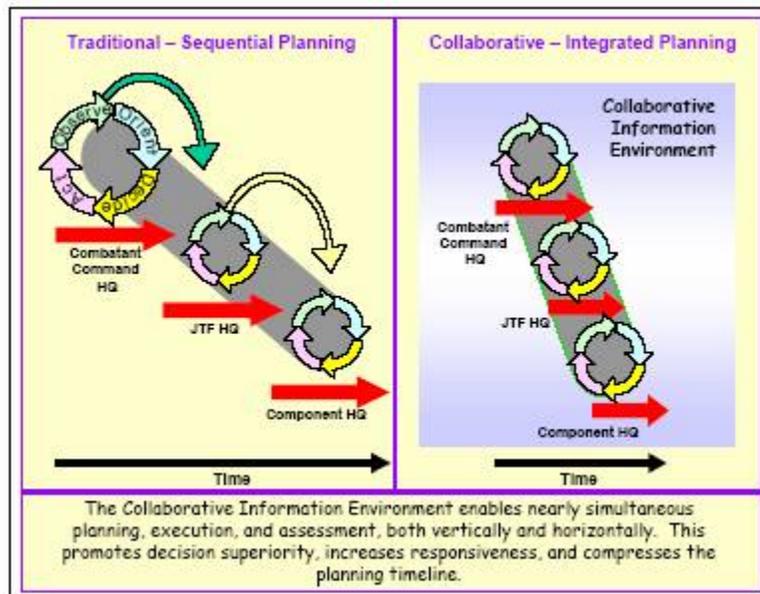


Figure 3: Collaborative planning

The common relevant operational picture (CROP) produced by and utilized in the Collaborative Information Environment is a virtual warehouse of timely, fused, assured, and accurate information, which can be tailored to meet the joint force requirements at all levels and is common to all organizations and individuals involved in the joint operation. The Collaborative Information Environment is essential to baseline Operational Net Assessment (ONA) development and subsequent updates during operations.

Effects-Based Operations has two organizational constructs that enable its holistic, integrated approach: the Standing Joint Force Headquarters Core Element [SJFHQ (CE)] and the Joint Interagency Coordination Group (JIACG). The Standing Joint Force Headquarters Core

Element provides the combatant commander with a full-time, trained, and equipped joint command and control capability specifically designed to enhance situational understanding within the designated focus areas.³⁹ The Standing Joint Force Headquarters Core Element makes Effects-Based Operations possible by conducting both the Operation Net Assessment and System of Systems Analysis that other organizations are not staffed to properly conduct. The Joint Interagency Coordination Group gives the combatant commander a multi-functional advisory element that facilitates information-sharing, operational-level planning, and political-military synthesis across the interagency community. The Joint Interagency Coordination Group bridges the gap between civilian and military campaign planning efforts, thereby helping to ensure a unity of effort in the actions taken to produce a behavior change in the threat system. These two organizational constructs are crucial to the full implementation of Effects-Based Operations. Despite Effects-Based Operations' dependence upon the new organizational constructs of the Standing Joint Force Headquarters Core Element and the Joint Interagency Coordination Group, an effects-based approach that considers systemic behavior is a marked improvement over the traditional reductionist task-based processes.

Effects-Based Operations directs its operations toward objectives that are clearly defined and attainable, much like the Joint Operation Planning and Execution System and the Military Decision-Making Process. Rather than statements of action, however, Effects-Based Operations expresses its operational-level objectives as goals, conditions, or outcomes. Effects-Based Operations achieves these objectives by taking action on nodes to produce a behavior change in the threat system. Armed with a holistic understanding based on the Operational Net Assessment, planners connect nodes identified in the System of Systems Analysis to specific events. A node connected to an effect is a key node, and some of these may become high-payoff nodes if they

³⁹SWJ Reference.

contribute to more than one desired effect when targeted. Planners then consider specific actions that, when taken against these nodes, will produce the desired effects. Planners identify resources required for each effect-node-action linkage, completing the Effect-Node-Action-Resources (ENAR) options that can achieve the desired effects that support specific objectives.

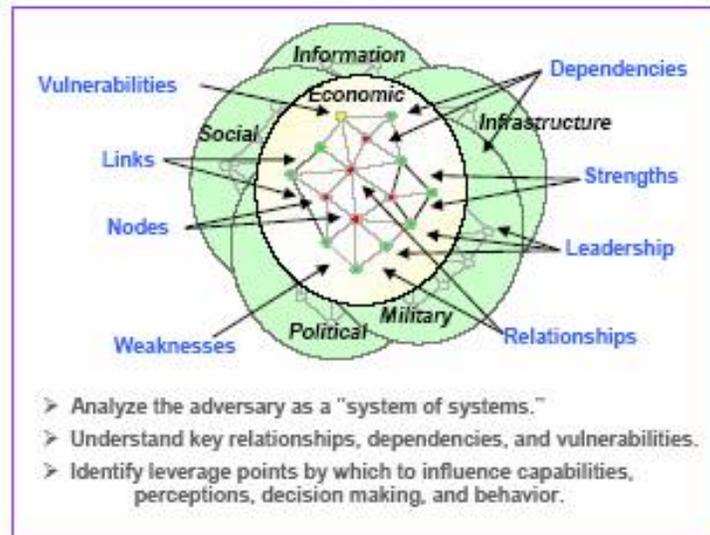


Figure 4: System of Systems Analysis

Effects-based planning consists of six major activities: end-state analysis, effects development, red and green teaming, action development and resource matching, effects-based assessment planning, and synchronization and plan refinement. End-state analysis defines the nature and scope of the problem, and identifies goals for the operation in the context of higher and subordinate commands. Effects development identifies the changes to the operational environment that are required to progress from the current situation to the desired end-state and determines the sequencing of desired effects to enable the later development and sequencing of actions. Red and Green teaming, in contrast with Intelligence Preparation of the Battlespace, does not develop an opposing threat campaign plan. Instead, it postulates threat and neutral

intentions and presents them in terms of end-states, effects and likely actions for consideration by friendly planners. Action development and resource matching develops several courses of action to achieve the desired effects and reach the desired end-state, uses wargaming to determine the best course of action to create the end-state, and determines the best combination of resources to execute the chosen course of action. Effects-based assessment planning develops effects-based assessment criteria that include Measures of Effectiveness (MOE) and Measures of Performance (MOP). Measures of Effectiveness are the criteria used to evaluate how actions have affected system behavior or capabilities. In terms of systems analysis, Measures of Effectiveness describe the intended changes to the elements or relationships within the system. Measures of Performance are the criteria used to evaluate the accomplishment of friendly actions. In terms of systems analysis, Measures of Performance describe the element and the relationship of the system that need to be observed in order to determine whether an assigned action has been completed. Synchronization and plan refinement validates and continually refines the developed plan, and synchronizes planned action and associated resources in time and space.

Effects-Based Operations relies on Operational Net Assessment and its associated System of Systems Analysis for situational awareness and understanding of the threat and the operational environment. Operational Net Assessment is the integration of people, processes, and tools that use multiple information sources and collaborative analysis to build shared knowledge of the friendly forces, the threat, and the environment. As the name implies, Operational Net Assessment focuses on the operational level. It is not a substitute for current intelligence, operations, or logistics methods. On the contrary, it supports effects-based planning and complements existing processes such as Intelligence Preparation of the Battlespace. Operational Net Assessment considers how to employ friendly instruments of power to achieve desired effects relative to the operational environment's Political, Military, Economic, Social, Information, and Infrastructure (PMESII) systems. The Operational Net Assessment process begins when the combatant commander designates a priority: specific nation, region, contingency or entity, within

the area of responsibility. The initial effort for a specific priority is to develop a System of Systems Analysis that populates the baseline Operational Net Assessment with data on Political, Military, Economic, Social, Information, and Infrastructure systems and their organization, characteristics, and relationships. Effects-Based Operations relies on the comprehensive system-of-systems understanding of the operational environment achieved through System of Systems Analysis. System of Systems Analysis is a collaborative process that continues throughout the Operational Net Assessment cycle. It views the threat as an interrelated system of Political, Military, Economic, Social, Information, and Infrastructure systems.

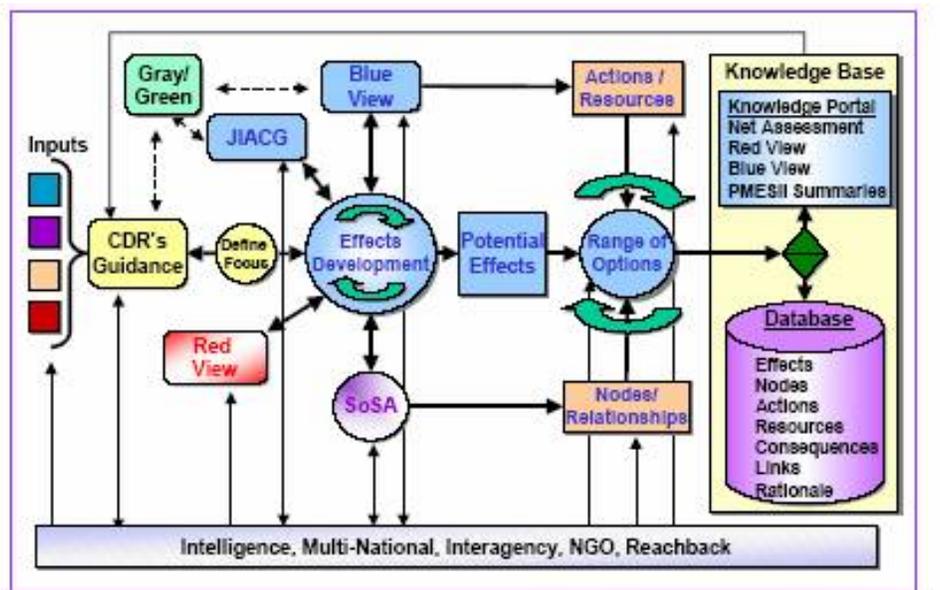


Figure 5: Operational Net Assessment Baseline

Biological Systems, Recognition-Primed Decision-Making, and Networked Organization

Effects-Based Operations reflects the second stage of systems theory, a biological view of a uni-minded system.⁴⁰ The biological thinking that led to the concept of an organization as a uni-minded system initially emerged in Germany and Britain. In contrast to the mechanistic view, uni-minded systems operate based on cybernetic principles as a homeostatic system.⁴¹ The disparate parts of a uni-minded system react in a predefined manner to events in their environment, while a single command center, such as a brain, controls the operation of a uni-minded system as a whole. Concepts based on this biological view permeate Effects-Based Operations, as demonstrated by the Effect-Node-Action-Resources process that acts on a part of the system in order to trigger the desired behavior change of the whole. The assumption that the parts will react to the events in their environment in a predictable way is one of the key tenets of Effects-Based Operations. However, most emerging threats are not centrally controlled systems, but complex adaptive systems.

Effects-Based Operations' fatal flaw may well be in its failure to determine causality in complex adaptive systems. Complex adaptive systems are systems that contain agents or populations that seek to adapt.⁴² Most complex adaptive systems have distinctive interaction patterns that are neither random nor completely structured.⁴³ Effects-Based Operations attempts to exploit these patterns of interaction by identifying and acting on key nodes, or relationships between nodes, through the Effect-Node-Action-Resources process in order to achieve a predicted change in the system. Effects-Based Operations seeks to provide the combatant

⁴⁰Gharajedaghi, 11.

⁴¹Ibid.

⁴²Robert Axelrod and Michael D. Cohen, *Harnessing Complexity* (The Free Press, 1999), 7.

⁴³Ibid., 63.

commander the ability to be more responsive and discriminating by focusing on the desired end-state behavior and the specific effects that would bring about this new behavior. The Effect-Node-Action-Resources process relies on identifying cause and effect relationships. Establishing even short-term cause and effect in a complex adaptive system is difficult due to the nature of its interactions. A system is complex that has a great many independent agents that are interacting with each other in a great many ways.⁴⁴ A system is adaptive when it responds to the interactions with its environment by undergoing spontaneous self-organization while actively seeking to turn whatever happens to its advantage.⁴⁵ Complex adaptive systems such as social systems are in a state of continuous change as new information is learned and assimilated. Effects-Based Operations seems to demand the impossible: predicting future behavior in a continually learning, changing and adapting system.

Long-term prediction of complex adaptive systemic behavior is complicated further by the inevitable rise of emergent properties. Emergent properties are properties of the whole system that the separate parts do not have. Emergence occurs as complex adaptive systems respond to environmental changes through the evolutionary process of adaptation. The system's emergent structures constantly adjust and readjust in response to input from the environment.⁴⁶ Analysts cannot understand emergent properties by examining the separate parts, so predicting which emergent structures will arise from interacting parts is impossible for all practical purposes. Additionally, taking action to produce a predicted effect ignores a complex adaptive system's sensitive dependence on initial conditions. This is the same phenomenon that makes determining long-range weather forecasting impossible.⁴⁷ Prediction requires an ability to

⁴⁴Mitchell M. Waldrop, *Complexity* (Touchstone Books, 1992), 11.

