The Conceptual Tangle of Contemporary Planning Doctrine

A Monograph

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14. ABSTRACT
The US Army is an institution with an affinity for planning. To stay ahead of emerging trends the organization strives for continual improvement to ensure practitioners have robust tools to plan in complicated and complex environments. This monograph reviews the historical lineage of Army Design Methodology, the Army's current conceptual planning model while considering the parallel explorations of effects-based operations and systemic operational design. The conceptual tangle over effects-based operations and systemic operational design initiated in the early 1990s. It was the military's response to planning in a complex world. By 2004, the conventional fight in Iraq morphed into an unconventional battle, and the Army was struggling to make sense of the situation. This campaign catalyzed the Army to develop a conceptual logic model of its own that could bring understanding to the complex environment. The evolutionary product created was Army Design Methodology. It was a framework predicated on systems thinking, operational art, and the OODA Loop. This concept represented a distinct way of thinking that provided practitioners with a holistic tool that informed new approaches capable of influencing the new complex world.

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Abstract

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The US Army is an institution with an affinity for planning. To stay ahead of emerging trends the organization strives for continual improvement to ensure practitioners have robust tools to plan in complicated and complex environments. This monograph reviews the historical lineage of Army Design Methodology, the Army's current conceptual planning model while considering the parallel explorations of effects-based operations and systemic operational design. The conceptual tangle over effects-based operations and systemic operational design initiated in the early 1990s. It was the military's response to planning in a complex world. By 2004, the conventional fight in Iraq morphed into an unconventional battle, and the Army was struggling to make sense of the situation. This campaign catalyzed for the Army to develop a conceptual logic model of its own that could bring understanding to the complex environment. The evolutionary product created was Army Design Methodology. It was a framework predicated on systems thinking, operational art, and the OODA Loop. This concept represented a distinct way of thinking that provided practitioners with a holistic tool that informed new approaches capable of influencing the new complex world.

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Acronyms

ADM	Army Design Methodology
CAS	Complex Adaptive Systems
CACD	Commander's Appreciation and Campaign Design
DOD	Department of Defense
EBO	Effects-Based Operations
FM	Field Manual
GST	General Systems Theory
IDF	Israel Defense Forces
MDMP	Military Decision-Making Process
NCW	Network Centric Warfare
OODA	Orient, Observe, Decide, Act
OTRI	Operational Theory Research Institute
SAMS	School of Advanced Military Science
SOD	Systemic Operational Design
SOSA	System of Systems Analysis
TRADOC	Training and Doctrine Command
USAF	United States Air Force
USJFCOM	United States Joint Forces Command

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Introduction

Over the last three decades, the US military has experimented with and explored a number of variants of doctrinal approaches to planning and decision-making. This contrasts with the relatively stable use of the estimate of the situation, subsequently known as the Military Decision-Making Process (MDMP), throughout most of the twentieth century. For a variety of reasons, by the 1990s, some critics came to see MDMP as an overly-linear, overly-formalized approach to planning that was associated with an 'industrial age mindset' out of step with the challenges of the post-Cold War world. Beginning in the 1990s, several variants to MDMP were introduced in the joint community--corresponding with the development of a body of joint doctrine--with a wide array of institutional advocates. These variants included, System of Systems Analysis (SOSA), Effects-Based Operations (EBO), Systemic Operational Design (SOD), and Army Design Methodology (ADM). This monograph explores the theoretical and institutional drivers behind the conceptual tangle of contemporary planning doctrine.

Planning is a core tenent of the US military. Having the right planning tools is essential to create an operational approach that increases the probabilities of success. The military has traditionally relied on MDMP as a ‘one-size fits all’ planning framework. As the military entered the post-Cold War era, it became a common refrain to invoke the complexity of the international environment. To plan in a complex environment, each service developed competing ideas to fill the conceptual planning void in the military. In the late 1990s, the Air Force promoted their abstract planning tool, Effects-Based Operations (EBO), anchoring on the success of its employment in Desert Storm. The Army promoted Systemic Operational Design (SOD), an Israel Defense Forces constructed by Shimon Naveh. Both tools served as possible models that could frame a problem by making sense of the environment through a systems approach. The

underlying belief was that if a planner understood the environment and the problem, they could design an operational approach to link strategic guidance to the theater campaign plan.[1]

This monograph analyzes the development of EBO, SOD, and the emergence of Army Design Methodology (ADM). This analysis includes an exploration of the theoretical underpinnings of design to its' inclusion in FM 5-0. This monograph argues that ADM is a synthesis of systems thinking, operational art, and the OODA (orient, observe, decide, act) Loop to create a conceptual planning tool. This conceptual tool provides the planner with a framework to engage in abstract and divergent dialectical conversations before converging on an operational approach. It remains to be seen if ADM is equally suited for countering insurgencies and planning the conduct of large-scale combat operations.

An Overview of US Army Planning Doctrine

Plans are worthless, but planning is everything.

— President Dwight D. Eisenhower

Prussian General Helmuth von Moltke conceived the idea of the general staff in the late nineteenth century with the intent to replicate the genius of the commander through a team of educated experts that possessed additional authorities beyond their rank.[2] A rigorous selection process ensured that Moltke had the best officers. These officers received an education via staff rides, wargames, map exercises, and troop exercises to aid the staff in decision-making. The purpose of the German General Staff was to improve the rational, mathematical approach to the science of war to analyze, predict, and perfect battlefield geometry. The staff used calculations to compute mobilization and logistic schedules and synchronized them with train schedules to ensure troops and supplies were at the right place at the right time. The Prussians phenomenal orchestration of forces across the battlefield through the use of the general staff and their

[1] Joint Staff US Department of Defense, *Joint Publication (JP) 5-0, Joint Planning* (Washington, DC: Government Printing Office, 2017), xiii.

[2] Walter Goerlitz, *The German General Staff* (New York, NY: Sterling Publishing, 1995), 10.

processes enhanced the planning capability of the commander and allowed them to gain a competitive edge and win large scale wars through national mobilization such as Germany's rapid defeat of France in 1870.[3] In the late nineteenth century, most militaries adopted staff systems influenced by the Prussian example. The US military implemented a model based on the German General Staff structure.[4] In 1914 the US Army Field Service Regulation (FSR) outlined general responsibilities and principles for the staff members at the theater level of operations without any detailed processes and steps.[5] However, by 1940 the scale and complexity of the US Army's mobilization effort in WWII required a more robust and detailed staff process to guide the staff to assist with decision making across the staff functions. To aid decision making the Army standardized the process in the US Army Field Manual 101-5, *Staff Officer Field Manual: The Staff and Combat Orders* which outlined the estimate of the situation in scope and depth.[6] The decision-making framework provided an analytical framework to standardize the decision-making process across the battlefield.

The estimate of the situation is still integral to US Army doctrine, though it has been generally subsumed into the Military Decision-Making Process. The current estimate of the situation is referred to as MDMP. It is a disciplined, linear, and detailed planning methodology which helps the commander analyze the mission, plan an operation around the mission and produce a plan in line with the commander's end state. Inside MDMP is a blend of the quantifiable science and the subjective art of decision making. The science includes movement

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[3] Goerlitz, *The German General Staff*, 62.

[4] John Sutton, "The German General Staff in US Defense Policy," *Military Affairs* 25, no. 4 (Winter 1961): 198.

[5] US Department of War, *Field Service Regulation (FSR)* (Washington, DC: Government Printing Office, 1914), 130.

[6] US Department of War, *Field Manual (FM) 101-5 Staff Officers' Field Manual: The Staff and Combat Orders* (Washington, DC: Government Printing Office, 1940), 50. US Department of War, *Field Manual (FM) 101-5 Staff Officers' Field Manual: The Staff and Combat Orders* (Washington, DC: Government Printing Office, 1954), 47. The 1940 version expanded the staff estimate. The 1954 version added staff estimates by staff function: personnel, intelligence, operations, logistics, civil affairs, military government and deception.

rates, fuel consumption, and assets available while the art balances the tangibles of war by estimating the moral and physical strength of the enemy, their center of gravity, and strength of the friendly forces. Through time MDMP evolved into a seven-step format: the receipt of the mission, mission analysis, COA development, COA analysis, COA comparison, and orders production. The process is disciplined and sequential. In theory, the situation may require the planner to restart the process, yet time can inhibit the motivation to do so. The purpose of MDMP is to create a shared understanding among the staff by applying logical analysis, professional expertise, and sound judgment to create a course of action this is feasible, acceptable, suitable, and distinguishable.[7] The products of MDMP facilitate an understanding of the problem, the environment, and the plan with graphics and a narrative. The staff uses these products for future planning with higher, adjacent, and subordinate headquarters.

Historically, MDMP has a proven track record of success as the Army's primary decision-making methodology. It is used at every echelon of command and is versatile enough to solve complicated problems in a variety of mission sets from combat, security, to humanitarian missions. When dealing with complex, ill-structured problems, MDMP is less useful. MDMP exemplifies vertical thought, where ill-structured problems require lateral thinking. Both are necessary for problem-solving. However, vertical thought minimizes systems type thinking.[8] Vertical thought promotes teleologic analysis that uses deductive reasoning which is antithetical to systems thinking and adaptive learning.[9]

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[7] US Department of the Army, *Field Manual (FM) 6-0 Commander and Staff Organization and Operations* (Washington, DC: Government Printing Office, 2014), 9–1.The seven-step process has numerous sub-components currently numbering thirty-eight steps.

[8] Bryan Lawson, *How Designers Think: The Design Process Dymystified*, 4th ed. (Kidlington, Oxford: Elsevier, 2006), 201.

[9] "Definition of Teleology," *Oxford Dictionaries*, accessed March 6, 2019, https://en.oxforddictionaries.com/definition/teleology. Teleology is the philosophical explanation of a phenomena in terms of the purpose it serves rather that of the cause by which it arises. It means a problem solver starts at the end and reasons back, explaining things based on the end purpose.

MDMP is capable of incorporating adaptive learning. FM 5-0 *Army Planning and Orders Production* proclaims that planning is continuous and does not stop with orders production. It continues to process new information as it comes available, adjusting to the situation. If the unit incurs an unanticipated threat or opportunity that changes the situation, the planner needs to revisit the MDMP process.[10] Restarting MDMP is a break from the traditional linear pattern. Colonel Christopher Paparone advocated for a non-traditional approach to MDMP. He modified Henry Mintzberg's strategic control model to illustrate a non-linear MDMP model.[11] This unorthodox execution of MDMP viewed the plan as the stratagem. Feedback loops are positioned at different stages of the organizational mission to monitor the environment for emergent factors that could alter the plan. These feedback loops are placed not only in the execution phase but also in the experimentation phase, during simulations, during war games, and training.[12] The purpose of feedback loops is to inform the practitioner when they need to reframe or choose a new stratagem. Therefore, it is paramount to learn from the environment and incorporate the information into the stratagem. Learning through iteration is the benefit of non-traditional MDMP, an iterative approach to problem-solving built for twenty-first-century dilemmas.

