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14. ABSTRACT Systemic methods of operational Design have become a trend in the planning community since their introduction in the mid 2000's. Design offers an approach to generating a shared situational understanding necessary to plan military operations in a complex world. Design methods provide a resource for commanders and planners alike to comprehend and solve 'wicked' problems in an era of non-linear and irregular threats. However, systemic Design is not without its problems. Most critically, the oversimplification of Design's doctrinal practice derived from its theory limits its usefulness at the operational and tactical levels of war. Current DOD doctrine does a disservice to the joint force by misrepresenting what Design is, and prescribing its use where it may be unnecessary. This paper will trace the roots of Design's theory into its subsequent doctrine, and study several competing treatments of the concept in service publications. Then it will examine Design doctrine in comparison to standard mission analysis practices, and determine where Design-based methods are best used across the levels of war and the conflict continuum. Understanding Design's redundancies and limitations may help to guide its future use by recommending a combination of problem framing and mission analysis in the JOPP, as well as a new publication that gives Design theory its own treatment. This will allow Design's systemic and analytical nature to overcome the reductive methods prescribed in current doctrine. The implications of a coherent joint Design doctrine will provide a more nuanced, yet user-friendly conceptual treatment that can be applied to future military problems.

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Design Doctrine in Military Planning

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the Joint Military Operations Department.

The contents of this paper reflect my own personal views and are not necessarily
endorsed by the Naval War College or the Department of the Navy.

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Abstract

Systemic methods of operational Design have become a trend in the planning community since their introduction in the mid 2000's. Design offers an approach to generating a shared situational understanding necessary to plan military operations in a complex world. Design methods provide a resource for commanders and planners alike to comprehend and solve 'wicked' problems in an era of non-linear and irregular threats.

However, systemic Design is not without its problems. Most critically, the oversimplification of Design's doctrinal practice derived from its theory limits its usefulness at the operational and tactical levels of war. Current DOD doctrine does a disservice to the joint force by misrepresenting what Design is, and prescribing its use where it may be unnecessary. This paper will trace the roots of Design's theory into its subsequent doctrine, and study several competing treatments of the concept in service publications. Then it will examine Design doctrine in comparison to standard mission analysis practices, and determine where Design-based methods are best used across the levels of war and the conflict continuum.

Understanding Design's redundancies and limitations may help to guide its future use by recommending a combination of problem framing and mission analysis in the JOPP, as well as a new publication that gives Design theory its own treatment. This will allow Design's systemic and analytical nature to overcome the reductive methods prescribed in current doctrine. The implications of a coherent joint Design doctrine will provide a more nuanced, yet user-friendly conceptual treatment that can be applied to future military problems.

Introduction

In the mid-2000's, the U.S. Army introduced a systems-oriented approach to conceptual planning to help commanders deal with interactively complex situations. This new methodology was intended to supplement the Military Decision Making Process (MDMP) and other doctrinal planning methods. Known simply as Design, this approach assumed a multidisciplinary, systemic view of the environment to better understand conceptual military problems. Popularized as an alternative to reductive mission and environmental analysis, it gained a following after the military's failure to predict and prevent instability in Iraq and Afghanistan. Design intends to help commanders understand the interactively complex open systems found in modern conflict and develop broad approaches to solve them. However, Design theory, as described by J.F. Schmitt in "A Systemic Concept for Operational Design".[1] is often misunderstood and misused across the joint force as a panacea for military planning problems.

The military has been unable to describe how Design tools should be used, and if its methods are even suitable across the conflict continuum. The purpose of this paper is to highlight Design's use in doctrine across the joint force, determine how and when it can effectively supplement existing planning processes, and better understand its limitations. Specifically, Design theory's codification into doctrine is reductive and oversimplified, and generates confusion about the difference between Design and mission analysis. Because of its holistic and systemic processes, Design is best applied at the theater-strategic realm rather than at the operational or tactical levels of war.

Background

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Design 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."[2] Separate and distinct from planning, Design generates a shared understanding of the operational environment between a commander and staff prior to conducting formal military planning processes. The Israeli Defense Force formalized its application to military decision making in the early 2000s.[3] The Israeli method of Systemic Operational Design (SOD) was a novel way to approach military operations by using systems theory to understand an operational environment.[4] The DOD concept of Design was derived from SOD and shares its systems-oriented intellectual roots.[5]

Design assumes that the world has become more complex through globalization and competing pressures, ideologies, and societies. As a result, military operations have also become more complex and consist of situations not adequately understood through doctrine, training, or commanders' experience.   Each military situation therefore has unique and open interactive aspects, necessitating a thorough understanding of the environmental system prior to planning operations. "These situations cover a wide range and variety…They are fundamentally social problems, comprising numerous individuals interacting in countless ways according to various motivations. Involving the interplay of human will, intellect, and creativity, these situations are essentially unknowable."[6] Because of the complex interactions within a society, linear cause and effect is no longer a suitable way to think about the second and third order impacts of military operations.