⁴⁵Ibid.

⁴⁶Ibid., 184.

⁴⁷James Gleick, *Chaos: Making a New Science* (Penguin Books, 1987), 253

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 overall effect of events can be unforeseeable if their consequences scatter unevenly through the interaction patterns within the system. In such an environment, current events can dramatically change the probabilities of many future events. Small changes in complex systems have wide ranging and unpredictable consequences that Effects-Based Operations does not consider.

Effects-Based Operations' other major drawback is that it is resource intensive in terms of personnel, technology, and time. The two organizational constructs, the Standing Joint Force Headquarters Core Element and the Joint Interagency Coordination Group, call for a considerable investment of highly trained personnel. The Collaborative Information Environment demands a significant, high-level technological capability for all of its users. Both Operational Net Assessment and System of Systems Analysis require a substantial amount of time to develop meaningful products. Clearly, another method must be used for unanticipated contingencies, austere environments that will not support the Collaborative Information Environment, or operations that require interaction with coalition partners who are not as technologically enhanced.

Nonetheless, Effects Based Operations does enable recognition primed decision-making. Recognition Primed Decision-Making incorporates both the rapid assessment of the situation and the mental course of action evaluation.⁴⁸ The development of Recognition Primed Decision-Making resulted from field research on the way experienced personnel made decisions in real-

⁴⁸Gary Klein, *Sources of Power: How People Make Decisions* (MIT Press, 1999), 24.

world settings. It explains how experience allowed the decision-makers studied to react quickly and make sound decisions without having to contrast options. Decision-makers begin by recognizing the situation as one they have some type of past experience with. 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. Effects-Based Operations' 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 a 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.⁴⁹ He calls upon prior learning to structure his new perceptions, and uses these new perceptions to advance learning in the form of theory construct and modification.⁵⁰ 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 multiples 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.⁵¹ Recognition Primed Decision-Making makes extensive use of mental simulations.⁵² Mental simulation, or mental wargaming, occurs in the initial assessment of the situation, when

⁴⁹Valerie Ahl and T. F. H. Allen, *Hierarchy Theory* (Columbia University Press, 1996), 13.

⁵⁰*Ibid.*

⁵¹Gary Klein, *Sources of Power: How People Make Decisions* (MIT Press, 1999), 21.

⁵²*Ibid.*, 89.

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. It also enables course of action evaluation by previewing how the 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, Effects Based Operations enables recognition primed decision-making for known and well-developed threats.

Effects-Based Operations moves towards a network organization and away from a focus on an organizational structure based on hierarchy at the operational level. Units and agencies that are 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.⁵³ Formal ties are less important than partnerships. Network organizations encourage information sharing and inspire innovation.⁵⁴ Unfortunately, there are several significant downsides to network organizations. The sheer amount of information able to be rapidly disseminated may actually hamper situational awareness and clear 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. This is especially likely if the components are geographically separated from each other, have no hierarchical ties, face competing priorities, and exhibit different senses of urgency. Effects-Based Operations' shift towards a network organizational structure replaces one set of communication problems with another.

⁵³Hatch, 191.

⁵⁴Ibid., 192.

Effects-Based Operations brings a crucial strength to the operational-level planning table: holistic understanding. Effects-Based Operations is holistic in that it utilizes a systems concept that is concerned with both wholes and their hierarchical arrangement, not just with the whole.⁵⁵ This systemic approach considers not just the separate components of the system, but also those properties that arise when the disparate parts come together. Looking at the entire system compensates for a key fault that lies with a reductionist, systematic approach which is “similar to trying to reassemble the fragments of a broken mirror to see a true reflection.”⁵⁶ From a very early age, Western culture teaches learning by breaking apart problems and fragmenting the world. While this process may seem to make complex tasks more manageable, there is an enormous hidden price. An understanding of how the consequences of actions impact the larger whole is lost. Effects-Based Operations attempts to remedy this problem by gathering and sharing a greater amount of knowledge, in order to inform a more holistic approach.

And thus the native hue of resolution
Is sicklied o’er with the pale cast of thought,
And enterprises of great pith and moment
With this regard their currents turn away,
And lose their name of action.

Hamlet, III, I

⁵⁵Checkland, 14.

⁵⁶Peter M. Senge, *The Fifth Discipline* (Doubleday, 1990), 3.

POTENTIAL DOCTRINE

War is not like a field of wheat, which, without regard to the individual stalk, may be mown more or less efficiently depending on the quality of the scythe; it is like a stand of mature trees in which the ax has to be used judiciously according to the characteristics and development of each individual trunk.

Clausewitz

Systemic Operational Design (SOD): A Socio-Cultural Systems Approach to Planning and Design

Systemic Operational Design (SOD) 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.⁵⁷ Neither the biological nor the mechanical models can explain the behavior of a system whose parts display a choice. The critical variable is that of 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 different environment.⁵⁸ The various interests of the purposeful parts are constantly re-aligning in relation to each other and to the whole. Multi-minded systems are information-bonded; they achieve guidance and control by agreement based on a common perception preceded by a psychological contract.⁵⁹ An example is riding a horse as opposed to driving a car. It matters to the horse who the rider is, and a proper ride can only be achieved after a series of information exchanges between the horse and rider.⁶⁰ The influence of this socio-cultural view permeates Systemic Operational Design, as evidenced by its concept of injecting energy into a multi-minded system through action in order to learn

⁵⁷Gharajedaghi, 12.

⁵⁸Ibid.

⁵⁹Ibid.

⁶⁰Ibid., 13.

more about, or discover, its purpose. Systemic Operational Design not only reflects the current stage of systems thinking, it also lays the foundation for the inevitable transition to the next stage by its emphasis on the learning organization.

The potential doctrine of Systemic Operational Design (SOD) is a process of inquiry that produces both a framework rationalizing strategic complexity and a framework for planning action in accordance with the logic of that complexity.⁶¹ The term systemic denotes Systemic Operational Design's application of system logic to operational thinking and practice. Rather than relying on certain understanding or complete information, Systemic Operational Design recognizes that uncertainty is an attribute of complex adaptive systems and addresses it through continuous reframing. Whereas Effects-Based Operations' holistic approach focuses on disrupting nodes and relationships, Systemic Operational Design focuses on transforming the relationships and interactions between entities within a system. This different emphasis allows Systemic Operational Design to develop a rationale for systemic behavior that facilitates the system's movement in accordance with the designer's aim. Systemic Operational Design uses the term operational to signify its focus on the level that synchronizes strategy and tactics. It is an attempt to rationalize complexity through systemic logic in order to translate strategic direction into operational level design. Systemic Operational Design develops concepts of operation 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 may be explained using an urban planning metaphor.⁶² The strategic sponsor is like the city government. The city government decides to initiate a project to

⁶¹Shimon Naveh, "Questions of Operational Art", (Powerpoint presentation given at the School of Advanced Military Study, Fort Leavenworth on 17 January 2006), 9.

⁶²COL Mark Inch, "SOD Primer", (Powerpoint presentation developed for the School of Advanced Military Study, Fort Leavenworth in May, 2005), 6.

achieve a specified aim. It informs the urban developer, the combatant commander, who enlists the aid an architect, or designer, to develop the concept. The discourse between the urban developer and the architect ensures that the design meets the specified aim. The design is then given to the engineer, or planner. The planner transforms the abstract concept of design into the physical logic of a plan. The planner then gives this plan to the tacticians to execute. Systemic Operational Design’s utilization of design to inform the construct of the plan makes it stand apart from both the Military Decision-Making Process and Effects-Based Operations. Design focuses on learning, while planning concentrates on action. A designer introduces new artifacts or strategies into the world.⁶³ A planner takes those new creations and adapts them to the existing situation. The designer sets the problem in context through critical questions and rigorous thought. The planner enables adaptive action to solve the problem set by the designer. Both functions are necessary, but neither is sufficient by itself. Systemic Operational Design does not replace the planning process; it incorporates the element of design to enlighten planning. Traditional operational planning approaches utilize existing templates to solve a current problem. These templates lose their validity when the threat system adapts and exhibits new emergent properties. Systemic Operational Design iteratively creates new patterns that are consistent with the unique logic of the emerging context. It adapts to the changing operational environment through its cycle of design, plan, act, and learn. Systemic Operational Design 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 is commander-centric, as “design is the prerogative of the operational commander.”⁶⁴ The commander selects members of his design team based on their

⁶³Axelrod, 19.

⁶⁴Naveh, 7.

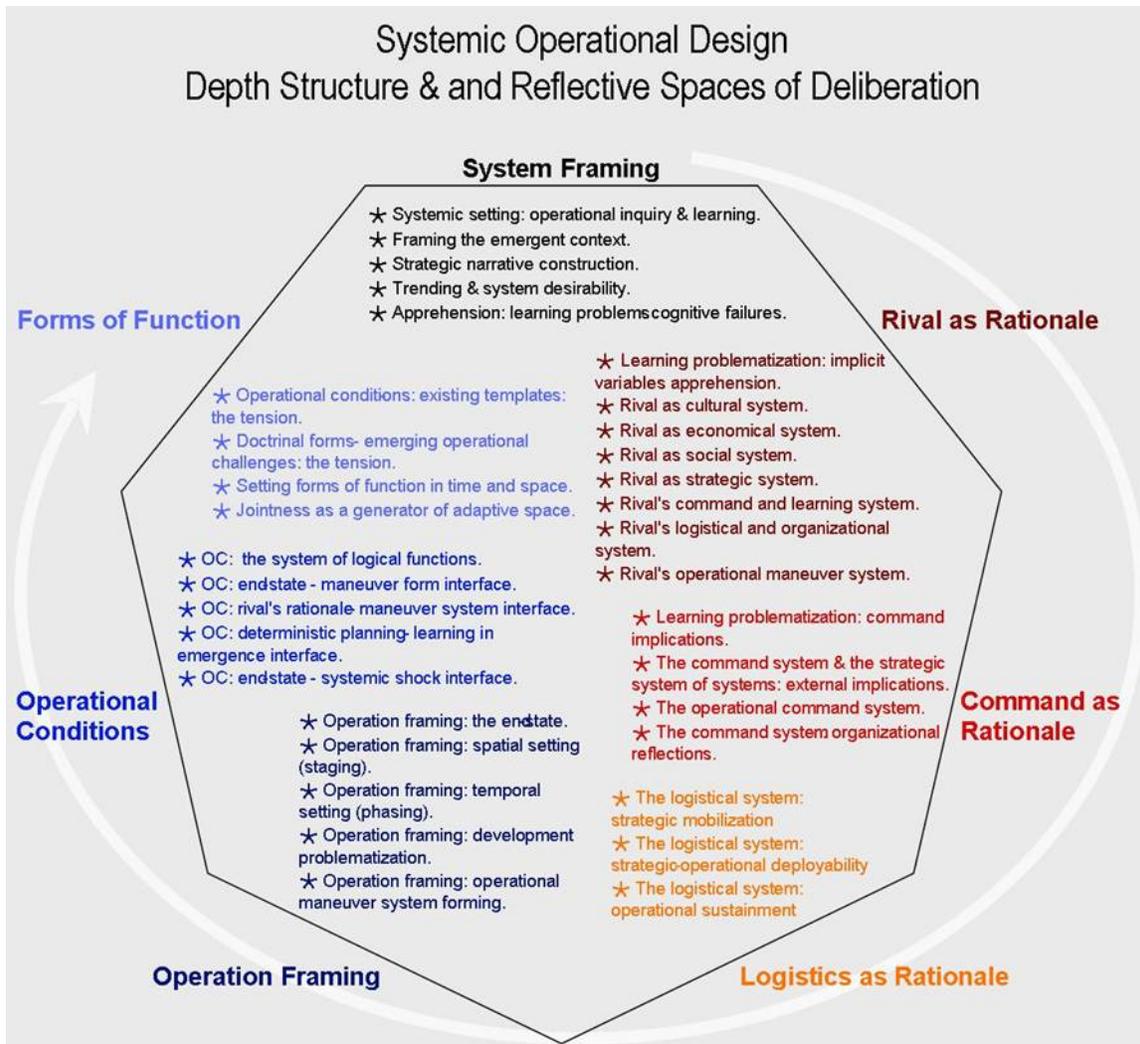


Figure 6: Systemic Operational Design Overview

ability to contribute to a rigorous discourse.⁶⁵ 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. Systemic Operational Design is composed of

⁶⁵Ibid.

seven sets of structured discourse. 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.⁶⁶ 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 seven discourses are systems framing, rival as rationale, command as rationale, logistics as rationale, operation framing, operational conditions, and forms of function.⁶⁷

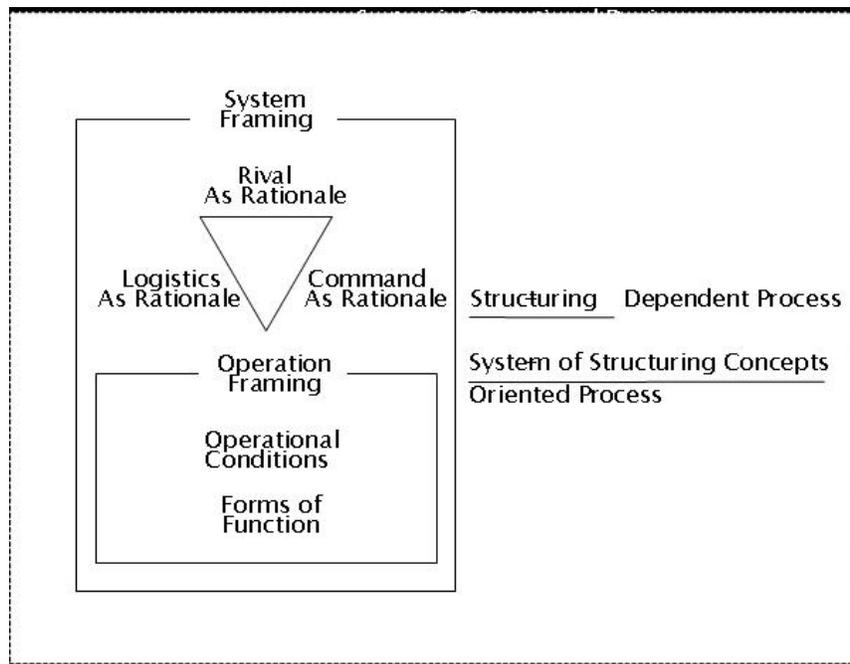


Figure 7: Systemic Operational Design Discourses

⁶⁶William T. Sorrells, et al, “Systemic Operational Design: An Introduction” Monograph (School of Advanced Military Studies AY 04/05), 22.