This non-linear approach to MDMP can work, FM 5-0 (2005) encouraged this process. However, conventional norms establish rigid patterns of habit that prevent an iterative approach to MDMP. Commanders and staffs can become enamored of the process. Practitioners began to operate on system one heuristics after years of teaching and executing MDMP in a linear lock-step process. Daniel Kahneman characterizes this tendency to follow a preprogrammed and

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[10] US Department of the Army, *Field Manual (FM) 5-0 Army Planning and Orders Production* (Washington, DC: Government Printing Office, 2005), 1–9.

[11] Henry Mintzberg, "Of Strategies, Deliberate, and Emergent," *Strategic Management Journal* 6, no. 3 (July 1985): 258. In his model Mintzberg compared the intended strategy with the real strategy advocating that the realized strategy is an emergent strategy that occurs despite intentions. The vision provides a guiding direction, there is room for adaptation to react to feedback on past actions or new opportunities or threats in the environment.

[12] Christopher Paparone, "US Army Decision Making: Past, Present, and Future," *Military Review* (August 2001): 54. To monitor feedback one must implement decision support tools in the precise location.

uncensored approach to action as systems one thinking. Commanders are using systems one thinking when they approach MDMP in a rote and linear way.[13] Rigid adherence avoids the inclusion of meta-questioning or reflection in action to determine what are we supposed to do and why are we doing it. Most practitioners focus on moving forward through the seven steps and avoiding reflection in action which could cause the MDMP process to revisit the beginning.[14] Military cultural norms stifle divergent thinking and focus on developing an operational approach. However, when dealing with ill-structured problems that require extensive meta-questioning the conceptual processes of EBO, SOD, and ADM assist with problem formulation to improves decision making.[15] Adding a conceptual tool to the detailed planning tool enables higher echelons to engage in an iterative process to define the right problem. Solving the right problem ensures a cost-effective use of resources. In contrast, solving the wrong problem more efficiently is a waste of resources. Therefore, the Army requires a process such as ADM to cut through the complexity and make sense of the environment.

ADM relies on three theoretical underpinnings: operational art, John Boyd's OODA Loop, and systems thinking. The first theoretical construct is operational art. Design advocates constructed an intellectual genealogy to tie design back to operational art. The concept of operational art precedes ADM by ninety years. The Soviet Union was the first military to promulgate a level of war between the strategic and tactical levels. Soviet Union theorist, Mikhail Tukhachevsky professed that before detailed planning occurred, a series of operations need to be linked to a broader strategic goal. He stated, "It is essential to conduct a series of successive

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[13] Daniel Kahneman, *Thinking Fast and Slow* (New York, NY: Farrar, Straus, and Giroux, 2011), 10. System one thinking is the pre-programmed up front and unconscious way of thinking. Because of its autonomous and efficient nature there is little energy spent to complete tasks. The danger is its prone to bias and systematic errors.

[14] Donald Schon, *Educating the Reflective Practitioner* (San Francisco, CA: Jossey-Bass, 1987), 130.

[15] Paparone, "US Army Decision Making," 49.

operations which are distributed in space and time."[16] Tukhachevsky's conception of the novel concept generated from his experience in the 1919-1921 Polish-Soviet War. Tukhachevksy was a commander in the Northern Front at the Battle of Warsaw. He experienced multiple tactical victories, yet he lost the operational campaign. Tukhachevksy wrote,

> Since it is impossible, with the extended fronts of modern times, to destroy the enemy's army at a single blow, we are obligated to try to do this gradually by operations which will be more costly to the enemy than to ourselves. In short, a series of destructive operations conducted on logical principles and linked together by an uninterrupted pursuit may take the place of the decisive battle that was the form of engagement in the armies of the past, which fought on shorter fronts.[17]

In the 1980s theorists and senior military leaders were advancing the concept that Tukhachevsky promulgated sixty years earlier. In 1980, Edward Luttwak wrote an article in *International Security* that proposed the addition of Tukhachevskiy's theory into US doctrine. Luttwak's article was insightful and timely, as the US Army doctrine would soon acknowledge a new level of war. A year later, Major Huba Wass de Czege, a doctrine writer, catalyzed the introduction of the operational level of war to the US Army. It was a significant component of the 1982 Army Field Manual (FM) 100-5, *Operations*, commonly referred to as AirLand Battle.[18] This updated version replaced the 1976 FM 100-5, *Operations* known as Active Defense.[19] In FM 100-5 (1982) the doctrine authors placed the operational level of war between the strategic

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[16] Georgii Samoilovich Isserson, *The Evolution of Operational Art*, 2nd ed. (Fort Leavenworth, KS: Combat Studies Institute, 2013), xxvi. Isserson was a student of Tukhachevksy and discussed the history of the concept in his book. The 2015 publication of FM 3-0 is very similar to the early twentieth century Soviet definition. It defines operational art as an arrangement of tactical actions and the retainment of these operations linked towards the larger campaign goals

[17] Justin Kelly and Mike Brennan, *Alien: How Operational Art Devoured Strategy* (Carlisle, PA: Strategic Studies Institute, US Army War College, 2009), 43. Tukhachevksy is quoted in Kelly and Brennans's book to highlight the emergence of Soviet Operational Art.

[18] Blythe Wilson, "A History of Operational Art," *Military Review* (November 2018): 45.

[19] Walter Kretchick, *US Army Doctrine: From the American Revolution to the War on Terror* (Lawrence, KS: University of Kansas Press, 2014), 350. The 1983 version of AirLand Battle reversed the defensive posture of General William DePuy's 1976 manual and assumed a maneuver-orientated offensive stance. Kretchick believes doctrines serves the Army well to prepare for conventional fights however it falls short on preparation for the unconventional. To understand the conventional fight, the planner must identify the problem. This is where design can be leveraged.

and tactical levels. The operational level of war included campaigns and operations that were an amalgamation of battles and engagements at the tactical level of war. The new concept of the operational level encouraged a joint approach to fighting by combining land and air power to deliver synergistic effects against an adversary.[20] The overwhelming success of Operation Desert Storm demonstrated to the satisfaction of many observers in the effectiveness of planning at the operational level of war.[21] The military theorist, Colonel John Boyd, heavily influenced the AirLand Battle doctrine used in Operation Desert Storm.

John Boyd, a US Air Force (USAF) fighter pilot, and doctrinal theorist, was a leading contributor to the design of AirLand Battle. At the core of the AirLand Battle doctrine is the thought that "attacking the enemy throughout the depth of the battlefield by coordinating fires and aerial assets will collapse the enemy's operational system."[22] This theory directly reflects Boyd's influence. He developed the notion that if a pilot could operate inside their opponent's time and space cycle, they would win in a dogfight. He elevated this theory from singular aerial combat fights to combat in general. He professed that operating inside of the enemy's decision cycle would allow the commander to control the tempo of battle.[23] To accomplish this, a commander

[20] US Department of the Army, *Field Manual (FM), 100-5 Operations* (Washington, DC: Government Printing Office, 1993), 1–3. AirLand Battle defines the operational level of war provides the link between strategic objectives and tactical employment of forces. The military forces attain strategic objectives through the design, organization, and conduct of campaigns and major operations.

[21] Robert Scales, *Certain Victory: The US Army in the Gulf War* (Herndon, VA: Brassey Books, 1994), 10. Operations Just Cause and Desert Storm dramatically demonstrated the capability of the US to synchronize assets at all levels of war. BG Robert Scales headed the Army's Desert Storm Study Group that reviewed thousands of official documents and personal interviews to document the success of the campaign and the use of the operational level of war.

[22] Wilson, "A History of Operational Art," 46. Boyd advocated for "deep battle" in his 1976 briefing, *Patterns of Conflict*, to attack the Soviet forces in the rear while maintaining an agile front line to derail the Warsaw Pact Command System.

[23] John Boyd, *A Discourse on Winning and Losing* (Maxwell AFB, AL: Air University Press, 2018), 152.

applies the framework of observation, orientation, decisions, and action. Practitioners commonly refer to this theory as the OODA Loop, (see Fig 1).[24]

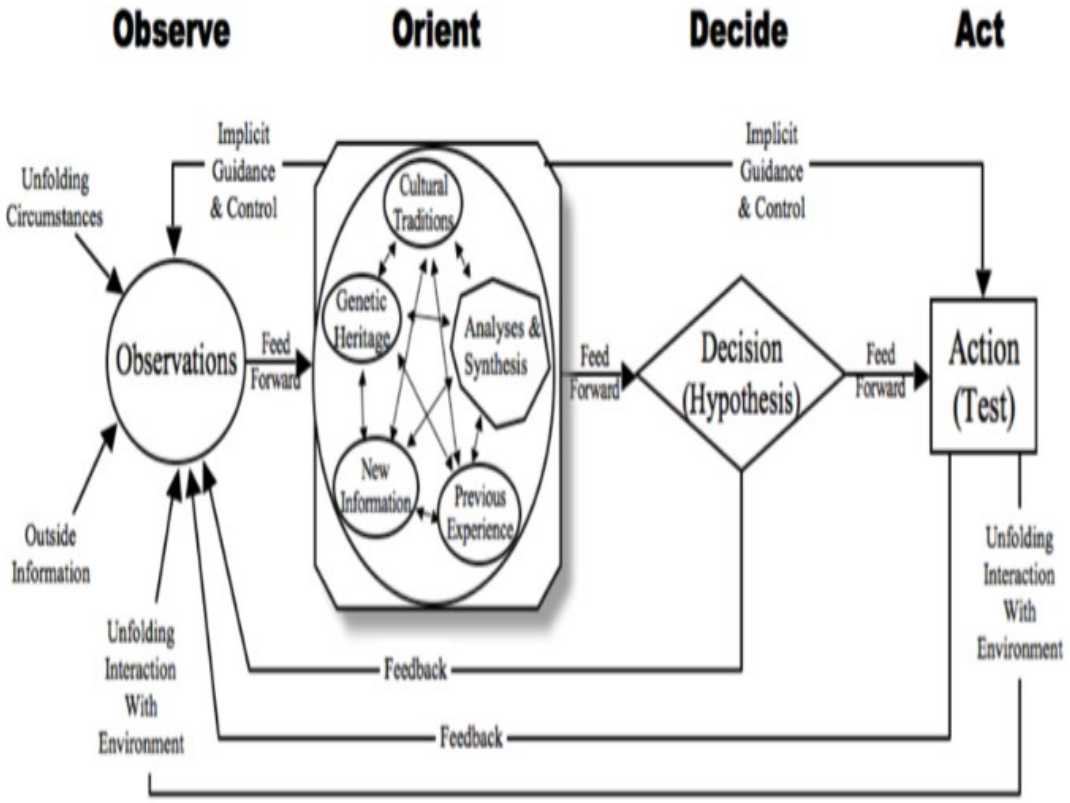

Figure 1. Boyd's OODA Loop theory. *Discourse on Winning and Losing* 1987, 384 .