Design theory takes a systems-logic oriented approach to understand the tensions and predispositions of open societal systems, seeking to describe how and why these systems exist. By describing the operational environment as a system in its historical and current states,

designers hypothesize how injecting energy (military effort) into that system may change it. Identifying the underlying tensions that resist change is critical to the Design process. These tensions, called 'problems', are "a discrepancy between the state of affairs *as it is* and the state of affairs *as it ought to be* that compels military action to resolve it."[7] Military effort should be directed towards resolving these problems, allowing the system to take on an improved condition. It is important to note that systemic Design activities do not impose a desired future state on the system. Design holds that no ideal 'end state' conditions can exist in an open system and that efforts to change system behavior will only create better or worse futures.[8] Thus the concept of directing all military activities towards the achievement of an endstate is not a goal of theoretical Design.

The U.S. Army saw the IDF's SOD as a way to understand the complexity of its stability operations in Iraq and Afghanistan, and began to integrate many of its elements under the broad term "Design" as early as 2008.[9] The Army felt "there is a need for a different type of thinking that allows for meaningful insights into unfamiliar, dynamic, and complex situations… Defaulting solely to traditional, linear, and reductionist detailed planning processes is not sufficient for the types of complex challenges that U.S. forces face in operational environments."[10] The preliminary document describing Design in the Army was TRADOC Pamphlet 525-5-500, *Commander's Appreciation and Campaign Design (CACD)*. Although not yet doctrine, CACD began to define terms and describe Design's function in the U.S. military.

To codify Design as a doctrinal concept, the Army reduced its processes into a repeatable methodology. Simplifying its complex conceptual nature, the Army reduced Design theory into a three-step process called Army Design Methodology (ADM), first seen in FM 5-0 in 2010.[11] ADM's three steps modify the CACD concept of problem framing into a sequential method of

creating understanding by framing the environment, framing the problem, and generating an

operational approach.[12] With a heavy emphasis on narrative and graphical portrayals of

operational environments (OEs) and their problems, ADRP 5-0 represented the ADM as shown

in Figure 1. Its central process involves identifying the tensions between an OE's current state

and its *desired future state*; identifying the problem preventing the OE from attaining its desired

state and developing an operational approach to solve the problem. A line of effort (LOE)

diagram that links actions through the logic of purpose was used to describe the operational

approach, represented in Figure 2. This causal diagram is the output of the ADM process,

informing the commander's inputs to the MDMP. This is a notable break from Design theory,

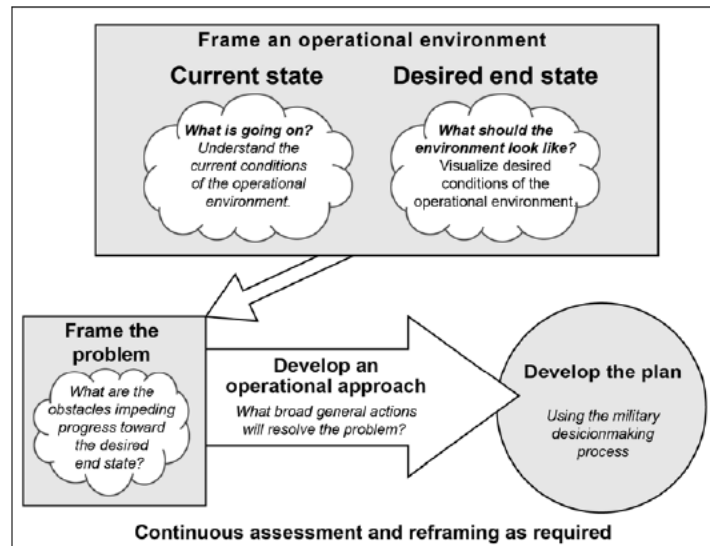which does not involve determining endstate conditions.

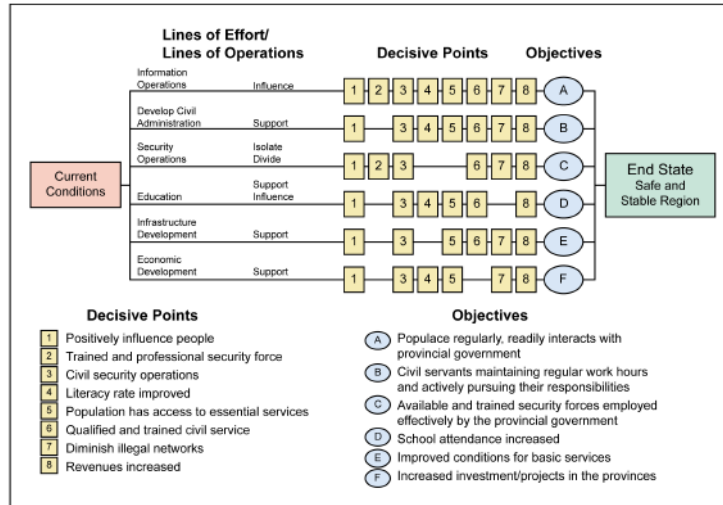Figure 1. Army Design Methodology Activities.[13]

Figure 2. Representation of a LOE-Based Operational Approach.[14]