⁶⁷All figures related to Systemic Operational Design are taken from Shimon Naveh’s “Questions of Operational Art, December 2005.”

System framing sets the holistic plot for the design process.⁶⁸ It articulates the scope and limits of the system that the design is being formulated to address. It begins the dialectic and creates a theory that serves as a cognitive map. The cognitive map is an abstract representation of the current context. It helps make sense of the context much like a topographic map helps make sense of the terrain.⁶⁹ The scale and fidelity of the map depends on the type of operation to be conducted. Maps reflect the changes on the ground by being continually updated. Minor changes that do not alter or challenge the logic of the map can be added on the existing map. Major changes, however, necessitate the design of a new map. System framing has five sub-areas for focused examination: system setting, framing the emerging context, constructing the strategic narrative, system trending, and learning challenges. System setting examines what is new in the system that calls into question the old design and requires a new system framing. Something has emerged that is unexplained by known historical patterns of operations, and therefore was not taken into consideration when the current plan was developed. System setting explores why the emergence has occurred at this specific time, and what its implications might be for current and future operations. At this point, system setting seeks out concepts that can serve as references to help understand the new system manifestation. Framing the emerging context explores the logical trends in the emerging system and differentiates them from the previously existing trends. It attempts to explain the various implications of the differences. Constructing the strategic narrative focuses on the possible meanings of unique events and circumstances in the new context. It relates the existing relationships, power structures, functions, and organizations to the emerging ones and identifies shifts that may prove significant. System trending looks at the

⁶⁸Naveh, 11.

⁶⁹The idea of comparing cognitive maps to topographic maps came from multiple discussions with Dr. Jim Schneider, Professor of Military Theory at the School of Advanced Military Studies.

disparity between where the system seems to be headed in relation to the desired strategic end-state for the system. It highlights the conceptual obstructions and operational problems that make the strategic end-state inconsistent with the system trend. Crucially, it identifies the potential for transformation of the current system through the application of a military operation. Learning challenges identifies the knowledge gaps and cultural shortcomings that hamper understanding of the emergence and friendly learning throughout the conduct of the operation. The result of system framing is a conceptual framework that outlines the scale and scope of the system, and an understanding of the emerging context that triggered the need for the new design.

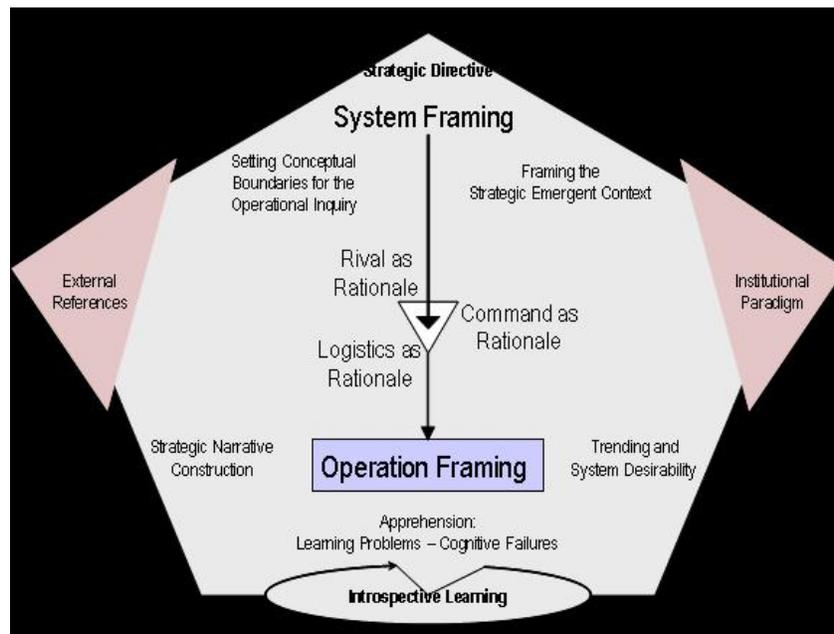


Figure 8: System Framing

Rival as rationale produces intelligence synthesis of the rival system. It examines a wide-ranging spectrum of components that interact to create the unique rival system. The rival as rationale discourse serves as the thesis in the operational dialectic, with the operation framing serving as the antithesis. Rival as rationale has seven sub-areas for focused examination: rival

learning, rival culture, rival economics, rival social system, rival strategic system, rival command and learning, rival logistics, and rival operational maneuvering system. Rival learning deals with how the differences between the rival system and the friendly system create obstacles to learning and understanding. It searches for ways in which similar obstacles have been overcome in the past. It also points out examples of past failures that arose from failures to overcome these learning impediments. It identifies the relevant actors, relationships, structures, and organizations in the rival system which will need to undergo further examination. Rival culture explores the internal and external sources of culture that combine to form the rival's current cultural system. It outlines the historical sources of cultural identity and power that inform rival strategy and tactics. It illuminates the sources of tension inherent in the rival culture and explores how who those might be exploited. Rival economics focuses on the economic dynamics of the rival system. It relates the rival's economic agenda to the rival's culture and strategy. It also identifies key economic players, institutions, and relationships that encompass the economic system. Rival social system examines the cultural trends that organize the rival's social agenda. It examines the internal sources of power of the various social groups and the primary institutions that organize the social system. Most significantly, it determines the sources of self-regulation in the rival system that will arise should the prevailing order experience disruption. Rival strategic system relates the nature of the rival's strategic character to the rival's social, economic, and cultural systems. It studies the relationships between important strategic functions and searches for vital relationship links. It examines the conditions necessary to produce tension between the rival's strategic and operational systems. Rival learning deals with how the rival system structures itself to learn and act. It searches for historical, institutional, and cultural methods of learning, and areas in which the rival system resists learning. It explores the key concepts organizing the rival's command system and the principle functions it performs. It identifies weak links in the command structure and gaps in the flow of information in order to exploit them. Rival logistics looks at how the rival system stores its potential sources of energy. It identifies the

organizational characteristics, structural composition, and vital components of the rival's logistical system. It discovers the rival's logistical components that can be deliberately exploited. Rival operational maneuvering system describes the emergent patterns of operation that qualitatively differ from the historical patterns of operation. It seeks contextual explanations for the new patterns and ways in which the patterns are vulnerable to disruption. The result of rival as rationale is an understanding of the relevant actors, vital structures, and key relationships that comprise the rival system that the design aims to counter.

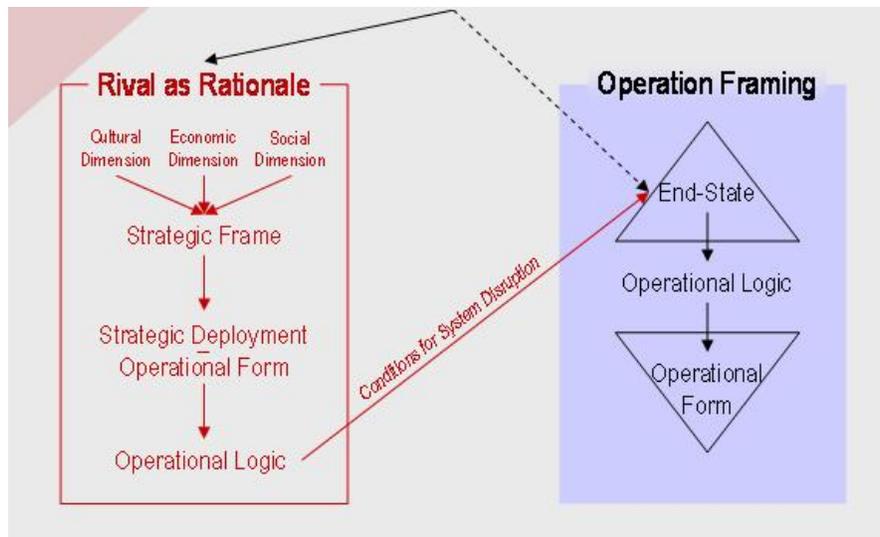


Figure 9: Rival as Rationale

Command as rationale deals with how the friendly organization learns. It attempts to overcome institutional biases and organizational learning disabilities before they interfere with the operation. It considers current command structures and determines what should be modified to suit the logic of the current system frame. Command as rationale has four sub-areas for focused examination: command learning, external command interface, the operational command system, and organizational reflections. Command learning explores what there is about the current context that challenges conventional learning practices. It investigates various references

that may assist in identifying and confronting the learning challenges posed by the emergence. Most importantly, it ensures an explicit search for emergences in the system that challenge the current design and necessitate a reframing of the system. It examines what is new that might call the existing pattern of command into question. External command interface relates the current operational command to the national command structure and to other friendly command structures. It examines strategic, coalition, sister service, inter-agency, and non-military implications that may affect operational boundaries. It also recognizes and reinforces the linkages between command relationships and operational learning. The operational command system differentiates between the command system in existence and the command system required by the operation. It outlines the ways in which the command system must learn, determines the direction information should flow, and identifies the enablers that need to be incorporated into the command structure. It ties the disparate elements of the command together in order to form a learning organization. Organizational reflections scrutinizes the hierarchical habitual command structure and the place of the operational command within that structure. It searches for potential pitfalls, conflicts, and opportunities to consider in the development of the operational command system. The result of command as rationale is a command structure that is poised both to act and to facilitate learning.

Logistics as rationale deals with storing potential energy. It examines the current logistics structure and considers whether the new design calls for changes. Logistics as rationale has three sub-areas for focused examination: Strategic mobilization, strategic-operational deployability, and operational sustainment. Strategic mobilization and strategic-operational deployment are areas of meta-logistics. They are the logistics necessary to provide logistics. Strategic mobilization considers the relations between the national strategic logistical system and the system of logistics required for the operation. It ensures that the existing logistics system provides the type of support called for by the campaign. It determines if either the campaign design or the rival system challenges the current logistical structure and boundaries, and changes

them as necessary. It also examines the unique characteristics of the campaign that may necessitate a logistical change. Strategic-operational deployability is the dimension of logistics that organizes operational time, space, and resources. It identifies the civilian infrastructure that is essential to the campaign. It recommends potential coalition support that would facilitate campaign logistics. Most importantly, it ensures that the logistics system is able to support the time and space requirements of the campaign. Operational sustainment deals with the supporting the forces on the ground. It makes certain that the concept of logistics reflects both the concept of operations and the current command structure. It also guarantees that the logistical requirements of each functional component are met. The result of logistics as rationale is an understanding of the unique challenges presented by the campaign and an identification of means by which to address them. This sets the conditions for the next discourse, operation framing.