According to Bousquet, the most essential phase of Boyd's theory is the orientation phase.[25] Here the actor absorbs the information in their environment, studies the current situation, and acknowledges the actions of the adversary. During the orientation phase, the actor makes sense of the information through an existing framework of analysis to create meaning and distinguish between opportunity and threat. The decision phase is the actor taking action. Finally,

[24] Antoine Bousquet, *The Scientific Way of Warfare* (New York, NY: Columbia University Press, 2009), 188. Orientation is where the actor compares their observed world with their internal frameworks. The actor uses analysis to makes sense of their observations according to pre-existing patterns of knowledge, and synthesis which is the creation of new patterns of knowledge to novel situations that do not have a preestablished frame of reference.

[25] Ibid., 189.

the entire process loops back to the observe phase to understand how their action affected the environment. Using the OODA Loop enables the Army to learn, anticipate, and adapt their tactics faster than the adversary, thus staying inside their decision cycle. Boyd believed that war is a human endeavor based on moral principles and does not occur on terrain or among machines, but in the minds of men. Therefore, by getting inside the enemy's decision cycles, they change the behavior of the enemy. It is essential to understand faster decision cycling is not the sole method for achieving temporal dominance over the enemy; Boyd also encouraged the use of friction to slow down the enemy's decision cycle. By projecting confusion into an adversary's decision cycle, it would create an unpredictable and chaotic world that exceeds the adversary's physical and mental capacity to adapt.[26]

When a commander uses the OODA Loop theory, their goal is to control the tempo of the battle until the enemy capitulates. Achieving capitulation is not easy, as the enemy does not readily accept defeat; they adapt to survive. An enemy organization is analogous to an organism; both adapt to their environment to survive. Boyd articulated a theory to understand the adaptation phenomenon in his paper *Destruction and Creation*.[27] The concept is rooted in evolutionary biology which explains why enemy systems are resilient. A practitioner constructs a mental model of the observed reality which includes the enemy. Boyd states, "to comprehend and cope with our environment, we develop patterns or concepts of meaning."[28] The purpose of creating models is to understand reality thereby helping practitioners understand the volatility of the environment and the evolution of the adaptive enemy. Just as the practitioner develops mental models the enemy "comprehends and copes with their environment by developing mental patterns or concepts of meaning…They destroy and create these patterns to permit them to shape and be

[26] Boyd, *A Discourse on Winning and Losing*, 8.

[27] John Boyd, *Destruction and Creation* (Fort Leavenworth, KS: US Army Command and General Staff College, 1987), 2.

[28] Ibid., 1.

shaped by the environment in order to survive."[29] Thus, the friendly practitioner must view victory as a temporary condition. They must continuously assess the enemy to unmask their strengths, weaknesses, and mental models. To properly assess the enemy a feedback loop is placed at key points in the system. The objective of the feedback loop is to create an asymmetrical information advantage that translates to a strategy that will "destroy the internal harmony of the enemy, produce paralysis, and collapse the enemy's will to resist."[30]

The creation and destruction of mental models are the historical linkages to ADM's concepts of framing and reframing during the operational framing process. Both concepts encourage an open dialectic process to generate a picture and narrative that enhance shared understanding of the current operational environment. The narrative changes and expands in unison to the changing and expansion of observed reality. Decision-makers use these models to guide their choices and monitor the effects of their actions on the environment. The Army added Boyd's OODA Loop theory to doctrine and professional military education.[31] It is important to note that Boyd rejected the notion of a total understanding of war; no framework can encapsulate war because of its temporary character. To use Boyd's theories, it is crucial to understand the interconnectedness between the elements within the same ecosystem. To understand the system, a practitioner must evaluate both the details of the world and the environment in which they occur.

[29] Boyd, *Destruction and Creation*, 1.

[30] Boyd, *A Discourse on Winning and Losing*, 153.

[31] US Department of the Army, *Field Manual (FM) 6-0 Commander and Staff Organization and Operations* (Washington, DC: Government Printing Office, 2003), 6–33. The OODA cycle is used to portray the command and control process with the goal of cycling faster than the antagonist through the decision-making process to make the antagonist's decisions less and less relevant in substance and timeliness.

Systems Theory: Making Sense of the Ecosystem

> Always keeping the larger perspective foremost in mind, the sage commander sees both the details of the world and the environment in which these details occur. Holding both of these in his mind at the same time, he begins to see the patterns that the details form. Perceiving their interconnectedness, he knows the actors through which they may progress. There is no certainty about how any single thing will turn out. This is how the sage commander begins to read the world and see the Tao of things.
>
> — Sun Tzu, *The Art of War*

This section is a primer in systems theory to help understand how the military can use frameworks to understand the adversary, the critical nodes in the complex system, and using the information to construct an operational approach. Before the incorporation of conceptual planning paradigms such as EBO, SOD, and ADM a planner was likely to view different components of the problem in isolation. The conceptual approach promotes wholistic analysis grounded in General Systems Theory (GST). The advantage of systems thinking is that the process increases the capacity to design, plan, and operate against an adversary in a complex world.

Humans continually search for methods that reduce complexity and promise certitude. In 1814 the French mathematician and astronomer Pierre-Simon Laplace dreamed of a deterministic equation capable of aggregating vast volumes of data. Historical data comprised from the previous state of the universe was amalgamated into an algorithm that could predict the future state of the universe. Thus, if one could collect enough data, they could eradicate uncertainty. Laplace named the omniscient creation the 'Laplace demon.'[32] By the twenty-first century, scientists did not believe the Laplace Demon was possible; in fact, they believed that uncertainty was eradicable.[33] The uncertainty principle, also known as the Heisenberg principle, asserted that there is a fundamental limit to the precision with which pairs of physical properties of a particle can be measured, it states that "the position and the velocity of an object cannot be measured

[32] Philip Tetlock, *Super Forecasting* (New York, NY: Broadway Books, 2015), 18.

[33] Ibid., 141.

exactly, at the same time, even in theory."[34] Therefore, if it is difficult even measure physical properties of a particle it is safe to assume that forecasting the behavior of a human system has levels of uncertainty. Phillip Tetlock suggests that "It is the dream of total certainty that is an illusion."[35] Thus, a complete understanding of a system and perfect foresight is not achievable. However, scientists did strike a balance between knowing all and helplessly reacting to the present. Systems theory is not the omniscient Laplace demon. However, the utility of the theory introduced the notion of analyzing components within a system without studying its parts in isolation.

In 1936, the biologist Ludwig Bertalanffy developed GST. The theory proclaimed that the properties and modes of action of components is greater when viewed in combination rather than isolation.[36] The principles of GST are in line with Aristotle's views of holism "knowledge is derived from the understanding of the whole and not the single parts."[37] Bertalanffy's concept introduced a new way of looking at systems, which moved away from reductionism, the traditional model of evaluating components disparity.[38] The GST indicates that analysts who work in fragmented yet parallel specializations should combine their unique knowledge under one framework. This combination shows that different elements share similar models, principles, and laws to govern the relationship between them. Bertalanffy's goal was to understand these laws and principles and apply them across the group, thereby looking at the disparate elements as a system.

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[34] Adam Augustyn, "Uncertainty Principle," *Encyclopedia Britannica*, last modified January 2019, accessed April 18, 2019, https://www.britannica.com/science/uncertainty-principle.

[35] William Byers, *The Blind Spot* (Princeton, NJ: Princeton University Press, 2011), vii.

[36] Ludwig Von Bertalanffy, *General Systems Theory: Foundations, Development, Applications* (New York, NY: George Braziller, 1969), 148. Bertalanffy originally published his book in 1936 in German.

[37] Christina Mele and Jacqueline Pels, "A Brief Review of Systems Theories and Their Managerial Applications" (Institute for Operations Research and the Management Sciences, 2010), 126.

[38] Bertalanffy, *General Systems Theory*, 32.

A system is a functionally, physically, or behaviorally related group of regularly interacting or interdependent elements which form a unified whole.[39] Anything composed of two or more related elements is a system. There are multiple types of systems: open or closed and deterministic or adaptive. The circulatory system is an example of a closed system.[40] A closed system is more understood than an open system, and any action in the system has a predictable outcome. A closed system can still be structurally complex, meaning it is composed of components that must be arranged in a specific pattern to operate, but the system is rigid; it exhibits predictable behavior. It is a deterministic system, composed of a few rules, fixed over time. EBO, which is covered in depth later in this paper, views friendly actions in the system will produce deterministic results. At the tactical level planners used EBO to identify structural targets, which represents a closed based system. It proved problematic in an open humanistic system.

A closed system can be a component of an open system. By expanding from the biological view of the system to the subsequent social system, one can see the circulatory system as a component of the human body. Next, the human is part of a family, and a family is considered an open social system with few boundaries.[41] A conflict system is a military example of an open system that is similar to the biological and social systems discussed above. The conflict system consists of inputs such as weapons, money, recruits, and knowledge. The amount of violence, control of territory, or changes in power are measurements of power within the

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[39] US Department of Defense, *Commander's Handbook for an Effects-Based Approach to Joint Operations* (Washington, DC: Government Printing Office, 2006), II–2.

[40] Ralph Stacey, *Complexity and Creativity in Organizations*, 3rd ed. (San Francisco, CA: Berrett-Koehler Publishers, 1996), 11. The heart, arteries, and veins are the predominant elements in the system. The system receives input, conducts a process, and generates output. The input of the system is blood, and the systematic process is the heart acting as a pump, and the output of the system is the amount of oxygen and nutrients delivered to organs and cells.

[41] Ibid. Zooming out further the family operates a farm in the local economic system. The local economic system interacts with social and political systems to create a state. The state interacts with other states to form a nation that is part of a global system. Thus, people reside in an interconnected ecology that is a system of a system.

system. The output of the system is a measurement of the most crucial variable, be it territory controlled or the number of civilians killed.[42] The interacting entities produce patterns of behavior. The system can be buffeted, constricted, or driven by outside forces.[43]

The conflict system is an example that enables a planner to understand the variables and interdependence within a system from a humanistic perspective. Although war as a human endeavor is not a new concept, using the lexicon to frame a military problem from the humanistic perspective provides a lens for the planner. Army Doctrine Publication (ADP) 3-0 states, "War is a human endeavor, a fundamental clash of wills often fought among populations."[44] Humans operate in these open conflict systems. They self-organize according to their world views and adapt their behavior to their environment. Adaptation is achieved by learning through positive or negative feedback loops which dampen or amplify their current behavioral patterns.[45] Because of this adaptive learning trait, the humanistic system operates on the edge of chaos.[46] Operating near the edge of chaos causes rival factions to fight for power and relevance. These different cultural and national subsets vying for power attempt to gain complete control by eliminating or absorbing the other elements into their sphere of control. The factions are resilient and evolve their behavior to fight for survival. Thereby they become a complex adaptive system (CAS) to

[42] Robert Lamb and Melissa Gregg, "Preparing for Complex Conflicts," *Policy Brief* No. 7, Washington, DC: US Institute for Peace, (October 2016): 2.

[43] Donella Meadows, *Thinking in Systems* (White River Junction, VT: Chelsea Green Publishing, 2008), 10.

[44] US Department of the Army, *Army Doctrine Publication (ADP) 3-0, Operations* (Washington, DC: Government Printing Office, 2012), 1–4.