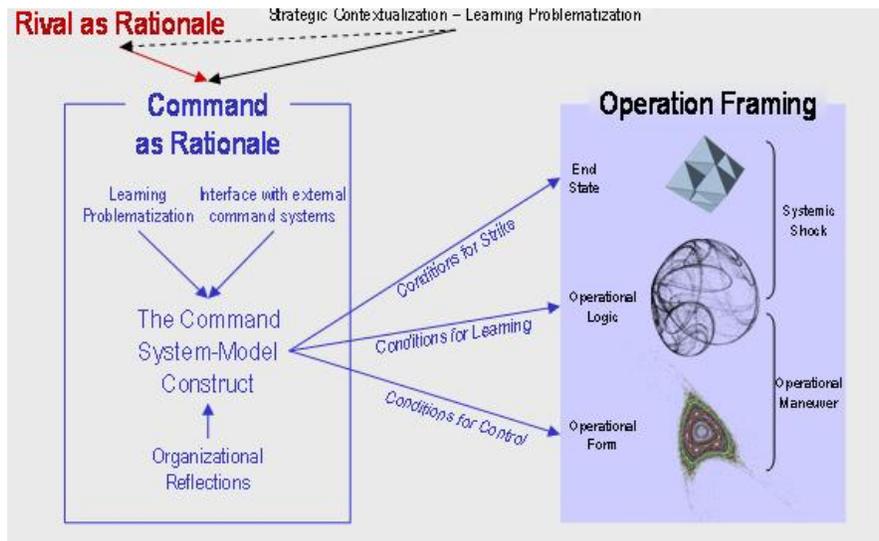


Figure 10: Command as Rationale

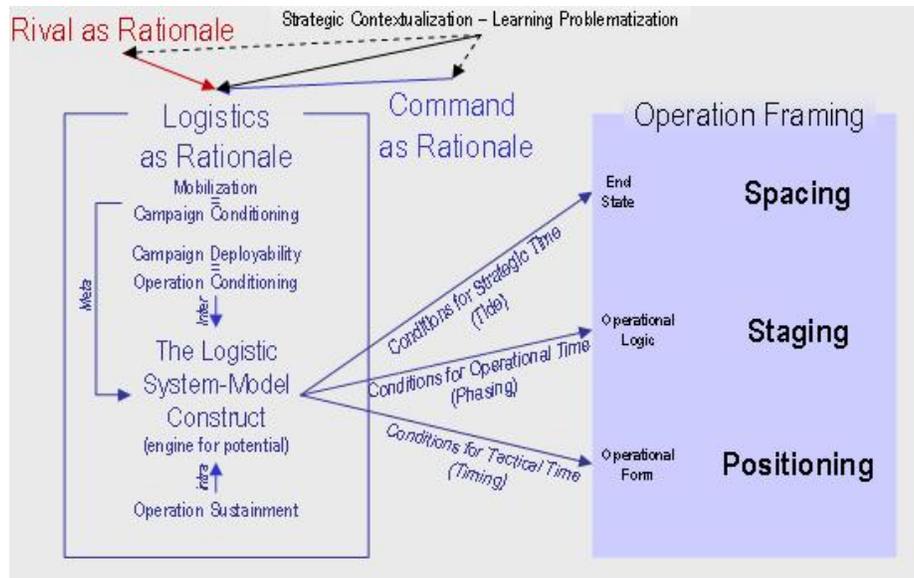


Figure 11: Logistics as Rationale

Operation framing exploits the differences and tensions within the system in order to influence the system more towards the designer’s aim.⁷⁰ Operation framing positions forces in space and time and provides a frame for key ideas on how the operation will unfold. Operation framing sets the stage for conducting action in order to learn. Acting in order to learn is neither new nor exclusive to military operations. Senior corporate executives often initiate a course of action simply to learn more about an issue.⁷¹ One of the best ways to handle uncertainty is to conduct a pre-emptive strike against it in order to shape the environment.⁷² Operation framing addresses the problem posed by the rival system. Operation framing has five sub-areas for focused examination: the end-state, spatial setting, temporal setting, problem development, and operational maneuver. The end-state postulates what the friendly forces will look like on the

⁷⁰Sorrells, 26.

⁷¹Gary Klein, *The Power of Intuition* (Doubleday, 2003), 126.

⁷²Ibid., 125.

ground once they have achieved the strategic aim. It considers the set of conditions necessary for the maneuver forces to achieve that aim. It considers factors such as the number of operations required by the campaign, gaps in knowledge and resources, and the array of functional components available and needed. It disrupts the rival system through systemic shock. Spatial setting arrays maneuver forces in space. It determines the logical operational boundaries, evaluates the applicability of internal and external lines, and ensures the spatial conditions of the end-state materialize through the campaign. Temporal setting arrays maneuver forces over time. It assesses the time conditions required in order to achieve the end-state, and examines the friction inherent between planning timelines and the timeframe in which the execution unfolds. Problem development defines the problems, limitations, and constraints that might potentially affect the operation. It is about recognizing and reducing friction. It ensures command mechanisms are in place to identify and mitigate problems as they arise. Operational maneuver transforms the plan into action, and ensures that action leads to learning. The essential element of operational maneuver is enabling friendly learning through action faster than the rival system is able to learn and act. The result of operation framing is a plan of action that disrupts the rival system, achieves its operational end-state, and furthers the strategic aim.

Operational conditions determines the operational form required to achieve the desired and necessary conditions required at each stage and at end-state. Operational conditions has five sub-areas for focused examination: logical functions, end-state – maneuver interface, rival – maneuver interface, planning – emergence interface, and end-state – systemic shock interface. Logical functions examines current doctrinal references to assess the need to deviate from them. It searches for ways to organize and shape the operation in order to achieve synergy and complementary effects. The end-state – maneuver interface ensures that the both the form of maneuver and the operational effects are conducive to achieving the desired end-state. The rival – maneuver interface focuses on ensuring that the maneuver plan will result in the rival's systemic shock. It considers how to identify an emergence in the rival system that might call into

question the logic of the maneuver plan. It also identifies those parts of the rival system with the potential for self-regulation that might prove difficult to disrupt. The planning – emergence interface deals with the difference between the abstract rival the plan was formulated to counter and the actual rival the maneuver system is facing. The rival system is an adaptive system. By the time the plan is formulated, the rival may have already changed. This part of the discourse ensures that the friendly system is proactively searching for those qualitative changes in the rival that might require a reframing or redesign. The end-state – systemic shock interface explores the possible counter-productivity of shocking the rival system and achieving the end-state. It determines the necessary conditions to accomplish both. The result of operational conditions is a plan that accomplishes the necessary effects and achieves its desired end-state through a maneuver system that is poised to learn through action and recognize emergences in the rival system.

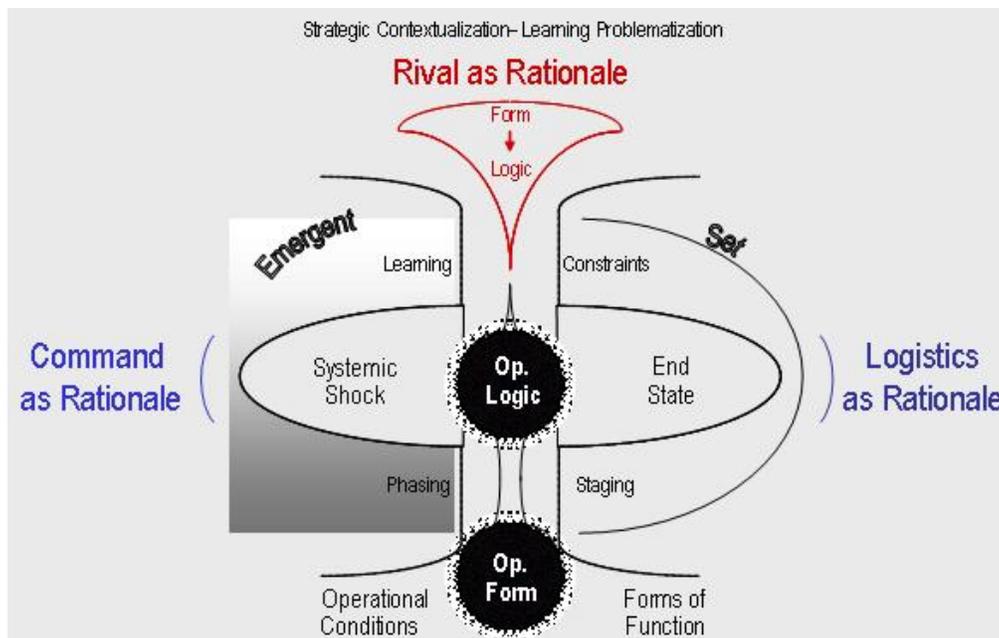


Figure 12: Operational Conditions and Forms of Functions

Forms of functions begins the transition from design to planning. It translates the established conceptual logic into physical activity in the form of tasks. It moves from the abstract to the concrete by addressing the tensions between doctrinal, historical patterns of operation and those called for by the emerging context. Forms of functions has four sub-areas for focused examination: the tension between operational conditions and existing templates, the tension between doctrinal forms and emerging operational challenges, setting forms of function in time and space, and jointness as a generator of adaptive space. The tension between operational conditions and existing templates examines how the unique characteristics of the current context may call for new patterns of operation in order to achieve the desired operational conditions. The tension between doctrinal forms and emerging operational challenges explores options outside the scope of doctrine that may be more relevant to confronting the rival system in its current form. Setting forms of function in time and space determines the best operational pattern that synergizes the effects of maneuver and non-maneuver elements in time and space. It recognizes that new patterns may be applied if previously existing ones are unsuitable. Jointness as a generator of adaptive space incorporates the sister services in the synergistic pattern of operation. The result of forms of function is a pattern of operation that combines all forces synergistically in a manner that suitably counters the current emergence.

Intuitive Team Decision-Making, and Learning Organization

Systemic Operational Design and intuitive decision-making are complementary and synergistic processes. Intuition is a natural outgrowth of experience and preparation; intuitive decision-making translates that experience into action.⁷³ The recognition-primed decision model discussed earlier is a form of intuitive decision-making that relies on the identification of familiar

⁷³Gary Klein, *The Power of Intuition* (Doubleday, 2003), 4.

patterns. Whereas Effects-Based Operations applies intuitive decision-making to recognize patterns from previous experience, Systemic Operational Design uses it to identify anomalies. It takes advantage of intuitive decision-making to identify points of departure from previous experience. Intuition is central to the recognition-primed decision model because it identifies cues and appropriate actions based on past experience. Intuition is also of great benefit when there are no discernable or familiar patterns. 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 refined sense of what is typical.⁷⁴ Intuitive decision-making uses reframing to account for deviations from expected patterns. Reframing enables the intuitive decision-maker to perceive the problem differently.⁷⁵ 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.⁷⁶ Consistent with systemic operational design, they seek to identify emergences in 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. The military planners studied used it continuously and implicitly.⁷⁷ 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.⁷⁸

⁷⁴Ibid., 104-105.

⁷⁵Ibid., 113.

⁷⁶Ibid., 107.

⁷⁷Ibid., 99. Researchers analyzing five consecutive hours of a Battle Command Training Program (BCTP) planning session identified twenty-seven distinct decision points. During only one of these points did the planners show any signs of comparing options.

⁷⁸Ibid., 4-5, Cue learning refers to the need to perceive patterns and make distinctions.

Systemic Operational Design's application of intuitive decision-making maximizes inherent human capabilities and tendencies, while mitigating human fallibilities. The emphasis is on being poised to act rather than being paralyzed by information 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.

Intuitive decision-making also recognizes the nonlinear aspects of problem solving. Traditional, linear decision-making begins by defining the problem. If the problem is ill-defined, however, the linear process stalls. Most problems that occur outside a laboratory setting are ill-defined. In order to solve an ill-defined problem, decision-makers have to clarify the goal even as they are trying to achieve it. The goal will not remain constant. Systemic Operational Design addresses goal definition through its iterative, recursive discourses.

Systemic Operational Design acknowledges that uncertainty is a battlefield constant and calls for continuous reframing. Its approach anticipates the threat opponent's adaptation and plans for self-adaptation. Systemic Operational Design values flexibility in order to learn and adapt more quickly than the threat through a process of inquiry that never ends. Its forward approach makes it more relevant in the joint operating environment. Forward planning begins with the present conditions, lays out potential decisions and actions forward in time, and identifies the next feasible step that best approaches the established aim. Forward planning focuses on what is feasible in the relatively short term. The envisioned end-state serves as a distant and general aiming point rather than as a specific objective. This is opposed to a reverse planning process which is end-state driven. Reverse planning focuses on a specific end-state determined at the beginning of the planning process. Forward planning is the more natural because it is consistent with the direction time moves and the way humans act.

Systemic Operational Design recognizes that logic is the key to achieving the multiples levels of explanation required for understanding the framed system. An abstract

conceptualization of a system requires several levels of explanation. The explanation of each level must be consistent with the logic inherent at that level. For example, in the hierarchical classification: animal-carnivore-dog-Spot, each branch of the hierarchy represents a change of logical type.⁷⁹ Spot, the individual dog, is a different logical type than dog in general, which is a different logical type than carnivore. However, both carnivore and herbivore are of the same logical type, classified by the same criterion of diet.⁸⁰ An individual man named Mohammed is a different logical type than a Saudi man in general, which is a different logical type than a Sunni, which is a different logical type than a Wahabist. Explanations that would be relevant at the individual level may not be valid, or may even be at variance with, explanations at a different level. Tolerance for multiple levels of explanation is at odd with reductionism, but necessary for systemic understanding.

While Systemic Operational Design utilizes intuition, it also recognizes that intuition is fallible. This is where the power of the team comes in. Teams prevent overconfidence and the tendency to irrationally support a plan one develops. The development of team decision-making has four features: team competence, team identity, team cognition, and team meta-cognition.⁸¹ In order for the team mind to develop, the team must be familiar with the competency level of the individual team members. The team must then move past individual performance and think of the team's requirements as much as each individual's requirements. The team identity requires time to develop. Teams that have not sufficiently developed their identity will be confused about roles and functions, and work together less efficiently. The team then develops team cognition through shared situational understanding. Finally, the team achieves the level of meta-cognition,

⁷⁹Ahl and Allen, 23.

⁸⁰Ibid.

⁸¹Gary Klein, *Sources of Power* (MIT Press, 1999), 240-248. These four features are presented and described by Klein in his Advanced Team Decision-Making Model.

or the ability to think about the way it thinks. The ability to manage the flow of ideas is one of the team's most essential skills. A team with the four features of advanced team decision-making has the power to create new and unanticipated options. It is able to draw on the experience of all the team members to generate products beyond the abilities of any of its individual members. Systemic Operational Design fosters advanced team decision-making through its discourses. Systemic Operational Design makes extensive use of the dialectic during discourse. For ill-structured problems involving a number of people the very idea of a problem which can be solved has to be replaced with a dialectical debate, by the idea of problem-solving as a continuous, never-ending process, but one which can be aided, and orchestrated, by the application of systems ideas, particularly that of a human activity system.⁸² Dialectic is a form of reasoning developed in ancient Greece that proceeds by question and answer.⁸³ It is a process of investigation through dialogue. It involves the exchange of theses and antitheses, resulting in a synthesis that leads to truer understanding of the opposing assertions.

The best setting for advanced team decision-making is a learning organization. A learning organization embraces the cycle of thinking, doing, evaluation and reflecting that produces valid learning.⁸⁴ Some of the characteristics of a learning organization include an environment where individuals continually expand their capacity to create, where new and expansive patterns of thinking are nurtured, and where individuals are continually learning how to learn together, resulting in the ability to learn faster than their competitor.⁸⁵ There are five disciplines in a learning organization: systems thinking, personal mastery, mental modeling, building shared

⁸²Checkland, 18.

⁸³Ted Honderich, *The Oxford Companion to Philosophy* (Oxford, 1995), 198.

⁸⁴Senge, 351.

⁸⁵*Ibid.*, 3-4.

vision, and team learning.⁸⁶ Systems thinking considers the whole and the inter-relatedness of its parts. Personal mastery is reflected in a commitment to continuous learning. Mental models are deeply ingrained assumptions about how each individual understands the world, which the learning organization brings to the surface and challenges. Building shared vision involves fostering genuine commitment and enthusiasm rather than compliance. Team learning utilizes dialogue to enhance the capacity of members of a team to suspend assumptions and enter into a genuine thinking together. Each of the five learning disciplines occurs on one of three distinct levels: practices, principles, and essences.⁸⁷ Practices denote what you do. They are the activities in which practitioners spend most of their time and energy. They are the most evident aspect of any discipline and where the novice focuses. Practices are evidence of learning, since it is at this level where behavior occurs. Systemic Operational Design practices are exemplified by its seven structured discourses. Principles signify guiding ideas and insights. They are the foundation of underlying theory on which practices rest. Understanding the principles behind the discipline is important to both the novice and the master. They help the novice appreciate the rationale behind the practice and serve as points of reference for the master. Two of the underlying principles of Systemic Operational Design are holism and indeterminism. Essences indicate the state of being of those with high levels of mastery in the discipline. The five disciplines become interconnected and begin to converge at this level. The disciplines will reinforce each other collaboratively throughout the execution of Systemic Operational Design as both individuals and teams gain more experience.

Systemic Operational Design gains and maintains the cognitive initiative by being able to adapt to the threat, which is both more important and more operationally relevant than being able

⁸⁶Ibid., 6-11 Senge introduces and describes the five disciplines of the learning organization in Chapter One, and refers to them throughout his book.

⁸⁷Ibid., 372-374. Senge discusses the three levels on which the five learning disciplines occur in Appendix 1.

to predict the threat. Systemic Operational Design differs from traditional approaches by harnessing the concept of emergence to drive the learning process. By actively searching for emergences, Systemic Operational Design provides a mechanism for the organization to adapt to the constantly changing operating environment. Systemic Operational Design regards the utilization of force not only as a means to shape the operational environment and battlespace, but 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.⁸⁸

On s'engage et puis on voit!

Napoleon

⁸⁸Naveh, 14.

CONCLUSION

Chance favors the prepared eye.

Louis Pasteur

The Military Decision-Making Process (MDMP) and Intelligence Preparation of the Battlespace (IPB) remain the most suitable of the approaches at the tactical level. In accordance with the original intent of their creation, they deal well with the physical reality of tactics, and threats that follow rigid and mechanistic doctrine. They are reductionist processes that are appropriate in hierarchical organizations and in situations where compliance is more important than time-consuming discourse. They are insufficient, however, as they are extrapolated upwards into operational planning for the contemporary operational environment. They lack the element of design. The operational level deals with more than just the physical enemy. It deals with concepts and abstractions. The decisiveness required at the tactical level becomes a liability at the operational level, where time is needed to consider the multiple and varied implications of any action, or inaction. In order for the Military Decision-Making Process and Intelligence Preparation of the Battlespace to function at the operational level, a coherent process of design should inform them.

Effects-Based Operations (EBO) is clearly intended for the operational level. It introduces a holistic approach to deal with the challenges of the contemporary operational environment. It views the threat as a system of systems, recognizes the importance of relationships as well as nodes, and considers the entire range of elements of national power in order to affect the threat system. By attempting to change system behavior rather than simply accomplish discrete tasks, it rises out of the physical realm and into the realm of abstraction. Through its Operational Net Assessment (ONA) and System of Systems Analysis (SoSA), Effects-Based Operations pioneers the first systemic, rather than systematic, methods of studying and understanding threats in their environment and context. Its Collaborative Information Environment (CIE) enables operational decision-makers by making more information available

about the threat system. Effects-Based Operations' two organizational constructs, the Standing Joint Force Headquarters Core Element and the Joint Interagency Coordination Group, ensure that operations are integrated across the diplomatic, information, military and economic aspects. Much like the Military Decision-Making Process and Intelligence Preparation of the Battlefield, Effects-Based Operations lacks an explicit method of producing a design. Although Effects-Based Operations is the first holistic approach to be created for the operational level, it is not the best.

Systemic Operational Design accomplishes both operational design and planning. The discourses of system framing, rival as rationale, command as rationale, and logistics as rationale deal with concepts and abstractions . . . the design. Operation framing begins the translation of the abstract to the physical, in order to deal with the reality on the ground . . . the plan. The final two discourses, operational conditions and forms of functions, are more akin to traditional planning. Once the design has been developed, planning takes over. Redesign only occurs if something new emerges in the system that calls into the question the original logic of the design. The insurgency in Iraq would be an example of an emergence that called into question the original logic of a campaign design. Systemic Operational Design does not seek to attain perfect knowledge. It strives for useful and timely understanding. It emphasizes developing a conceptualization of the system that provides a sound basis for action and learning. This conceptualization addresses why the system is the way it is today, how the system will self-regulate or resist attempts to change it, and what aspects of it have the potential to escalate both positively and negatively. It is not reasonable to expect that designers will develop a completely correct conceptualization of a system that is constantly changing by its very nature, but it is also not necessary. It is vital, however, that it be useful for learning about the system so that successive conceptualizations are more right and more useful. Systemic Operational Design injects energy into a system in order to move it closer to the desired aim. It recognizes that the system will continually change and adapt, not just in response to friendly actions, but also in

response to the rest of its environment. It is not a passive approach and does not see intellectual effort as a waste of time. It does call for a consideration of whether the effort should be at the level of planning, or the level of design. The discreet element of design is fundamental at the operational level and a model explicitly addressing design, as Systemic Operational Design does, should stand out in military doctrine.

When I took a decision, or adopted an alternative, it was after studying every relevant — and many an irrelevant — factor. Geography, tribal structure, religion, social customs, language, appetites, standards — all were at my finger-ends. The enemy I knew almost like my own side. I risked myself among them a hundred times, to learn.

Colonel T.E. Lawrence
Letter to Liddell Hart, 26 June 1933

RECOMMENDATION: A FUSION MODEL

Systemic Operational Design fills a void in both current and emerging doctrine. It explicitly incorporates design. Although current doctrine specifies elements of operational design, it does not provide a method to coherently develop them or integrate them into a plan. There are sixteen fundamental elements of operational design: synergy, simultaneity and depth, anticipation, leverage, timing and tempo, operational reach, forces and functions, balance, systems perspective of the operational environment, lines of operation, arranging operations, centers of gravity, direct versus indirect, decisive points, culmination, and termination.⁸⁹ Five additional systemic elements of operational design should be: learning, emergence, self-regulation, shock, and adaptation. These elements of operational design should be developed and integrated into planning using a model that fuses Systemic Operational Design with the Military Decision-Making Process. The advantages which Effects-Based Operations offers are already inherent in Systemic Operational Design, without any of its disadvantages. Systemic Operational Design complements the advantages of the Military Decision-Making Process, while it offsets its disadvantages. Therefore, a model that fuses Systemic Operational Design with the Military Decision-Making Process appears to be the best approach.

Operational level commanders should form and train a Design Team. The Design Team, selected by the commander, should consist of four to six staff officers who are experienced at the operational level, trained in systems theory, open to egalitarian discourse, and able to work well as a member of a team. The Design Team should begin by using the Questions of Operational Art listed in Appendix 1, with all of their complex language, as the primary guide through the discourses. Once the Design Team has gained experience through extensive practice, their first

⁸⁹Chairman of the Joint Chiefs of Staff. *Joint Publication 5-0, Draft Doctrine for Joint Planning Operations, 3rd Revision* (U.S. Government Printing Office, 2005), IV-6.

priority should be to translate the language of the questions into a more universally understandable format, without losing any of their original meaning. The Design Team must ensure that the products given to the planners are understandable to them.

The discourses of System Framing, Rival as Rationale, Command as Rationale, and Logistics as Rationale deal with the concepts and abstractions implicit in design. The first discourse, System Framing, rationalizes the strategic directives in broad context and relates them to the current situation being examined. It requires the Design Team to study what has changed in the system that triggered the need for a strategic directive to take action. System Framing delineates the area of interest (AI), and produces a system frame diagram and an accompanying narrative. It begins with a presentation by the J2/G2 of the current understanding of the threat situation. While this presentation might be extensive for well-known and anticipated threats such as north Korea, it might be very austere for unexpected threats or military contingencies such as JTF Katrina. Through the course of the System Framing discourse, several elements of operational design will be addressed as appropriate to the current context. These are the systems perspective of the operational environment, anticipation (trending), leverage, and centers of gravity. Either the Questions of Operational Art or a refined version of them guides the discourse, while the system diagram captures it visually. The system diagram shows the various agents and their relationships within the system. The Design Team identifies relationships whose transformation would produce a more desirable system trend. It also identifies points of leverage where energy might be injected into the system to initiate the desired transformation. An effective method for capturing the system diagram is using a dry erase board. Designers can make changes easily without wasting a great deal of time and effort. Once it becomes a digital product, it tends to cease being a useful and adjustable tool. Writing the narrative is more difficult than drawing the system diagram. The person typing the narrative focuses primarily on capturing the discourse, not participating in it. A trained recorder should type the discourse as it occurs, organize and summarize it at the end of the discourse, and present it for revision by the

Design Team before the next discourse begins. Designers update both the system diagram and the narrative continually throughout the remaining discourses.

The next three discourses, Rival as Rationale, Command as Rationale, and Logistics as Rationale, result in an initial area of operation (AO) and a composite diagram that displays the logic behind selecting the area of operation's scope and boundaries. Rival as Rationale produces the initial Intelligence Estimate during the first design, and the running Intelligence Estimates for each redesign. Each space of deliberation in the Rival as Rational becomes a section of the Intelligence Estimate, with adjustments and additions made in accordance with the specific context. Since the situation for every operation will be different, each Intelligence Estimate should be different as well. The spaces of deliberation for Rival as Rationale incorporate Effects-Based Operations' Political, Military, Economic, Social, Information, and Infrastructure (PMESII) elements. They also provide the threat trending and logic that informs Intelligence Preparation of the Battlespace. Nothing is lost by using the Rival as Rationale method, and much is gained. Rival as Rationale explores the learning challenges and implications of the threat culture up front, so that they inform each subsequent deliberation. The Command as Rationale discourse produces the Commander's Learning Estimate that addresses learning challenges and their command implications. The Logistics as Rationale generates the initial Logistics Estimate that incorporates strategic mobilization, strategic and operational deployability, and operational sustainment. The completion of these three discourses produces an initial area of operations that may be further refined through Operation Framing.