[45] Jamshid Gharajedaghi, *Systems Thinking: Managing Chaos and Complexity*, 3rd ed. (Burlington, MA: Elsevier, 2011), 16. Social organizations self-organize through cultural codes based on beliefs, assumptions, and expectations.

[46] Dee Hock, *Birth of the Chaordic Age* (San Francisco, CA: Berett-Koehler Publishers, 1999), 27. Operating on the edge of chaos is the transition space between order and disorder where complexity is at the maximum with just enough self-organization to see cognitive patters emerge.

maintain their existence.[47] As a CAS their behavior is less predictable and deterministic. SOD and ADM which are discussed later in the monograph use an open systems philosophy in an attempt to understand and influence the propensity of the CAS.

In social sciences, a CAS consists of individual actors in a society that interacts with each other according to a set of rules. Any change in this structure will have ripple effects that change the behavior of other parts in the systems because they are contained within a web of interdependence. The behavior change is a phenomenon known as a learning system.[48] People act according to established rules or norms through self-organization. If an analyst views people in isolation, the environment seems chaotic. By zooming out and viewing the system as a whole, the observer can see patterns emerge over time. In a humanistic system different factors, like emotion, power, and strategy affect other agents. Each agent experiences a feedback loop based on discovery, choice, and action.[49] This co-evolutionary process leads to learning and change. Change is necessary to survive. As Boyd articulated in his 1976 paper, humans have an instinctual mind to survive and will cooperate or compete to remove or overcome physical and social environmental obstacles.[50] Spontaneous self-organization is not controllable, and the outcome is uncertain. To increase the degree of probability, a designer should study the system and evaluate historical data from past events. Understanding the system and increasing the probability of knowing where the propensity of the system is moving is the object of general systems theory in EBO and complexity theory in SOD and ADM.

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[47] John Holland, "A New Era in Computation," *Daedalus* (Winter 1992): 18. Complex Adaptive Systems change and reorganize their components to adapt themselves to the problem posed by their surroundings. This makes systems hard to identify and control, they become a moving target.

[48] Stacey, *Complexity and Creativity in Organizations*, 10. Learning happens when the individual components in the system interact with one another they examine and respond to each other's behavior to improve their behavior.

[49] Ralph Stacey, *Managing the Unknowable: Strategic Boundaries Between Order and Chaos* (San Francisco, CA: Jossey-Bass, 1992), 157.

[50] Boyd, *Destruction and Creation*, 1.

The next section provides the historical background in the evolution of abstract planning. This monograph already explained the start state, as the military used MDMP as the sole decision-making framework. Moving beyond MDMP the paper will explain the competing frameworks of EBO, SOD, and the emergent concept of ADM. Each conceptual planning tool was an attempt to understand the complex nature of warfare.The theories were rooted in a long lineage of thought and borrowed ideas from previous theorists to construct new frameworks that were useful to military planners to make sense of the operational environment and create a operational approach with a high probability of success, measured by the ability to achieve the desired effect. The table below elaborates on the four concepts.

Table 1. The History of Planning in Military Doctrine

Method	Manual or School	Salient Concept	Result
MDMP	*FM 5-0, Operations Process*	MDMP is a methodical process that seeks knowledge in complex environments and involves a step-by-step, systematic procedure	The process was not flexible enough to use for conceptual planning. It is streamlined for detailed planning after the planner frames the problem
EBO	*Commander's Handbook for Effects-Based Operations in the Joint Environment*	A goal of EBO is to "visualize the operational environment beyond the traditional military battlespace as an interconnected systems-of system while harmonizing and synchronizing military actions with instruments of national power."	Effects-based operations were deemed too deterministic, reserved for closed systems which are more predictable.
SOD	Israel Defense Forces Operational Theory Institute	Holistic analysis of a complex adaptive system while using continuous systems reframing to address uncertainty.	The IDF performed poorly in the second Lebanon war in 2006 using SOD. Many blamed the overly esoteric language of SOD and the inability for the military to apply it.
ADM	*FM 5-0, Operations Process*	Army Design Methodology is defined as "a methodology for applying critical and creative thinking to understand, visualize, and describe complex, ill-structured problems and develop approaches to solve them"	Army Design methodology is the officially adopted design process included in US Army doctrine.

Source: Salient concepts are derived from appropriate manuals listed in the second column

Moving Beyond Reductionism

> The whole is more than the sum of its parts, which outlines the basic rationality of using a systems theory approach.
>
> — Ludwig Von Bertalanffy, *The History and Status of General Systems Theory*

The Army required a conceptual planning tool that was not overly-mechanical nor too reductionist. Practitioners believed that MDMP was not the one-size fits all planning construct. In ill-structured problems, planners viewed the construct as too reductionist. Reductionism is necessary to scale down a complex subject into something understandable. It consists of organizing information into smaller chunks that are readily absorbed by the practitioner. Informally, reductionism is a habit of the mind to quickly make sense of the situation. Formally, reductionism is a philosophical and scientific principle that first appeared in the Enlightenment era.

Descartes, an enlightenment-age philosopher, approached problems by reducing them into the smallest pieces and understanding the simplest phenomena first, then applying the acquired knowledge to the more complex phenomenon. This process is the Cartesian analytic method. A method of reasoning that endorses "decomposing a problem into its parts and re-assembling it to yielded an understanding of the integrated whole."[51] A doctrinal example is the PMESII-PT framework which consists of Political, Military, Economic, Social, Infrastructure, Information, Physical Environment, and Time. The objective of the framework is to categorize complex elements into separate bins to reduce the system complexity via structure. Through compartmentalization, this process "breaks downs relationships, destroys linkages across scale and time and through over-simplification promises a false reduction in uncertainty."[52]

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[51] Alex Ryan, "What Is a Systems Approach?" (presented at the Eighth International Conference on Complex Systems, Booze Allen Hamilton, 2008), 3, accessed February 17, 2019, https://arxiv.org/pdf/0809.1698.pdf.

[52] Ben Zweibelson, "Three Design Concepts Introduced for Strategic and Operational Applications," *Prism* 4, no. 2 (2013): 94.

The goal of conducting abstract conceptual planning is to use models that reveal not destroy the relationships between objects in time and space. Several theorists warn of the danger in ignoring this goal. Peter Senge, the author of *The Fifth Discipline*, warns of a hidden price by fragmenting the world into smaller chunks. The problem-solver loses the intrinsic sense of connection to a larger whole.[53] Senge's warning is not a novel concept. In the Napoleonic Wars period, Herbert Scharnhorst, the Chief of Staff of the Prussian Army stated, "One must habitually consider the whole of war before its components."[54] At the turn of the 21st century, the US Army began to test conceptual planning models that were in line with Senge and Scharnhorst's logic. The US Army started to explore the logic of using a systems approach for conceptual planning. At the joint level, the US Joint Forces Commander, General James Mattis, desired a planning framework that relied less on strict procedural adherence while incorporating systems type thinking. He wanted a conceptual planning framework that encouraged critical and creative thinking in the early stages of planning.[55] The Army lead their an effort to fulfill General Mattis' request, eventually creating ADM. The foundational underpinnings of ADM originated from the Air Force's concept of EBO and the Israeli Defense Force concept of SOD. To understand the history of ADM, once must explore these two concepts further.

[53] Peter Senge, *The Fifth Discipline* (New York, NY: Doubleday Business, 1990), 24.

[54] Herbert Rosinski, "Scharnhorst to Schlieffen: The Rise and Decline of German Military Thought," *Navy War College Review* 29, no. 3 (1976): 85.

[55] Commander, US Joint Forces Command, Memorandum for US Joint Forces Command, Subject: Vision for a Joint Approach to Operational Design (Norfolk, VA, October 2009).

Effects-Based Operations and Systems of Systems Analysis

> An effects-based approach is one where operations against enemy systems are planned, executed, and assessed in order to achieve specific effects that contribute directly to desired military and political outcomes.
>
> — Air Force Doctrine Center White Paper, March 2004

In 2001, Secretary of Defense Donald Rumsfeld envisioned a plan to modernize the Department of Defense (DOD) through organizational restructuring and the exploitation of modern technology. Rumsfeld articulated that, "we need a new way of thinking and a new way of fighting."[56] As Rumsfeld transformed the physical structures of the DOD, the US Joint Forces Command (USJFCOM), the operational level military transformation engine, was experimenting with the Air Force network-centric concept, EBO, as a planning logic. It applied creative and critical thinking processes with deliberate methodologies for planning, executing, and assessing operations to create specific effects to achieve national security objectives.[57] USJFCOM defined EBO as a planning framework that "planned, executed, assessed, and adapted operations based on a holistic understanding of the operational environment in order to influence or change system behavior or capabilities using the integrated application of selected instruments of power to achieve directed policy aims."[58] EBO is a derivative of the broader concept of Network-Centric Warfare (NCW).[59] The advent of NCW principles was advanced in the 1990s as technology heightened levels of precision. Advocates believed that Western military technology could lift the

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[56] Donald Rumsfeld, *Quadrennial Defense Review Report* (Washington, DC: Government Printing Office, 2001), 3. President George W. Busch elevated the priority to transform the DOD. His goal was to secure the United States by gaining an advantage in the military element of national power.

[57] Ben Connable, *Embracing the Fog of War: Assessments and Metrics in Counterinsurgency* (Santa Monica: RAND Corporation, 2012), 60.

[58] David Johnson, *The Evolving Roles of Ground Power and Air Power in the Post-Cold War Era* (Santa Monica, CA: RAND Corporation, 2007), 187.

[59] Leonard Rickerman, "Effects-Based Operations: A New Way of Thinking and Fighting" (Masters Thesis, US Army Command and General Staff College, 2002), 1. The Joint Experimentation Directorate, J9, USJFCOM, followed the Unified Vision 2001to develop a new warfighting concept. The concept included adopting EBO under the promotion of MG David Deptula the Air Combat Command Directorate of Plans and Programs.

fog of war to provide a new level of environmental understanding by use of the System of Systems Analysis (SOSA).[60] The *Commander's Handbook for an Effects-Based Approach to Joint Operations* emphasized EBO as a process that started with understanding the enemy as a system through SOSA.[61]

This analytical process sought to understand a complex system by learning the components of the system and the linkages between them.[62] SOSA captured these elements in an overlapping Venn diagram consisting of multiple nodes contained within a circle and connected by links (see Fig. 2).[63] For example different nodes in a system are terrorist groups, financial networks, social networks, political leaders, and territory. The juncture of multiple linkages signals a source of enemy strength. These specific nodes were considered the strategic and operational centers of gravity.[64] Understanding the system and its center of gravity provides the commander with a targetable objective.[65] The commander then chooses between an indirect or direct approach to severing the links thereby isolating the system or directly attacking the COG. With either approach, the goal is to compel the enemy to change their behavior.[66]

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[60] Connable, *Embracing the Fog of War*, 60.

[61] US Department of Defense, *Commander's Handbook for an Effects-Based Approach to Joint Operations*, II–2.

[62] Lamb and Gregg, "Preparing for Complex Conflicts," 2.

[63] Connable, *Embracing the Fog of War*, 64. The effects-based concept is founded on "General Systems Theory." This is a view of the world as a set of systems composed of tangible elements (nodes) and their relationships (links) to each other.

[64] US Department of the Army, *Army Doctrine Publication (ADP) 1-02, Terms and Military Symbols* (Washington, DC: Government Printing Office, 2018), 1–26.

[65] Lamb and Gregg, "Preparing for Complex Conflicts," 2. The linkages between the groups can be the transfer of drugs, money, and weapons purchases. Linkages include both types of feedback loops. Negative feedback loops counteract the effects of inputs where positive feedback loops amplify the outcome.

[66] Allen W. Batschelet, *Effects-Based Operations: A New Operational Model?* (Fort Belvoir, VA: Defense Technical Information Center, April 9, 2002), 2, accessed February 17, 2019, http://www.dtic.mil/docs/citations/ADA404406.

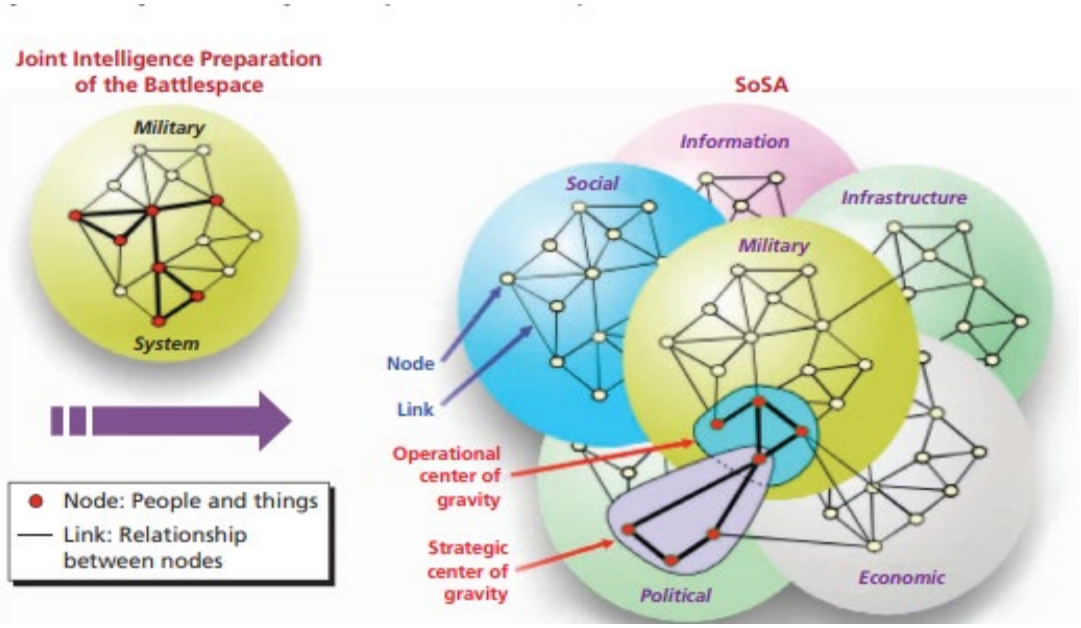

Figure 2. Systems of Systems Analysis. Joint Warfighting Center 2006, p II-2.

This SOSA analysis and subsequent targeting originated in a closed network at the tactical level. The Air Campaign of the Gulf War demonstrated the lethality of SOSA and EBO when it was combined with stealth technology, precision weaponry, and electronic counter-measures to disintegrate Iraq's Integrated Air Defenses Systems (IADS) in only twenty-four hours.[67] Air Force Major General David Deptula, a leading proponent of EBO, used the Desert Storm Campaign to promote the efficacy of the conceptual planning framework. He stated that EBO was used above the tactical level to synchronize the elements of operational art in time and space to destroy Saddam's defense network.[68] He argued EBO was a viable campaign planning methodology to use network-centric warfare to defeat future opponents.

EBO proponents, such as Admiral Arthur K. Cebrowski, then director of Office of Force Transformation, agreed with Deptula's assessment. He thought EBO represented a new focus to

[67] Williamson Murray and Kevin Woods, *Thoughts on Effects-Based Operations, Strategy, and the Conduct of War* (Fort Belvoir, VA: Defense Technical Information Center, January 1, 2004), 1.

[68] David Deptula, *Effects-Based Operations: Change in the Nature of Warfare* (Arlington, VA: Aerospace Education Foundation, 2001), 20.

conduct operations that "transformed the military into an agile, network-centric, knowledge-based force capable of conducting effective joint and combined military operations against future adversaries."[69] The genesis behind the idea was to create a form of parallel warfare that coordinated and synchronized operations to achieve a multiplicative effect. EBO planning incorporates simultaneous or parallel attacks. For example, a unit can plan to attack a closed physical network to reduce the functionality of command and control systems such as the IADS in Iraq, while degrading the enemy's operations by demoralizing them through massive artillery barrages before the attack and influencing the decisions of enemy leaders by making large scale ground preparations.[70] The goal of this parallel war is to achieve control over the adversarial system by exerting influence on their conceptual and physical centers of gravity.[71] To measure the qualitative effects of operations sensors and feedback mechanisms were placed strategically to evaluate the impact against the enemy and friendly centers of gravity. Rapid feedback allowed for quick adjustments to the course of action to meet the desired end state.

The Desert Storm air campaign design exploited the center of gravity approach as a "mindset that questioned how to impose force against enemy systems to achieve specific effects that would contribute directly to the military and political objectives of the coalition."[72] The Air Force marketed the concept to the Joint Force. The Air Force argued that parallel warfare was a useful tool that is useful beyond tactical targeting. It is capable of achieving synergistic effects for the Joint Force Commander.

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[69] Department of Defense, *Military Transformation, A Strategic Approach* (Washington, DC: Government Printing Office, 2003), 1.

[70] Paul Davis, *Effects-Based Operations, A Grand Challenge for the Analytical Community* (Santa Monica, CA: RAND Corporation, 2001), 23. The analytical work should be done to make a qualitative assessment of the enemies cognitive decision-making and behaviors of commanders, political leaders, and societies to increase the odds of success while minimizing the odds of troublesome side effects.

[71] William Head and Earl Tilford, *The Eagle in the Desert: Looking Back on US Involvement in the Persian Gulf War* (Westport, CT: Greenwood, 1996), 134. This chapter is written by David Deptula and explains parallel warfare, where it came from, and why it is important.

[72] Ibid., 143.

Merits of Effects-Based Operations

EBO aims to exploit an asymmetrical advantage to cause a psychological effect that breaks the will of the adversary.[73] EBO is rooted in Boyd's OODA Loop philosophy which attempts to get slow down the enemy's decision-making cycle through destruction thereby leading to confusions. A report from the Office of the Secretary Defense stated that EBO "is primarily about focusing knowledge, precision, speed, and agility on the enemy decision maker to degrade their ability to take coherent action rather than conduction combat operations on more efficient destruction of the enemy."[74] The Army did not endorse the EBO concept, yet components of the theory proved useful. They added the SOSA framework of Political, Military, Economic, Social, Structures, Information (PMESII) to MDMP as a mission analysis tool to enhance the tactical planner's understanding of an unfamiliar environment. The PMESII construct provided a common language across the military, interagency, and international organizations to understand the socioeconomic makeup, political systems, and other factors in the operational environment. However, this is method is reductionist as stated earlier. To gain a deeper understanding the planner must visually depict the information through a node and link analysis to show relationships between the disparate elements of PMESII. Outside of doctrine, EBO increased the robustness of information sharing networks to enhance situational awareness and interoperability among the different branches of service.

Deficiencies of Effects-Based Operations

EBO is capable of achieving desired outcomes when targeting well-defined, closed systems such as power grids, road networks, or railway infrastructure.[75] Its effectiveness in an open humanistic system is disputable. However, EBO assumes a level of unachievable

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[73] Department of Defense, *Military Transformation*, 34.

[74] Ibid.

[75] Milan Vego, "Effects-Based Operations: A Critique," *Joint Force Quarterly*, no. 41 (Quarter 2006): 21.

predictability in a complex system that moved further from the humanistic nature of war towards a scientific approach to war.[76] In the SOSA analysis, EBO practitioners applied linear cause and effect relationships to determine what action can produce what effect based on the nodal links. EBO was supposed to quantify both the tangible and intangible elements of war with absolute certainty, even at the operational and strategic level.[77] EBO was a transformational movement that promised to lift the fog of war by systematically targeting the critical nodes. However, achieving the desired effects with deterministic certainty is hard to achieve. Networks contain multiple causalities, as Jervis stated, "many outcomes are unintended and regulation is difficult, referencing the fact that crucial effects are delayed or indirect."[78]

EBO would certainly benefit from the recent surge in Artificial Intelligence (AI) that dramatically increases the capability and capacity to reach a level of perfect information. With AI humans are closer to developing the Laplace Demon. Senior leaders believe that AI will enable better decision-making. The Secretary of the Army, Mark Esper stated, "in some ways, AI will be able to lift the fog of war that can prevent actions that lead to bad outcomes."[79] Even with AI it is doubtful that humans or machines can create a battle zone devoid of mishaps, miscommunications, and misunderstandings. The notion of perfect intelligence is antithetical to Carl Von Clausewitz's longstanding idea that fog and friction will impact warfare.[80]

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[76] Milan Vego, "Effects-Based Operations: A Critique," *Joint Force Quarterly*, no. 41 (Quarter 2006): 51.

[77] Ibid., 53.

[78] Robert Jervis, *System Effects* (Princeton, NJ: Princeton University Press, 1997), 29.

[79] Sarah Boden, "CMU, U.S. Army Partner To Create AI For Future Wars," *Witf.Org*, last modified February 6, 2019, accessed March 9, 2019, http://www.witf.org/news/2019/02/cmu-us-army-partner-to-create-ai-for-future-wars.php. The army activated an Artificial Intelligence Task Force to develop the military use for AI.

[80] Carl von Clausewitz, *On War*, trans. Michael Eliot Howard and Peter Paret. (Princeton, NJ: Princeton University Press, 1989). Clauswitz wrote on the reliability of intellengence when he stated, "A general in time of war is constantly bombarded by reports both true and false; by errors arising from fear or negligence or hastiness." Therefore, war should be gauged in probabilities not certainties.

General James Mattis did not agree with the notion that EBO could cut through complexity with certainty. In a USJFCOM letter, he declared, EBO "discounts the human dimensions of war (passion, imagination, willpower, and unpredictability)."[81] Mattis stated, "EBO is too prescriptive and over-engineered" because war operates in a dynamic environment negating the ability to predict the outcome in a scenario that contains an infinite number of variables.[82] EBO is not capable of precisely anticipating the psychological effect on the enemy's will to fight because war is not devoid of emotion.[83] Because people can choose unpredictable and irrational options, they are impossible to predict. The enemy has free will, courage, and resolve to defy prediction.