Operation Framing begins to translate the design produced by the previous discourses into a plan. Operation Framing produces the Operations Estimate that addresses synergy, simultaneity and depth, timing and tempo, operational reach, internal and external lines of operation, forces and functions, self-regulation, shock, culmination, and termination. The figure below is a sketch of the how the spaces of deliberation for Operation Framing might combine to produce a concept of operation.

context of the other desired trends. The relationships to be transformed drive the development of logical lines of operation.

The Forms of Functions discourse replicates what the Military Decision-Making Process already produces, and is therefore superfluous. The Design Team delivers the design to the planners in written format via the narrative and estimates, visually through the system diagram and composite Rival as Rationale, Command as Rationale, and Logistics as Rationale diagram, and verbally through a formal presentation. The planners then begin Mission Analysis and continue through the Military Decision-Making Process to produce the operations order (OPORD). The Design Team assists the planners as necessary, maintains situational awareness, continually updates the system frame, and actively seeks signs of an emergence that might call into question the logic of their design. If this occurs, the Design Team initiates a redesign that will inform a subsequent Military Decision-Making Process session and results in a fragmentary order (FRAGO).

By using this Fusion Model, the powerful concepts of Systemic Operational Design provide a framework to develop and integrate the elements of operational design so that they more effectively inform the planning process. The Fusion Model is not the final answer. It might, however, serve as the starting point for a dialectic whose resulting synthesis might produce a better answer.

Appendix 1: Questions of Operational Art⁹⁰

System Framing

System Setting: Operational Inquiry and Learning

1. What is new or different in the emerging context in relation to the prevailing conceptual system and institutional paradigm?
2. What are the factors determining the need for a rigorous examination of the "propensity of things", and a critical study of the "flow of reality"?
3. What are the generators of tension between the traditional political discourse and the relevant "strategic shift"?
4. What are relations between the prevailing cultural, economic, and social discourses and the perception of the emerging system?
5. What are the strategic episodes and operational experiments that are relevant (can serve as a reference) to the rationalization of the emerging context?
6. Which conceptual materials can promote a critical inquiry of the emergent context?
7. What are the concepts that can serve as a referential framework for an ingenious investigation of the emergence?
8. Which dimensions in the strategic directive provide orientation to the systemic interpretation of the emergence?
9. What are the concepts that organize the perception of time in the emerging context?
10. What are the concepts that organize the perception of space in the emerging context?
11. What are the circumstantial components implying changes in forms of warfare?
12. Framing the Emerging Context
13. What are the determinants of the logical trends in the emerging system?
14. What is the difference between the emerging context and "other contexts" that have been investigated and experimented?
15. What are the various implications of this difference?

Strategic Narrative Construction

1. Which constituting events determine the uniqueness of the context?
2. Which circumstantial developments have constituted the current strategic constellation?
3. Which circumstantial details can be interpreted as systemic patterns (patterns of events)?
4. Who are the key strategic actors in the emerging context?
5. What are the relations between the various power ensembles in the emerging system?
6. Which logical trends associate these actors into a strategic system?
7. What are the functional combinations that define the logical trends in the emerging system?

⁹⁰Shimon Naveh, "Questions of Operational Art", (presentation given at the School of Advanced Military Study, Fort Leavenworth on 17 January 2006), 1-31.

Trending and System Desirability

1. What is the disparity between the strategic realization of the emergence and the strategic anticipation of a desired future reality?
2. What are the implications derived from a critical examination of the strategic directive in the emerging reality?
3. What are the external sources of legitimacy for a military operation in the current system?
4. What are the internal sources of legitimacy for a military operation in the current system?
5. What are the external sources of opposition to a military operation in the current emergence?
6. What are the internal sources of opposition to a military operation in the current emergence?
7. What are the principal conceptual obstructions and operational problems impairing the implementation of the logic indicated by the strategic directive?
8. What is the potential for transformation of the current system through the application of a military operation?

Apprehension: learning problems – cognitive failures

1. What are the knowledge gaps and conceptual lacunae that may hamper both our contextual inquiry and our learning in the course of the operation direction?
2. What are the conceptual and cognitive implications one derives from the exploration of the logical difference between the institutional paradigm and the emerging strategic context?
3. What are the logical tensions between the emergent system and the general political discourse?
4. Which contextual circumstantial characteristics may affect our system framing?
5. What are the implicit dimensions in the system, and what are the approaches that will enable their exploration?
6. What are the conceptual challenges that entail explicit revision and specific adjustment of the design process?

Rival as Rationale – Intelligence Synthesis

Learning Problematization: Implicit Variables Apprehension

1. How does the realization of the cultural "otherness" affect strategic learning, systemic thinking, and operational action?
2. What are the conceptual references for the inquiry of the rival in the emergent context?
3. What are the conditions for comprehending the implicit components in the rival system? What are the cognitive obstruction impairing their exploration?
4. Which implicit (known unknown) components in the rival system imply systemic learning through the application of operational maneuver in the course of the strategic campaign?
5. What are the indications that differentiate the functioning of the rival in the emergent system in relation to his functioning in the past?
6. What is the depth structure organizing the conception of the rival as a system?
7. What are the conceptual conditions for understanding the determinants of the "logical order" of the rival system?
8. Which conditions can free us from the prejudices and biases that impair our ability to appreciate the rival's strategic otherness and its operational implications?
9. What are the state actors and political factors that constitute the functional components in the rival system?

The Rival as Cultural System

1. What are the cultural functions that the rival system comprises of?
2. What are the cultural sources of the rival system's logic in the present?
3. Which of these sources derive from "external import", and which originate from "local production"?
4. What are the conceptual landmarks in the evolution of the rival's cultural discourses?
5. What are the cultural sources of the rival's "otherness"?
6. What are the cultural sources of the rival system's strategy?
7. What are the key components in the rival's institutional discourse?
8. What are the cultural tensions in the logical structure of the rival as a system?
9. What are the "cultural shapers" of the rival's conceptual system?
10. What are the cultural characteristics of the rival's perception of space?
11. What are the cultural characteristics of the rival's perception of time?
12. What is the "cultural code" of the rival as a system?
13. What are the cultural sources of the rival's warfare praxis (perception and practice)?
14. What is the evolutionary structure of the rival's cultural discourse, and how does it affect the prevailing cultural trends in the present?
15. What are the landmarks in the development of the rival's cultural discourse?
16. What are the relations between the development of the rival's cultural discourse and his strategic discourse?
17. What are the cultural elements that influence the rival's current strategic conception?
18. What are the cultural sources of the rival's argumentation for legitimacy, whether he is state entity or a non-state entity?
19. What are the relations between history, strategy, and constitution in the rival's cultural system?
20. What are the principal characteristics of the "difference" between the cultural system of the rival and our cultural system?

The Rival as Economical System

1. What are the principal characteristics of the rival system's economic dynamics?
2. Which cultural trends determine the rival system's economic agenda?
3. What are the characteristics of the rival system's economic food chain?
4. What is the structure of the security nets of the rival system's welfare complexes?
5. What are the external elements upon which the rival system depends economically?
6. What are the capital and human resources of the rival entity?
7. What commodities and services does the rival entity produce, and who are its clients?
8. In which markets does the rival entity constitute an active and significant player?
9. Who are the leading competitors of the rival entity in each of the markets?
10. What are the sources of strength and weakness of the rival's economic system?
11. What are the logical tensions and interdependences between the rival's and our own economic systems?
12. What are the principal strategic implications one can deduce from the conceptualization of the rival entity as economic system?

The Rival as a Social System

1. What are the cultural trends that organize the social agenda of the rival system?
2. Which economic components are reflected in social dynamics of the rival, or what are the tensions between the economic and social dimensions of the rival system?
3. What are the logical sources organizing the prevailing social order of the rival system?
4. What are the power groups that compete over control of the social order of the rival system?

5. What are the characteristics of the group discourse of each of these competitors?
6. What are the tensions between discourse of the various power groups and the national discourse of the state? How do these tensions evolve in the collective history? And, how do these evolutions affect the current state of affairs?
7. What is the social embodiment of the relations between history, strategy, and constitution in the rival system?
8. What are the sources of legitimacy of both, the various power groups, and the depth structure of the rival's social system?
9. What "war machines" (subversive entities) are built-in the state system of the rival?
10. What is the nature of the relations between the state-apparatus and the various power groups in the rival system?
11. From which external sources do the various power groups derive their relative strength?
12. What are the internal sources of physical, conceptual, ideological, and spiritual strength of the various power groups in the rival system?
13. What are the primary institutions organizing the social system of the rival entity?
14. What is the cement that glues the rival social system into an organizational super-structure?
15. What are the conditions that will preserve the current super structure of the rival social system?
16. What are the "strong seams" and "weak seams" in the rival's social system?
17. What are the implicit variables in rival's social system, and what are the means for their disclosure?
18. What are the pragmatic reflections of the rival's social system in his defense establishment, military complex, security organs, and militant organizations?
19. What are the sources of self-regulation in the rival system in the case that the prevailing order is disrupted?

The Rival as a Strategic System

1. What are the strategic functions comprising the rival as a system?
2. What is the organizing logic of the various strategic functions of the rival system?
3. What are the nature of the relations and the character of the strategic linkages between the various functions in the rival system?
4. What are the sources of cultural logic of the rival's strategic discourse?
5. What are the institutional reflections of the rival's social system in his strategic discourse?
6. What are the tensions between the rival's economic system and his strategic system?
7. What are the strategic implications of the cultural difference between one's own system and that of the rival?
8. What is the structure of tensions and balances in the rival's strategic system?
9. What are the implicit variables in the rival's strategic system, and what are the means and methods for their disclosure?
10. What are the historical landmarks in the evolution of the rival's strategic discourse?
11. What are the political events and institutional memories that shape the rival's strategic discourse at the present time?
12. What are the logical determinants of the rival's strategic agenda?
13. What are the spatial embodiments of the rival system's strategy?
14. What are the relations between the rival's strategy and his perception of time?
15. What are the sources of the rival system's strategic strength?
16. What are the sources of the rival system's strategic weakness?
17. What are the tensions between the rival's strategic system and our comprehension of the logic embodied in the strategic directive?
18. What are the strategic conditions for the disruption of the rival as system?

19. What are the conditions for a deliberate infliction of a discrepancy between the rival's strategic logic and his operational functioning?

The Rival Command and Learning System

1. What are the organizing logic and structural characteristics of the rival's institutional learning system?
2. What are the cultural sources of the rival's institutional form of learning?
3. What are the conceptual roots of the rival's command system structure and the forms of his operational functioning?
4. What are the key concepts organizing the command system of the rival?
5. What are the principal functions of the rival's command system, and how is this observation reflected in the detailed manning of the various functional positions?
6. How are the interpersonal tensions in the rivals' command system reflected in the routine functioning?
7. What are the functional logic and organizational structure of the rival's command system?
8. What are the tensions between the strategic logic of the rival as a system, his operational organization, and his form of command?
9. How does the rival's form of strategic deployment reflect the rationale of his command system?
10. What are the strong links in the rival's systemic chain of command?
11. What are the weak or missing links in the rival's systemic chain of command?
12. What are the operational conditions for disrupting the functioning of the rival's command system?
13. What are the operational conditions for disrupting the rival's institutional learning system?
14. What are the implicit variables in the rival's command system and what are the methods enabling their disclosure?
15. What are the landmarks in the evolution of the rival's command system?
16. What are the elements of self-regulation in the rival's command system in case that its functioning is being disrupted?

The Rival's Logistical and Organizational System

1. What are the cultural foundations, demographic basis, economical sources, and technological roots of the logistical organization of the rival as a system?
2. What are the organizing logic and structural characteristics of the rival's logistical system?
3. What are the essential functions in the rival's logistical system, and what is the nature of their relations?
4. What are the sources of strength of the rival logistical network?
5. What are the sensitive seams or systemic vulnerabilities of the rival's logistical network?
6. How is the rival's logistical logic manifested in his strategic deployment and systemic organization?
7. What are the characteristics of relations between the rival's economical system and his military logistical system?
8. How are the rival's principal strategic insights reflected in the organization of his logistical system?
9. What is the nature of the relations between the logic and structure of the rival national/strategic logistics and those of his operational logistics?
10. What are the strategic sources of the rival's logistical redundancy?
11. What are the implicit variables in the rival's logistical system?
12. What are the keys to the disruption of the rival's logistical system?

13. What are the elements of self-regulation in the rival's logistical system in case that its functioning order is being disrupted?
14. What are the logistical components in the rivals' system that can be deliberately exploited in favor of our operational maneuvering system?