Opponents of EBO and SOD focused on the conduct of the Second Lebonon War as a demonstration of the concepts shortcomings. The IDF senior leadership was versed in SOD, yet they recently converted to EBO to use as their design construct to develop an operational approach against Hezbollah. The US Army Combined Arms center issued a report that chastised the confusing lexicon of EBO and criticized two foundational guiding assumptions. First, the IDF assumed that air superiority alone was decisive. The Israeli Defense Forces invested heavily in their Air Forces at the expense of the Army. Second, they believed it was possible to anticipate an adversary's reactions with certainty in the complex environment.[84] Based on these two assumptions the IDF discovered that EBO is an intellectual 'Maginot Line' around which the enemy can maneuver."[85] Based on the dismal results of the campaign the Army divorced itself from EBO in 2007, concluding the mechanical principles were not a useful logic to guide their

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[81] James N Mattis, "USJFCOM Commander's Guidance for Effects-Based Operations," *Parameters* (Autumn 2008): 1.

[82] Ibid.

[83] Vego, "Effects-Based Operations: A Critique," 53.

[84] B.H. Liddell Hart, *Strategy*, 2nd ed. (London: Faber & Faber, 1967), 385. Hart warns that air superiority alone does not make up for bad Generalship on the ground.

[85] Mattis, "USJFCOM Commander's Guidance for Effects-Based Operations," 2.

campaigns. Shortly after this General Mattis published a joint memorandum to remove EBO from all joint documents. He stated, "The underlying principles associated with EBO and SOSA are fundamentally flawed and must be removed from our lexicon, training, and operations."[86] Simultaneously he issued a new memorandum, *Vision for a Joint Approach to Operational Design.* The latter memorandum acknowledged the Army was spearheading a new operational problem-solving approach using operational design under the label SOD. SOD focused on improving the commander's ability "to think clearly and deeply about the fundamental nature of the complex problem, to design a broad approach to achieving objectives and accomplishing the mission, and how to change approaches when circumstances change."[87]

[86] Mattis, "USJFCOM Commander's Guidance for Effects-Based Operations," 2.

[87] Commander, US Joint Forces Command, Memorandum for US Joint Forces Command, Subject: Vision for a Joint Approach to Operational Design.

Systemic Operational Design

> When ends are confused and conflicting, [and] there is not yet a clearly defined problem to solve; it is through the process of framing the complex situation that we may organize and clarify both the ends and the possible means to achieve them.
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> — Donald Schon, *The Reflective Practitioner*

In 2003 the conventional phases of the Iraq invasion were nearing completion. The US military found itself unprepared to cope with the evolving character of war, unconventional warfare which followed. Once the Iraqi military dissolved, the character of war morphed into a non-linear conflict characterized by a trend of episodic violence and confusion. The insurgency contained multiple fractured powers such as the Shia and Sunnis, former Baathist and foreign jihadis, and criminal and tribal groups. Because of the different ideologies, the entities rarely worked in unison. This unconventional campaign began with an amateur adversary against a professional military, yet the adversary proved competent, continually adapting their tactics to exploit the weaknesses of the US military.[88] The iterative evolution in tactical fighting increased the insurgencies lethality, resulting in a spike of US casualties. The increased costs in blood magnified the scale and scope of the Iraq problem.[89] One reason the US military was losing more soldiers to the less sophisticated enemy because is the US Government as a whole did not anticipate the enemy's transformation from conventional force to an insurgent force.[90] At the

[88] Bruce Hoffman, *Insurgency and Counterinsurgency in Iraq* (Santa Monica, CA: RAND Corporation, 2004), 6; Hart, *Strategy*, 365. General John Abizaid, the commanding General of US Central Command, asserted that the insurgency was evolving from disparate groups to organized groups and they exhibiting learning behavior. The insurgency groups are adapting to the coalition tactics, techniques, and procedures; Hart emphasizes that guerrilla warfare must always be dynamic to maintaining the insurgent momentum and pressure on the occupying force. Staying in a defensive stance allowed the opposing belligerent to win the hearts and minds of the local populace, thereby reducing support for the insurgency.

[89] Hoffman, *Insurgency and Counterinsurgency in Iraq*, 14. The numbers show a 41% increase in fatalities in early 2004, making the argument that insurgents' killing efficiency and effectiveness was increasing.

[90] Eliot Cohen, *Military Misfortunes, The Anatomy of Failure in War* (New York: Free Press, 1990), 249; Hoffman, *Insurgency and Counterinsurgency in Iraq*, 20. Eliot Cohen discusses three types of failure, one being the failure to anticipate. Hoffman believes the US Army failed to anticipate, identify, and adapt to the insurgency. US military planners failed to recognize the transformation of the organized resistance into an insurgency for over a year and a half. This allowed the insurgents to gain a foothold before the United States crafted a strategy of organized opposition.

tactical level, understanding the environment is crucial to winning engagements and minimizing losses. It is arguably more important that senior leaders at the operational level make sense of the environment to design a campaign plan that enables tactical success. The US Army needed to think differently about the conflict. The unconventional traits of the Iraq campaign served as the catalyst to develop a new conceptual planning tool to encourage critical and creative thinking to understand the environment, frame the problem, and develop an operational approach. The United States turned to an IDF theorist that was promulgating the concept of SOD.

SOD is the brainchild of Israeli Brigadier General Retired Shimon Naveh. The goal of SOD is to understand complexity by using systems thinking to translate strategic direction into operational level design. He combined three concepts: systems thinking, Soviet Operational Art, and design to create a new mental model for the IDF. Three School of Advanced Military Studies officers summarized Naveh's logic in their monograph, where they stated, "SOD focused on the relationships between entities within a system to develop the rationale for systemic behaviors that account for the logic of the system, facilitating a cycle of design, plan, act, and learn."[91] The new philosophy enabled a creative and unique way for the military to make sense of the war they were in and how they saw themselves in the war.[92]

The SOD framework is composed of seven sets of structured discourse groupings broken into two components: Systems framing through the exploration of a rival as a rationale, command as a rationale, and logistics as a rationale. Systems framing is an attempt to inform the planner of the relevant source of physical and phycological underpinnings that shape the adversarial worldview. Using the rival as a rational is an exploration of the rival's logic, motives, and

[91] Pendall Blakesley, Sorrells Walk, and Wallwork Downing, "Systemic Operational Design: An Introduction" (Monograph, School of Advanced Military Studies, 2004), i.

[92] Ben Zweibelson, "Changing Change While It Changes: The Rise of Disruptive Military Thinking (Part 2 of 3)," *Over the Horizon: Multi-Domain Operations and Strategy*, December 5, 2018, 2, accessed February 16, 2019, https://othjournal.com/2018/12/05/changing-change-while-it-changes-the-rise-of-disruptive-military-thinking-part-2-of-3/.

behaviors to understand their actions and their interconnectedness with the overall system.[93] Because all information was not readily present, friendly forces needed to probe the adversary. The use of small tactical provocations caused adversarial reactions that produced emergent intelligence that informs the planner of the rival's rationale.[94] The second rationale explored the command, which identified the tension between the existing command structures and those proposed by design. The third rationale explored logistics by examining the use of available logistics structures to enable the sustainment of maneuver in the design. Once a planner understands the three rationales, they construct an operational frame to translate the strategic logic into an operational plan.

The operational frame is the combination of art and science to achieve the strategic objective. It illustrates the location of forces in space and time along with their purpose. This battlefield arrangement enables operational maneuver within the context of the previous rationales: rival, command, and logistics.[95] Operational effects enable the achievement of end state conditions by using military action to exploit the tensions between the elements of a rival and the system as a whole. To achieve the desired effects against a system the commander uses system interventions to guide future action. Naveh drew on John Boyd's "Creation and Destruction" theory to understand how to recognize new patterns, possibilities, or logic that either validate the current approach or require the planner to reframe and possibly redesign their approach. Finally, the forms of function are a transition from a central idea that guides the

[93] Blakesley, Walk, and Downing, "Systemic Operational Design: An Introduction," 24.

[94] Eyal Weizman, "Lethal Theory," *Log*, no. 7 (Winter/Spring 2006): 53–77. In a guerrilla campaign little centralized intelligence is known about the enemy, therefore attacking and prodding them will induce the enemy to reveal itself and give shape to understand their system and attack it with more precision. A term called swarm intelligence referred to decentralized and unsophisticated intelligence of these attacks then when combined into a system reveals more than the individual component parts.

[95] Blakesley, Walk, and Downing, "Systemic Operational Design: An Introduction," 26.

conceptual logic to the physical activity composed of tasks. The forms of function are bound to the structural logic of the design that disrupts the adversary-as-a-system. [96]

SOD itself is an evolutionary product. The first phase of SOD started in 1995, a period marked by relatively stable relationships amongst Israel and its Gulf state neighbors of Syria, Egypt, and Jordan. Israel had the United States as a powerful ally, and the primary threat was Hezbollah, the Iranian-backed group, that operated in Southern Lebanon. With a relatively quiet background, BG Shimon Naveh completed his PhD in war studies at Kings College, London. He set out to explore the philosophical theories of Russian and Anglo-Saxon influenced operational art and advanced his ideas amongst trusted IDF senior officers. At the time, the IDF Chief of Staff allowed Naveh's private think tank, the Operational Theory Research Institute (OTRI), to explore alternative maneuvering concepts against future potential threats. The OTRI filled an operational void for the IDF. OTRI examined previous campaigns, noticing the IDF's failure to link the strategic context to tactical operations. OTRI's goal was to experiment with strategic planning that moved beyond the detailed planning at the tactical level. [97] The principles of SOD sought to go beyond the basic common understanding by moving towards abstract notions then transforming the abstract notions into concrete understanding.

Naveh and his research institute were removed from the IDF in 2005 when a new chief of staff took charge of the IDF. Lieutenant General Halutz, a conservative Israeli Defense Forces Chief of Staff, believed the concept interfered with his vision for the IDF. When the Naveh was fired from the IDF, other militaries to include the US Army opened their doors to SOD. [98] One schoolhouse, took notice of the philosophical movement. BG(R) Wass de Czege, championed the

[96] Blakesley, Walk, and Downing, "Systemic Operational Design: An Introduction," 28.

[97] Ofra Graicer, "Self-Disruption: Seizing the High Ground of Systemic Operational Design (SOD)," *Journal of Military and Strategic Studies* 17, no. 4 (2017): 24.

[98] Ibid., 27.

SOD model. He believed its adoption could increase the efficacy of operational art.[99] He was pivotal in establishing SAMS as the SOD testing institution for the US Army.

Wass de Czege envisioned SOD as the cognitive model capable of mapping the human complexities of war while enabling fluid adaption to change. Six SAMS' students volunteered to be a part of the SOD pilot project. Naveh instructed the students through an epistemological study of operational art, systems theory, and post-modern principles to explain the nature and structure of SOD.[100] The instruction challenged student's interpretations of reality. For example, he challenged students to explain what an alleyway is and to stretch their boundary of accepted belief. A laymen defines an alleyway as a narrow walkway between two buildings. Naveh challenged students to use French post-modernist interpretations to broaden their understanding of an alleyway. Using the post-modern lens, a Soldier views the alleyway not as a walkway, but as a fatal funnel where an enemy is lurking behind every window and door. This concept is taken one step further, arguing that humans can walk through walls. In the 2002 Nablus urban fight, the IDF "walked-through walls" by inversing geometry to avoid the streets, courtyards, and alleyways. They chose to move horizontally through walls and vertically through holes blasted in the structures, "rather than submit to the authority of conventional spatial boundaries and logic, the movement became constructive of space."[101] The three-dimensional form of warfare reinterpreted architectural and urban syntax.