The Rival's Operational Maneuvering System

1. What are the novel patterns that we observe in the operational behavior of the rival as a system of maneuver in the current emergence?
2. What are the contextual explanations rationalizing these novelties?
3. How is the rival's strategic logic reflected in his operational organization, and in the deployment of his fighting resources in space?
4. What are the cultural sources of the rival's operational perception?
5. What are the cultural sources of the rival's operational "otherness", and what are the systemic implications of this observation?
6. What is the evolutionary structure of the rival's operational discourse, and what is the historical structure of the development of his operational doctrine?
7. What are the principal concepts in the rival's prevailing operational discourse?
8. What are the key functions in the rival's operational maneuvering system?
9. Which of these functions may affect the materialization of our strategic directive?
10. How does the spatial organization of the rival's maneuvering system reflect the systemic relations between his operational functions?
11. What are the logical foundations of the structure of the rival's operational deployment in space?
12. What are the operational sources of strength of the rival maneuvering system?
13. What are the operational sources of weakness and systemic vulnerabilities of the rival maneuvering system?
14. What are the formal characteristics of the rival's maneuvering system?
15. What are the principal components that enable the development of the rival's maneuver form in time and space?
16. What are the logical elements of the rival's maneuvering system that lack a formal signature, and what is the operational method for uncovering them?
17. What are the implicit variables in the rival maneuvering system, and what are the methods for their disclosure?
18. What are the logical implications one can draw from the rival's form of maneuver?
19. What are the operational conditions for the disruption of the rival maneuvering system?

Command as Rationale

Learning Problematization – Command Implications

1. What are the contextual cultural tensions that imply a critical rethinking of our learning process, heuristics definitions, and command arrangements?
2. What are the unique political and strategic circumstances that imply the need for a critical review of the prevailing command paradigm?
3. What are the sources of conceptual ambiguity in the relevant strategic context?
4. What are the institutional and external references (both experimental-historical and theoretical-doctrinal) that can support the critical observation of the difference between the prevailing command paradigm and the learning challenges implied by the emergence?
5. What are the methods of inquiry and organizational arrangements enabling the command system to disperse the conceptual ambiguity and produce vital insights in the course of the operation direction?
6. What are the unique (contextual) systemic problems that our operational inquiry must focus upon?

7. What are the systemic problems that we are capable of "setting" in the course of the design process, and the setting of which problematic issues will be enabled through the application of forces and resources in the course of the operational direction?
8. The investigation and treatment of which systemic problems imply a concrete assignment of operational command agents external to the existing framework of command arrangements?
9. What are the potential sources for evolving operational misperceptions (friction) in course of the preparations for the operation and in the course of its direction?
10. Which command conditions can settle the conceptual tension between the system framing (problem setting framework) and the operation framing (problem solving working-frame)?
11. What are the weak links we observe in the existing command system as a result of the system framing?
12. What are the command implications of the rationalization of the rival as a learning-adaptive system?
13. What are the open questions that will be investigated in the course of the operation, through the systemic discourse between the relevant command agents functioning in the various functioning environments?
14. What are the operational learning methods that will enable the exploration of these questions?
15. What are the conceptual parameters that generate the observation of a quantum change in the logic of the operation (realization of the difference that makes the difference)?
16. What are the operational conditions indicating the exhaustion of the logic of the "running operation", on the one hand, and the need to reframe or redefine a new relevant logic, on the other?
17. Who are the crucial command agents for the appreciation of emerging categorical change in the logic of the progressing operation?
18. How do the cultural and organizational differences between the members of our coalition affect the appreciation of the common learning system and operational command organization?

The Command System and the Strategic System of Systems: External Implications

1. How does our interpretation of the strategic directive affect the command relations between our operational command, national strategic command, and other friendly operational commands?
2. What are the systemic, institutional and operational implications of the relations between our campaign/operations and other progressing campaigns?
3. What are the strategic moves and non-military activities that may affect the framing of the operation's logical boundaries?
4. Who are the agents that are responsible for executing these activities, and what is the exact character of the relations that they will exercise with the operational commander (RCC), both in the planning and execution stages?
5. Which strategic assumptions that have been studied in the course of the system framing and rival as rationale processes may determine the logical boundaries of operational system?
6. How does the logic of coalition, at the system of systems level (national-strategic), influence our perception of the operation boundaries, and the conception of command relations?
7. How does the logistics dimension, at the national-strategic level influence our perception of the operation boundaries and the conception of command relations?

8. How does the air-power dimension influence our perception of the operation boundaries and the conception of command relations?
9. How does the appreciation of the rival as rationale influence our conception of the command relations, and learning linkages between strategic and operational intelligence agencies?
10. How do our command relations with external operational commands reflect our "acknowledging of what we don't know"?

The Operational Command System

1. What is the disparity between the learning challenges implied by the emergence and the existing command paradigm?
2. What is the difference between the crystallizing logic of the operation and the existing command arrangements?
3. Which open systemic questions imply the assignment of special operational command agents?
4. Which logical directions in the operation need to be surveyed by particularly assigned command agents?
5. Which functional components of our command system have the potential for informing our operational learning and for illuminating systemic/operational ambiguities?
6. What are the existing operational organizations that can provide the relevant command agents to deal with the learning problems that we have identified?
7. What is the conceptual engine that can synthesize/synergize the various command agents into a coherent learning system?
8. What learning arrangements constitute enablers of discourse between the various command agents in the course of the operation direction?
9. What are the non-military trends/efforts that complement and support the development of the operational logic, and who are the "command agents" responsible for their application?

The Command System: Organizational Reflections

1. What are the observed tensions between the appreciation of the unique characteristics of the context and the prevailing form of functioning of the relevant operational command headquarters?
2. What is the unique nature of relations between the operational command and the national-strategic command, how do these relations affect the mode of functioning of our operational command headquarters, and what would be the organizational implications of these observations?
3. What are the unique relations between our operational command, the various command components, the subordinate theaters of operations, and commanders of primary operational directions, how do these relations affect the mode of functioning of the RCC Headquarters, and what should be the organizational implications of these observations?
4. How are the special relations between our operational command and other friendly operational commands reflected in the functioning logic and organizational arrangements of our command headquarters?
5. Which operational and cognitive problems imply the application of specific patterns of functioning and organization in our command headquarters?
6. Who are the staff agents/institutions that are supposed to treat these problems and organize the command learning in emergence?
7. Which forms of functioning, methods of inquiry, and working tools will enable those staff agents to synchronize the command learning system?

8. What organizational arrangements are required in our command staff and headquarters to enable the effective functioning of a coalition?

Logistics as Rationale

The Logistical System: Strategic Mobilization (The relations between strategic/national logistical system and the operational logistical system – the systemic relations and the definition of potential for the operation)

1. What are the principal logistical disparities that arise from the examination of the operational challenges in relation to the prevailing logistical paradigm (concepts, organizational structure, methods of research, planning tools, and calculus)?
2. How is the logistical system of our operation affected by operational and logistical activities in other friendly operational theaters?
3. What are the principal characteristics of our unique operation, and what are their logistical implications?
4. What are the logistical implications of the relations between the initial positioning of resources and forces and their position in the anticipated end state of the operation?
5. What are the quantitative calculi providing the methodological-conceptual framing of the campaign logistical planning?
6. How does our system framing affect our conception of the relations between time, space, and material?
7. What are the logistical definitions of strategic time (tide) that will enable the spacing of a coherent protracted campaign?
8. What are the logistical definitions of operational time (phasing) that will enable the staging of the relevant operation within the campaign?
9. What are the logistical definitions of tactical time (timing) that will enable the positioning of fighting forces and material within the progressing operation?
10. What are the interrelations between the time setting of the campaign and the logistical system enabling its materialization?
11. What are the interrelation between the space setting of the campaign and the logistical system enabling its materialization?
12. How does our systemization of the rival's rationale affect our conception of the operation boundaries within the campaign logical frame?
13. What are the relations between the boundaries of the logistical operation and the operational maneuver?
14. What are the principal tensions between the initiated campaign/operation and the state of national economy?
15. What are the implicit logistical variables in the campaign, and what are the methods for their disclosure?

The logistical System: Strategic-Operational Deployability (The dimension of logistics in the operation: Organization of Space, Time, and resources)

1. What civilian infrastructure and logistical components are essential to the accomplishment of logistical system in the relevant operation?
2. What contribution of coalition members can broaden the logistical potential for the campaign?
3. What is the relevant conceptual reference for the systemic investigation of the logistical dimension in the operation?
4. What are the logistical implications of the tension between the logic of the campaign and the logic of the operation?
5. What are the essential logistical conditions for the initiation of the operation?
6. What are the essential logistical conditions for arriving effectively to the end state?

7. What are the essential logistical conditions producing the desired time-frame for the operation?
8. What are the essential logistical conditions producing the desired space-frame for the operation?
9. What are the implicit logistical variables of the operation, and the operationalization of which approach can uncover them?
10. What are the logistical implications of the relations between the various service components participating in the operation?
11. What are the crucial resources for the operation in the light of our understanding of the system framing?
12. How does the logistical system reflect the unique characteristics of the form and logic of warfare applied in the operation?
13. Which of the rival's infrastructures and resources can be appropriated and utilized to serve our logistical needs in the operation?

The logistical System: Operational Sustainment

1. How does the logistical method manifest the operational maneuver system?
2. What are the organizational principles of the logistical system in the operation?
3. What are the reflections of the logistical method in the command system?
4. What logistical arrangements are implied by the operational characterization of each functional component in the maneuver system?

Operation Framing

Operation Framing: The End State (conceptualization of the maneuver terminating configuration which enables the accomplishment of the strategic logic)

1. What is the ensemble of systemic conditions one has to produce at the end of the operation in order to enable the effectuation of the strategic aim?
2. What are the temporal and spatial settings of these conditions?
3. What are the principal problems impairing the operationalization of these conditions?
4. What are generators of conceptual tension between the appreciation of national policy objectives, the interpretation of strategic aims and the definition of institutional operational capabilities?
5. What factors determine the latitude between the accomplishment of the strategic aim in a single operation, and its achievement in a protracted series of operations?
6. What are the gaps (knowledge, intelligence, understanding, and resources) that set the tension between the artificial definition of the operational end state and the realization of the conditions for a continual development of the strategic campaign?
7. The actualization of which constellation implicates the disruption of the rival's ability to implement his operational logic?
8. What are the functional components that are essential to the achievement of this constellation?
9. How should these components be arranged in time and space?
10. What operational forms are being implied by each of these functional components?
11. What are the systemic implications of the difference between positive definition of operational end state and the negative definition of the operational disruption of the rival's logic (systemic shock/strike)?
12. What are the strategic conditions for the accomplishment of the operational end state?
13. What are the operational conditions for disrupting the logical order of the rival system?
14. What are the operational conditions that can steer the rival system into self-regulation conforming to the evolutionary directions of the strategic system?

15. Which operational conditions are crucial to further development of the strategic campaign?
16. What is the holistic description of the modality terminating the operation?
17. What are the logical functions of that modality?
18. What is the operational form implied by each of these functions?

Operation Framing: Spatial Setting (staging)

1. What is the relevant metaphor for the rationalization of operational space in the examined strategic context?
2. Which spatial features entail unique systemic-operational implications?
3. What are the spatial manifestations of the relations between our operation and other friendly adjacent operations?
4. What are the essential spatial arrangements for the initiation of the operation within the logical boundaries of the system framing? Which moves and activities will take place in the course of the operation direction within the spatial boundaries of the operation, and which efforts will be conducted outside them?
5. What are the tensions (differences) in the perception of space between the political and military environments, between the strategic and operational command echelons, between the combatant commander and the commanders of the operational components and functions?
6. What is the spatial manifestation of the end state, or the modality terminating the operation?
7. What spatial conditions are required for the introduction of the end state?
8. What spatial ordering will enable the development of the operation within the desired logical framework (from the initial line of departure to the materialization of the end state or operational shock)?
9. What spatial conditions are required for the disruption of the rival's logic as a system?
10. What are the spatial reflections of the command logic?
11. What are the spatial reflections of the logistical logic?
12. What are the spatial manifestations of the operation framing?
13. Which logical implications of the operational space affect the structure of the operational maneuver?
14. Which formal implications of the operational space affect the structure of the operational maneuver?
15. Which conceptual templates of space can serve as a reference for rationalization of the battle-space in our operation?
16. What is the spatial embodiment of the relations between the system framing and operation framing in the examined context?
17. What are the relations between the strategic logic and our perception of space?
18. What are the relations between the functional components of the end state (or conditions enabling its accomplishment) and our rationalization of the operational space?
19. What are the spatial manifestations of the relations between the definition of end state and the conception of operational shock?
20. What are the spatial ramifications of the systemic relations between the operation and the campaign?
21. In what respects will the development of the operational maneuver in space be affected by the unique relations between the various service components in our specific strategic context?
22. What are the spatial reflections of the unique strategic linkages between the various members of the coalition or alliance?

23. How do the concepts of external lines and internal lines influence the setting of the operational maneuver in space?
24. How should the spatial relations between operational elements of high and low signature affect the structure of the operational maneuver?

Operation Framing: Temporal Setting (phasing)

1. What is the relevant conceptual reference for the rationalization of time in the operation?
2. What time arrangements are crucial to the initiation of the operation within the logical frame implied by the system? What efforts, moves, and activities will be incorporated in the operation time frame, and which will be conducted outside them?
3. What are the time implications of the systemic relations between our operation/campaign and other friendly operations/campaigns?
4. Which time elements entail specific operational implications?
5. What are the principal time functions that structure the process of accomplishing the strategic (systemic) logic?
6. Which time arrangements allow the development of the operation towards the achievement of its logic?
7. What are the tensions in the perception of time between the political and military levels, between the strategic and operational command echelons, and between the commander of the operation/campaign and the commanders of his operational components and principal efforts?
8. What are the time conditions are required to the achievement of the end state?
9. What is the time arrangement allowing the development of the operation within the desired logical frame (from its commencement to the materialization of the end state or operational shock)?
10. What time conditions are required for the disruption of the rival's logic as a system? What temporal tensions in the rival system invite maneuver manipulations?
11. What time functions may affect our operational learning within the operation framing?
12. Which time arrangements enable the functioning of the command system?
13. What is the time manifestation of the operation framing?
14. Which implications of time may affect the structural development of the operational maneuver?
15. What is the nature of the relations between our perception of (strategic-operational) time and the form of warfare applied in the operation?
16. What is the temporal reflection of the relations between the system framing and the operation framing?
17. How does the campaign's strategic logic affect the organization of operational time?
18. What are the time reflections of the tension between the definition of end state and the conception of operational shock?
19. What are the time implications of the systemic relations between the operation and the campaign?
20. In what respects do the systemic relations between the various service components participating in the operation/campaign affect our perception and organization of operational time (or the setting of operational maneuver in time)?
21. What are the temporal reflections of the unique strategic linkages between the various members of the coalition or alliance?
22. How do the concepts of external lines and internal lines influence the setting of the operational maneuver in time?
23. How should the temporal relations between operational elements of high and low signature affect the structure of the operational maneuver?

Operation Framing: Development Problematization (Defining the problems, limitations, constraints affecting the potential for development of the operation)

1. What command mechanisms are responsible for setting the strategic conditions determining the logical boundaries of the operation?
2. What conditions are required, in the course of the operation direction, to determine the realization of the initial (operational) logic and the transition (shift) to a new operational rationale? Who are the command agents responsible for the observation and application of these conditions?
3. What are the systemic constraints affecting the logic and structure of the operation?
4. What are the tensions between the crystallizing concept of operation and the allocated resources for its application?
5. In what respect does the maneuver system reflect an operational interpretation of the limitations set by the strategic command level (NCA)?
6. How does the operational maneuver manifest the systemic properties deriving from the synergy of relative weaknesses and strengths of the various service components and operational functions?
7. How should the dimensions of time and space be systemized in a manner promising operational momentum in the direction of attaining either the end state or the state of operational shock?
8. How should a deliberate shift to a subsequent operation regulate the problems (disparities, ambiguities, constraints) of the current operation?
9. What are the operational functions regulating a sequential transition between operations?
10. What functional elements in the operational maneuver generate conditions for self-regulation in the rival system, once the prevailing strategic order has been disturbed?
11. How does the tension between the conception of the end state and the realization of systemic shock generate operational potential?

Operation framing: operational maneuver system forming

1. What is the metaphor enabling the cognitive transition from the operation as a logical construct to the operation as a formal construct?
2. What is the formal layout of the operational maneuver?
3. What are the relations between the "operational what" and the "operational how"? What are the relations between the systemic logic of the operation and the operational method for attaining it?
4. What are the links between the rival's systemic logic (as implied by his operational form) and the operational form that is supposed to disrupt it?
5. How is the operational maneuver form associated to the end state?
6. What are the associations of the operational maneuver form and the operational shock one intends to inflict on the rival system?
7. Which conceptual patterns will serve as a reference for reflection on the construct of the operational maneuver form?
8. What are the manifestations of traditional forms of warfare in the form of the relevant operational maneuver?
9. How does the form of the operational maneuver reflect the delicate relations between structural functions of high and low signature?
10. What are the relations between the operational time frame and the development (unfolding) of the operational maneuver form?
11. What are the relations between the operational space and the development of the development (unfolding) of the maneuver form?

12. How does the form of the operational maneuver reflect the dialectical relations between the concepts of "smooth" and "striated space"?
13. How does the form of the operational maneuver manifest the complementary relations between Euclidean order and fractal disorder?
14. How should the command learning system regulate, in the course of the operation direction, the tension between deterministic and emergent forms?
15. What are the relations between the form of the operational maneuver and the command system directing it?
16. What are the relations between the form of the operational maneuver and logistical system energizing it?
17. What are the operational conditions that promise the "radiation of influence" (ecological impact) by the form of the maneuver?
18. What is the graphical sketch reflecting the unique formal properties of the operational maneuver?
19. Which formal components of the maneuver system will sharpen the learning asymmetry between our operational system and that of the rival?

Operational Conditions

Operational conditions: the system of logical functions

1. What are the logical functions of the operation as a system?
2. What are the functional conditions enabling the realization of the end state (terminating effects), and who are the command agents responsible for their effectuation?
3. What generic (doctrinal) operational concepts provide us with the relevant references for the construction of the internal logic of the operation?
4. What are the logical conditions organizing the systemic relations between our theater of war and other friendly theaters?
5. What are the logical conditions organizing the systemic relations between our theater of war and the various theaters of operations that comprise it?
6. What are the logical factors determining the various trends/directions/efforts within the operation framing?
7. What are the functions organizing the systemic associations between various components of the operation?
8. What are the operational conditions augmenting the synergy between the various trends functioning within the boundaries of the operation framing (complementing effects), and who are the command agents responsible for their effectuation?
9. Which functional conditions are essential for shaping the operation within its logical boundaries and formal configuration (shaping effects), and who are the command agents responsible for their effectuation?
10. What are the conditions that enable the emergence of the state of operational shock, or what are the logical functions of the trend/direction of the main strike?
11. Which political-strategic conditions (related to NCA) are crucial to the framing of the logical and formal boundaries of the operation?

Operational conditions: end state – maneuver form interface

1. What are the systemic relations between each operational effect and the end state?
2. What are the systemic relations between the various operational effects?
3. Which specific strategic conditions shape the structural logic of the operational maneuver?
4. Which logical implications of the terminating configuration determine certain elements in the form of the operational maneuver?

5. Which systemic conditions are crucial to the development of the operational maneuver in its unique form?
6. What are the reflections of operational time in each of the operational effects?
7. What are the manifestations of operational space in each of the operational effects?
8. How are the unique relations between high and low signature maneuver components manifested in each operational effect?
9. How does the ensemble of operational effects produce a logical network that can be translated into a detailed formal structure?
10. What are the systemic problems in the application of each operational effect?
11. How does each operational effect reflect the interface between a logical function (a logical component of the end state) and a formal function (a formal component in the method of the end state accomplishment)?

Operational conditions: rival's rationale – maneuver system interface

1. What metaphor explains the logical relations between a desired operational effect and the operational component of the rival system, which constitutes the object for this effect?
2. What conceptual products of our institutional research and experimentation can serve as a reference for rationalizing the relations between a specific operational effect and an operational component of the rival system?
3. What sources of operational strength in rival system should be neutralized or disrupted as a result of our realization of the tension between the end state and the state of systemic shock?
4. Which operational susceptibilities should be deliberately inflicted upon the rival system through manipulations of operational maneuver?
5. What are the operational and cognitive conditions for deliberate imposition of a disparity between the rival's operational perception (understanding of the emergence) and the actual constellation determined by the operational maneuver?
6. What are the essential conditions for disrupting the functional interaction between the operational components in the rival's maneuver system?
7. What are the crucial conditions for disrupting the functioning of the rival's command system?
8. What are the crucial conditions for disrupting the functioning of the rival's logistical system?
9. Which operational conditions have the potential for self-regulation of the rival system?

Operational conditions: deterministic planning – learning in emergence interface

1. Which conditions are crucial to the development of the learning system enabling the realization of the emerging change in the operational logic (the difference that makes the difference)?
2. Which space of adaptation is required from every warfighting commander, and how is it embodied in the relevant operational effect?
3. How should the tension between an operational effect and a relevant tactical mission affect the understanding of the emergent logic of a warfighting situation?
4. How will the difference, between the initial anticipation of the operation framing and the synthesis of subordinate commanders' reflection in action, be exploited for the realization of a quantum logical change in the emergence?
5. What open operational questions should be clarified in the course of operation direction through the examination of the cognitive tension between the initially defined operational effects and the actual operational occurrence?
6. Who are the operational command agents that should be responsible for investigating the "open issues" and "unanswered questions"?

7. Which methods of operational inquiry will enable a rigorous study of the problematic issues, open questions, and operational emergences in the course of the operation direction?
8. Which method operational discourse and which cognitive tools will promote the rationalization of the "emergent logic" in relation to the initial operation framing and operational effects?
9. What organizational arrangements in the operational learning system will generate a relevant understanding of the rival system's self regulation?

Operational conditions: end state – systemic shock interface

1. What is the scope of conceptual tensions between the rationale of the end state and that of the operational shock?
2. How are these tensions reflected in both the logic of each operational effect, and in the systemic relations between the various effects?
3. What directions for the rival system self-organization are implied by the logical tension between the end state and the operational shock?
4. What conditions should be produced by the operational maneuver in order to enhance the development of self-organization by the rival system?

Forms and Functions

Operational conditions – existing templates: the tension

1. What is the difference between a relevant operational effect and the prevailing conceptual conventions?
2. What are the organizational implications of the observed difference, or in what respect does the existing institutional paradigm provide patterns, templates, working frames and tools of modulation for every operational method relating to a relevant operational effect?
3. What are the operational conditions for the application of the operational logic embodied in a relevant operational effect?
4. What are the organizational conditions for the application of the operational logic embodied in a relevant operational effect?
5. What are the external and internal sources enabling the creation of operational and organizational combinations relevant to the operationalization of a relevant operational effect?
6. In what respects does the environment related to a specific operational effect affect the organizational structure of the tactical maneuver pattern?
7. What are the temporal arrangements guaranteeing compatibility between the logic of a specific operational effect and the mode of action, and organizational structure enabling its materialization?
8. Which existing organizational and structural templates provide a reference of thought for a relevant operational effect?
9. Which organizational, structural, and doctrinal combinations enable the composition of a warfighting method relevant to the accomplishment of a specific operational effect?
10. What are the organizational relations between supporting and supported elements participating in the execution of a certain operational effect?

Doctrinal forms – emerging operational challenges: the tension

1. What is the difference between a relevant operational effect and the prevailing conceptual conventions?
2. What are the organizational implications of the observed difference, or in what respect does the existing institutional paradigm provide patterns, templates, working frames and tools of modulation for every operational method relating to a relevant operational effect?

3. What metaphor can provide a framework rationalizing the transition from the operational effect's logic to the form of its application?
4. What are the operational enablers conditioning the application of the rationale of a certain operational effect?
5. What are the doctrinal templates promoting the accomplishment of the logic of this operational effect?
6. What unique formal patterns are implied by a critical examination of the operational effect's logic?
7. How does the environment relating to a certain operational effect affect the form of its application?
8. What graphic plot reflects the transition from the operational effect's rationale to the form of its application?
9. Which external patterns of action, both current and historical, provide a reference for conceptualizing the modus of execution of a certain operational effect?
10. What formal measures are implied by the examination of a specific rival functional component relating to a certain operational effect?

Setting forms of function in time and space

1. Which problematic components condition the formal application of a certain operational effect?
2. What existing patterns of action, from the various military services and non-military agencies provide formal modes that can be synergized into a maneuver component attaining a specific operational effect?
3. What factors may impede the synergy producing the relevant pattern of maneuver?
4. What organizational arrangements and operational combinations enhance such a synergy?
5. What new formal patterns are required in order to enable such a synergy?
6. What time arrangements provide the conditions for the development of this operational synergy?
7. What spatial arrangements provide set conditions for the development of this operational synergy?
8. What are the functional relations between the formal pattern of a relevant maneuver component attaining a specific operational effect and other friendly components of the maneuver system?
9. What are the functional relations between the formal pattern of a relevant maneuver component attaining a specific operational effect and the maneuver system as a whole?

Jointness as a generator of adaptive space

1. What are the sources of operational synergy between the various service components participating in the application of a relevant effect?
2. What is the organizing logic of the complex relations between the services' generic doctrinal forms, an effect's unique rationale, and the singular maneuver pattern enabling its application?
3. How does the tension between the logic of a certain operational effect and the maneuver pattern attaining it reflect the relative strengths and weaknesses of the various service components?
4. Which time arrangements will enhance the synergy between the various service components involved in the effectuation of the form of maneuver attaining a certain operational effect?

5. Which space arrangements will enhance the synergy between the various service components involved in the effectuation of the form of maneuver attaining a certain operational effect?
6. Which unique organizational/structural arrangements will enhance the synergy between the various service components involved in the effectuation of the form of maneuver attaining a certain operational effect?
7. Which unique command arrangements will enable this synergy and enhance joint learning in action?

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