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[99] Huba Wass de Czege, "Systemic Operational Design: Learning and Adapting in Complex Missions," *Military Review* (February 2009): 2–12. BG Huba Wass de Czege, was a principle developer of the Army's AirLand battle concept, the founder of the School of Advanced Military Studies, and a leading advocated of adopting SOD into the Army under the label of design.

[100] Mary Jo Hatch, *Organization Theory: Modern, Symbolic, and Postmodern Perspectives* (Oxford: Oxford University Press, 1997), 13. Epistemology is a branch of philosophy that is concerned with the theory of knowledge by exploring what it is, its justification for coming to belief, and how it is known. It relates to concepts such as truth, belief, and justification.

[101] Weizman, "Lethal Theory," 1. Lethal theory is an interview by the architect researcher Eyal Weizman with Shimon Naveh, OTRI, to understand the formulation of theories in the IDF municipal wars.

The six SAMS students absorbed Naveh's radical post-modernist concepts. The culminating event of instruction was the 2005 Unified Quest exercise held in Washington, DC against other teams that used MDMP and EBO as their guiding logic to develop operational approaches to ill-structured problems. The SOD team developed a creative solution that leveraged the indirect approach. The radically different and novel approach to the problem impressed senior Army leaders.[102] Senior leaders also witnessed majors discussing theory and philosophy when designing their plan versus dogmatic adherence to doctrine. In the midst of a period of uncertainty, this approach struck a positive chord with some.

The positive feedback prompted a 2006 SAMS elective, followed by a 2007 expansion. In 2008 the school integrated the pilot course curriculum into the core curriculum.[103] Instructors replicated the same design environment that impressed senior leaders at Unified Quest in the SAMS classroom at Fort Leavenworth. The classroom was radically different from standard staff exercises. Students formed a horseshoe around whiteboard drawings and drew systems diagrams and other visualizations while engaging in an expository dialogue of complex ideas. The groups were self-organized and were not following a sequential checklist.[104]

The Merits of Systemic Operational Design

SOD challenges overly determinist thinking while encouraging the commander to learn from the system through probing and feedback loops. Because the SOD framework is not deterministic, it does not advocate that inputs lead to equal and planned outputs. Central to the concept is acknowledging the irrationality of humans and the reasons they act versus perfect

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[102] Blakesley, Walk, and Downing, "Systemic Operational Design: An Introduction," iii. Exercise Unified Quest is the US Army's annual Title X war game.

[103] Alex Ryan, *Art of Design: Student Text*, Version 2.0 (Fort Leavenworth, KS: Strategic Advanced Military Studies, 2007), 1.

[104] Alex Ryan, "A Personal Reflection on Introducing Design to the U.S. Army," *Medium*, November 4, 2016, 2, accessed February 17, 2019, https://medium.com/the-overlap/a-personal-reflection-on-introducing-design-to-the-u-s-army-3f8bd76adcb2#.lqhycz1g7.

prediction.[105] To understand human combatants on the battlefield SOD challenged designers to discard the traditional maneuver paradigm of Euclidian geometric order for the principle of non-linear warfare in space, organization, and temporal terms.[106] In 2005 the Middle Eastern environments were characterized by non-linear warfare. The insurgency was characterized by combatants who were both civilian, and enemy separated only by a matter of minutes. Therefore, any action against a combatant or civilian could result in a multitude of reactions. A planner operating in this complex environment desired a spatial and organizational model such as SOD to help to understand the insurgency as a CAS.[107] Although helpful in making sense of the mess these theories challenged current doctrine.

SOD pushed designers beyond their knowledge, experience, values, and bias to create a new design. A central component of SOD is unloading the cognitive baggage by unshackling the process from dogmatic doctrine adherence. Going beyond current doctrinal frameworks is necessary because the world is in constant flux. The SOD inquiry process focuses on the designer's line of inquiry to arrive at new cognitive maps of the current state of reality.

The essential aspect of SOD is the ability to learn from the system to guide future actions and "rationalizing the emergence" which is understanding the effects of inputs through sensors and reports then devising an appropriate response.[108] The learning should show a linkage between strategic logic and operational actions to create a stratagem that has no precedence while rationalizing the potential for success or failure.[109] SOD emphasizes that the designer must be cognizant of confirmation bias while learning. If the design team undergoes a grueling session to

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[105] Blakesley, Walk, and Downing, "Systemic Operational Design: An Introduction," 13. The reason could be based on a beliefs, desires, or intention.

[106] Weizman, "Lethal Theory," 4.

[107] Senge, *The Fifth Discipline*, 86. CAS systems are not controllable; however, a planner can strive to dampen undesirable behaviors or amplify desirable ones to move the system towards an ideal state.

[108] Blakesley, Walk, and Downing, "Systemic Operational Design: An Introduction," 34.

[109] Graicer, "Self-Disruption: Seizing the High Ground of Systemic Operational Design (SOD)," 37.

untangle a complex phenomenon yet confirms the same strategy, current operations, and current paradigms they are expending time and energy without successfully designing.[110]

SOD is meant to be practiced by way of egalitarian discourse, unrestricted by rank. The goal is to understand the system through shared understanding and driven by the need to understand why and how versus what. SOD places the problem within the geo-strategic context, thereby providing insight into how the national elements of power can be applied. Naveh believed the SOD planner should be at the intermediate level between the high commander and the tactical commander. They could serve as the architect to "enable the military organization to understand what the problem is, define it, and interpret it through the engineers or tactical executors."[111] In the absence of this critical architectural link between the strategic realm and the tactical level, the tactical commander and the strategic commander cannot communicate effectively.

Deficiencies with Systemic Operational Design

SOD pessimists had three major concerns in its practical usage. SOD requires a relatively large amount of time. For many, SOD's esoteric language convolutes understanding. Finally, the dismal performance of SOD as a guiding rationale in the Second Lebanon War seemed to indicate its shortcomings.[112] The seven discourses require ample time to achieve the required level of understanding and even longer time to iterate through cycles of focused inquiry and synthesis. The increased demand on time means it is not intended for use at the tactical level or fast-moving operational problems that demand action. However, this is a noted limitation. SOD was not

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[110] Graicer, "Self-Disruption: Seizing the High Ground of Systemic Operational Design (SOD)," 36. SOD is a form of inquiry that uses a sequence of discourse to transform the abstract into the concrete cognitive frames. Using Donald Schoen, re-framing is done by constructing and deconstructing frames over time to understand the concept through dialectic deliberation. Each round of questioning ended in synthesis to create a new holistic cognitive frame.

[111] Yotam Feldman, "Dr. Naveh: How I Learned to Stop Worrying and Walk Through Walls," *Haaretz*, October 25, 2007, 2, accessed March 3, 2019, https://www.haaretz.com/1.4990742.

[112] Matt Matthews, *We Were Caught Unprepared, The 2006 Hezbollah-Israeli War* (Fort Leavenworth, KS: Combat Studies Institute, 2006), iii. Israeli reliance on poorly understood and controversial EBO and SOD warfighting theories, and a nearly singular dependence on air power were root causes of Israeli problems.

intended for everyday use; it is reserved for occasions when the strategic sponsor runs into an ill-structured problem of high importance that demands dedicated time and human resources to structure the problem. If the designer runs into a structured problem, there is no need to expend additional mental energy for marginal gain, switch to MDMP.

Second, the dense philosophical language and abstract concepts of SOD pose problems for the IDF and US Army to incorporate the theory into the officer professional military education model and disseminate the terminology to the lower level forces in combat. Naveh stated, "The theory is not easy to understand; my writing is not intended for ordinary mortals."[113] The plethora of dense flow charts and labyrinthine of conceptual grids move beyond generic Army doctrine.

Third, critics claimed the IDF's poor performance in the Hezbollah War was partially due to SOD infecting the operational decisions of the general officers executing the war.[114] Naveh indoctrinated the IDF Generals of the 2006 Lebanon War with post-modern ideas at the expense of classical military theorists, which ironically reduced their effectiveness in operational art.[115] The IDF chose an air heavy strategy with an indirect probing approach, yet by employing SOD principles they improperly assessed the situation and their obliquity of action failed to disrupt the enemy's mental and physical freedom of action.[116] The US Army studied the Second Lebanon

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[113] Feldman, "Dr. Naveh," 1.

[114] Avi Kober, "The Israel Defense Forces in the Second Lebanon War: Why the Poor Performance?," *Journal of Strategic Studies* 31, no. 1 (February 2008): 33. The IDF was educated in SOD as a systems construct. One year prior to the conflict they replaced SOD with EBO as their guiding logic. EBO emphasized the cult of technology paired with perfect intelligence by use of precision weaponry and Air Force at the expense of ground maneuver. There were other factors that lead to their loss to include political hesitation, yet the prioritization of air power guided by EBO was a costly assumption.

[115] Matthews, *We Were Caught Unprepared, The 2006 Hezbollah-Israeli War*, 61. The IDF conducted limited raids and probes into Southern Lebanon in attempts to produce a cognitive collapse of the Hezbollah at the expense of violent systematic clearings allowed the Hezbollah to regain their footing and prolong the war.

[116] Hart, *Strategy*, 384. Obliquity refers to the angle of attack on the enemy by use of director or indirect approach. Understanding this is a mental task that requires correct assessment of the situation as there are no discernable laws that govern the war.

War and determined that neither EBO nor SOD would be adopted as a cognitive planning tool in their current form. Each had attractive components. However, the Army needed a tailored approach to integrating with current doctrine.

Army Design Methodology

> Design does not replace planning, but planning is incomplete without it. The operational design must help the commander provide enough structure to an ill-structured problem so that planning can lead to effective action toward strategic objectives. Executed correctly, the two processes always are complementary, overlapping, synergistic, and continuous.
>
> — General James N. Mattis, *Planners Handbook for Operational Design*

The principles of ADM first appeared in the 2006 edition of FM 3-24, *Counterinsurgency.* Two years later SAMS published the *Art of Design* which encapsulated a number of Naveh's teachings of post-modernist theory, design, and systems framing. In 2008, the Army Capabilities Integration Center authored Commanders Appreciation and Campaign Design (CACD). It outlined an experimental process that focused on using a cognitive framework to assist commanders with the conceptual process of problem setting, developing understanding, and setting paradigms. CACD describes the process to create a shared understanding of an ill-structured problem and design a broad approach to achieve identified objectives. The intent for the CACD cognitive framework was to link tactical actions to strategic aims at the operational level of war. Doctrine writers built CACD on the lessons from the Army's Future Warfare Study Plans and the capstone operational-level wargame, Unified Quest in 2005-2007. [117]

In 2009, the US Army published interim FM Interim 5-2 *Design* and the US Army Combined Arms Center published *Design: Tools of the Trade;* In 2010 doctrine authors dedicated an entire chapter in FM 5-0 *The Operations Process* to design. The inclusion in FM 5-0 was a signal that the Army officially adopted the concept. The point of contention was the fact that FM 5-0 distilled 3,000 pages of SAMS curriculum into thirteen pages of doctrine. In 2011 the Army

[117] US Department of the Army, *TRADOC Pamphlet (TP) 525-5-500, Commander's Appreciation and Campaign Design* (Washington, DC: Government Printing Office, 2008), i.

modified the term from design to Army Design Methodology and included it in ADP 5-0, *The Operations Process*.[118] The Army released a copy of the current FM 3-0, *Operations* in 2018 and a new FM 5-0 will accompany the manual. The most current take on ADM will be included.

Design was the chosen conceptual planning tool. It served as a "methodology to apply critical and creative thinking to ill-structured problems and develop approaches to solve them."[119] It is the by-product of Army efforts to find a systems-based framework that integrated with the current institutional doctrine and processes. The goal of design like SOD was for the commander to use an expository dialogue with their design team to gain a deeper understanding of the environment, a deeper understanding of the problem, and visualize an operational approach. ADM incorporates concepts from GST, SOD, and EBO while still adhering the guidelines of the Army institution and its' doctrine.

Merits of Army Design Methodology

ADM thinking is more than theory, process, or product. It is a conceptual construct that encourages critical and creative thought to understand ill-structured problems. ADM provides an understanding of the "composite of the conditions, circumstances, and influences that affect the employment of military forces and bear on the decisions of the unit commander."[120] Like EBO and SOD, ADM uses a systems approach to make sense of the environment. Unlike previous systems approaches ADM increases the accessibility of the concept by lowering the barriers of entry.

Army's design advocates adopted simplified lexicon to ease the learning curve associated with the new planning paradigm. It was a deliberate decision to reduce the complexity of the

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[118] US Department of the Army, *Field Manual (FM) 5-0 The Operations Process* (Washington, DC: Government Printing Office, 2010), 3–1. Design is the methodology for applying critical and creative thinking to understand, visualize, and describe, ill-structured problems and develop approaches to solve them.

[119] Ibid.

[120] US Department of the Army, *Army Doctrine Reference Publication (ADRP) 1-02, Operational Terms and Graphics* (Washington, DC: Government Printing Office, 2016), 1–70.

lexicon to integrate ADM with traditional doctrine better which smooths the transition from conceptual planning to detailed planning (see Fig. 3). For example, operational design elements such as objective, end state, and line of operations are design tools and elements of operational art. Minimizing the esoteric language reduces the level of abstract thought desired. However, the product as it stands encourages metacognition to develop an understanding of the environment and the problem. ADM provides a balance between innovative and adaptable thinking while still producing actionable results. Where and how to apply design rests in the judgment and creativity of the planner to fit the operational setting, timeframe, and team dynamics.

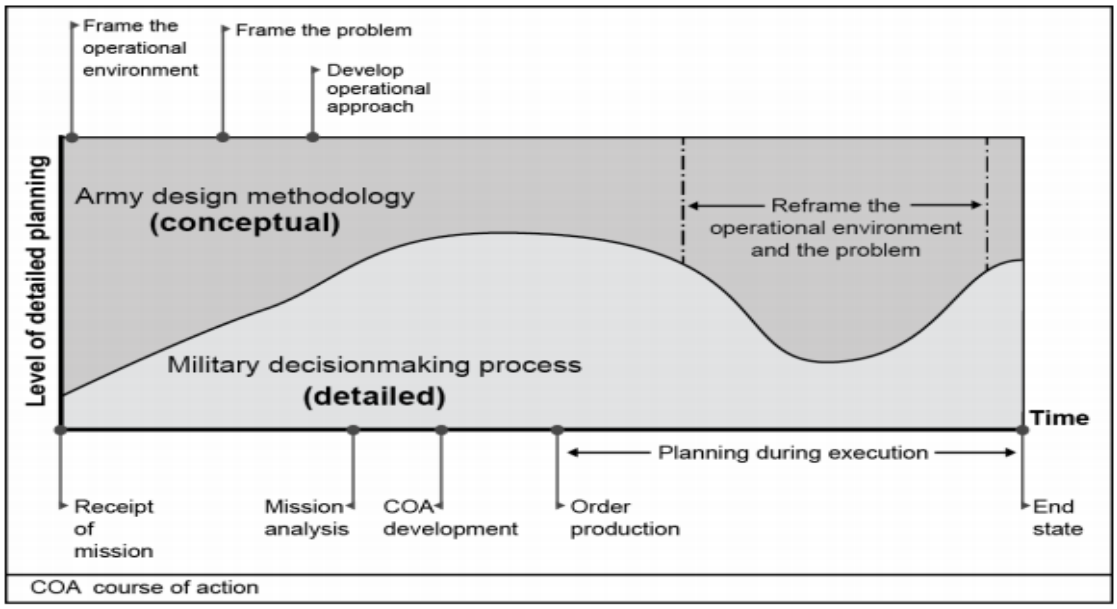

Figure 3. The Integrated Planning Concept. *Army Techniques Pamphlet (ATP) 5-0.1, Army Design Methodology* 2010, 2-2.

ADM was not intended to replace MDMP. It complements and enhances the overall planning process. ADM serves as the conceptual tool that enables commanders and staffs to make sense of the environment they are in and design a solution based on that understanding before moving into detailed planning. Army FM 3-24*, Counterinsurgency* stated*,* "the purpose of design is the achieve a greater understanding, a proposed solution based on that understanding, and a

means to learn and adapt.[121] ADM is a crucial and preemptive step that informs detailed planning. ADM produces a solution, which is distinct from a course of action. The design solution informs the commander's intent where detailed planning compares multiple COAs that synchronize activities to achieve an end state. The staff uses MDMP to convert the broad concepts of ADM into feasible and executable plans.

Issues with Army Design Methodology

The concept of ADM is drastically different from Naveh's original concept. Over 3,000 pages were required to understand SOD, yet only thirteen pages of doctrine are available to educate the novice designer. The design methodology was supposed to address the complexities of modern, ill-defined conflict. The ten-year evolution of design creates multiple design camps that embrace separate language and logic.

An early version of design stated:

> Design is a commander-driven process of structured discourse to understand and modify strategic guidance in order to frame the problem and solution for the operational planners.[122]

FM 3-24 defined design as:

> To achieve a greater understanding, a proposed solution based on that understanding, and a means to learn and adapt.[123]

Joint doctrine defined design as:

> The conception and construction of the framework that underpins a joint operation plan and its subsequent execution . . . design is the practical extension of the creative process. Together they synthesize the intuition and creativity of the commander with the analytical and logical process of design. The key to operational design essentially involves: (1) understanding the strategic guidance (determining the end state and objectives); (2)

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[121] US Department of the Army, *Field Manual (FM) 3-24, Counterinsurgency* (Washington, DC: Government Printing Office, 2006), 4–1.

[122] Mark Inch, "Systemic Operational Design: Case A Outbrief." (Presented at the Exercise Unified Quest, Carlisle, PA, May 6, 2005).

[123] US Department of the Army, *US Army, FM 3-24 (2006)*, 4–2.

> identifying the adversary's principal strengths and weaknesses, and; (3) developing an operational concept that will achieve strategic and operational objectives.[124]

The US Army defined design as:

> A methodology for applying critical and creative thinking to understand, visualize, and describe complex, ill-structured problems and develop approaches to solve them.[125]

As with any new concept, the iterative nature can confuse what the concept means and what its purpose is. The release of Army Technical Pamphlet 5-0.1 *Army Design Methodology* clarified some of the confusion. This eighty-two-page pamphlet describes the most updated activities of ADM and provides the techniques for framing operational environments, framing problems, developing operational approaches, and reframing.[126] The pamphlet helps commanders and staffs with the "understanding, visualizing, and describing of operations as an aid to conceptual planning."[127]

Conclusions

Doctrine needs to be written clearly and succinctly for all leaders to understand the concept. ADM succeeded where EBO and SOD failed. The convoluted lexicon of EBO and SOD produced higher levels of abstract thinking yet there was a steep learning curve to understand the concept. In an already time-constrained environment, the Army required a process that provided seamless integration into their established doctrine. ADM as the conceptual planning process integrates into the detailed planning process of MDMP, demonstrating a complimentary relationship. Neither SOD or EBO contained logic and language that was complimentary to established military practices. Therefore, under these constructs planning was subject to misunderstanding at the execution level. US analysts witnessed the IDF's faulty implementation

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[124] US Joint Staff, *JP 5-0, Joint Operations* 2017, IV–1.

[125] US Army, *FM 5-0 (*2010), 3–1.

[126] US Department of the Army, *Army Technical Publication (ATP) 5-0.1, Army Design Methodology* (Washington, DC: Government Printing Office, 2015), iii.

[127] Ibid., iv.

of EBO and SOD in the second Lebanon War, attributing the General Officers conceptual mistakes to the convoluted guiding logic of EBO and SOD. In order for the tactical elements to achieve operational success the tactical plan must serve the purpose of the operational plan.

Planning is the art and science of understanding a situation and creating a practical path to change the current reality into the desired reality. ADM is the evolutionary concept that uses a wholistic approach to define the problem and inform the operational approach. It helps leaders develop conceptual solutions to problems and coordinate their actions in time and space. Adopting the ADM framework is a signal that the military embraces systems-type thinking. It is imperative to apply this approach when attempting to understand the non-linear relationships exemplified by the humanistic traits of war. Ben Zweibelson, a well-known military design advocate, stated, "Design seeks explanation instead of description and looks at systems holistically instead of reducing the world down into chunks."[128] Incorporating ADM into the military planning process filled a void in the Army Operations process.

The emulation of design written into US Army doctrine is an example that the Army is a learning organization. Amid the Iraq war, the Army adopted ADM, encapsulated it in doctrine, and applied it across the entire 1.4-million-person organization.[129] Ironically, had the United States not faced unconventional warfare in the Iraq ADM may not have been adopted. It is imperatively important to be proficient with this framework to survive and thrive in environments of chaos, uncertainty, and friction.

ADM is intended to address the perceived shortcomings of MDMP. It is a shift in thinking to develop a new conceptual framework that incorporates the requisite systems-based logic capable of harnessing the complex nature of twenty-first century problems. Foundational to the logic is its ability to recognize the world in a different light than detailed planning. MDMP

[128] Zweibelson, "Changing Change While It Changes," 18.

[129] Ryan, "A Personal Reflection on Introducing Design to the U.S. Army," 4.

was inadequate when attempting to understand non-linear complex adaptive systems due to the underpinning rationale of linear causality, reductionism, and mechanism. ADM brought forth a new lexicon and set of terminology that was distinct enough to force new thought yet similar enough to current doctrine to create a symbiotic relationship between the two concepts. This complimentary lexicon facilitates a smooth hand-off from ADM planning to detailed planning. Time will be the test to evaluate the efficacy of the concept and inform future iterations. The goal is to provide the practitioner with the best tools available. Currently, ADM has filled a void in the operations process. Proficiency with ADM can be the weapon to use against the adversary who does not cope as well nor adapt to the circumstances.

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