Design In Doctrine

Design's treatment in FM 5-0 and ADRP 5-0 was conceptually oversimplified into a 'problem framing' process, setting the stage for growing pains when the Army's concept was adopted by the joint force as doctrine. Sister service publications used ADM, rather than Design theory, as the baseline for its codification. By basing Design doctrine on ADM and its problem framing steps, doctrine writers simplified, quantified, and reduced a complex, intuitive process into linear and mechanistic steps. Design was never intended to be a repeatable process, instead one that produced cognitively unique solutions based on the specific characteristics of the environment and the problem.[15] The Director of Design Programs at the Joint Special Operations University describes the dissonance between what Design was meant to be and its current treatment: "Doctrine essentially prevents adaptation and learning to occur within the (D)esign process because the very nature of military doctrine revolves around…canonizing select patterns and observations as the prescriptive guidance for future action. This unfortunately does not work well with military (D)esign methodology due to the adaptive nature of open systems."[16]

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Early Army publications like CACD reflect SOD proponents Shimon Naveh's and John Schmitt's ideas on interactive complexity.[17] However, these rich conceptual roots gave way to ADM when it was canonized in FM 5-0. ADM simplifies Design's concept of open systems into a construct where it is possible to impose a specific future state, and introduce a regressive LOE approach to link the present and future states. Designers (those who adhere to systemic Design theory vice its doctrinal treatment) deliberately avoided this regressive process, feeling that it was impossible to precisely control open systems. Using LOE's, ADM does not explain how to change systemic conditions without resorting to linear causality. "This implies that conceptual planning requires an operational approach that functions in a similar linear and mechanistic fashion. The eleven pages covering the environmental frame and problem frame in FM 5-0 Chapter 3 couch Design in a category separate from detailed planning, yet under the operational approach Army doctrine prescribes using linear methodology prevalent in detailed planning."[18] Design's alteration in Army publications from its non-linear underpinnings to its current state of ADM has fundamentally degraded the joint force's understanding and use of the concept.

All joint and service planning publications contain sections on Design. In general, these chapters are a surface treatment of Design concepts; describing it as a way to generate a shared understanding of ill-defined and complex situations, but without the focus on interactive systems. These publications describe problem framing as synonymous with ADM sans the Army acronym. However, these Design treatments reduce and oversimplify the concept beyond CACD or ADM, and add additional confusion over the dual-use term *design*.

Joint Publication 5-0's chapter *Operational Art and Operational Design* confuses traditional operational design with Design-based problem framing. When JP 5-0 was revised to include Design elements, doctrine writers did not distinguish between operational design and an

operational approach by stating "The purpose of operational design and operational art is to produce an operational approach …translating broad strategic and operational concepts into specific missions and tasks and produce an executable plan."[19] By not separating operational design terms and the conceptual processes of Design, JP 5-0 describes two separate concepts as the same. It goes on to describe operational design activities as ADM's problem framing steps.[20] Conversely, the same chapter goes on to describe the traditional elements of campaign design which inform the commander's estimate in the JOPP.[21]

Operational design is the "conception and construction of the framework that underpins a campaign or operation and its subsequent execution."[22] This does not infer that the operational design was conceived using Design methodologies, despite the dual use of the term. "The main elements of…operational design included the desired strategic end state, ultimate and intermediate objectives, force requirements…identification of the critical factors and centers of gravity, initial positions and lines of operation, directions/axis, the operational idea, and operational sustainment."[23] Joint doctrine does not differentiate between an operational design and an LOE-based operational approach. The operational approach as a procedural output of problem framing must be separated from traditional operational design.

Reflecting JP 5-0's dichotomy, Air Force doctrine also combines the idea of traditional operational design and conceptual Design in its Annex 3-0.[24] By not making the distinction between operational design and developing an operational approach via problem framing, the Air Force is unclear on which conceptual method they are prescribing. Navy Warfare Publication (NWP) 5-01 contains an annex on Design which describes problem framing in a manner consistent with the ADM, but under the general term Design Methodology.[25] Navy problem framing steps adhere to the ADM current state-future state method; however corresponding text

and graphics describe Effects Based Operation's node-link analysis and center of gravity (COG) method. EBO and the node-link method of COG derivation are inconsistent both with Design and the method of COG analysis described in NWP 5-01 Annex C.[26]

The Marine Corps uses Design to underpin the Marine Corps Planning Process (MCPP) but does not prescribe the use of ADM-based problem framing steps. Instead, the Marine Corps renamed step one of the MCPP as Problem Framing (Figure 3). Per MCWP 5-1, Problem Framing combines traditional methods of mission analysis with a commander-driven dialogue to understand the environment and the problem. As complementary and parallel activities, a commander-driven Design dialogue coupled with staff analysis creates a cohesive understanding of the situation that drives COA development. The MCPP's Problem Framing brief is similar to the mission analysis brief used by other services but contains outputs of the problem framing process as well as traditional mission analysis. The Marine Corps approach is the only truly unique treatment of Design and problem framing outside Army publications. This allows the Marine Corps to apply Design elements it considers relevant to its operating concept, and discard those it does not.
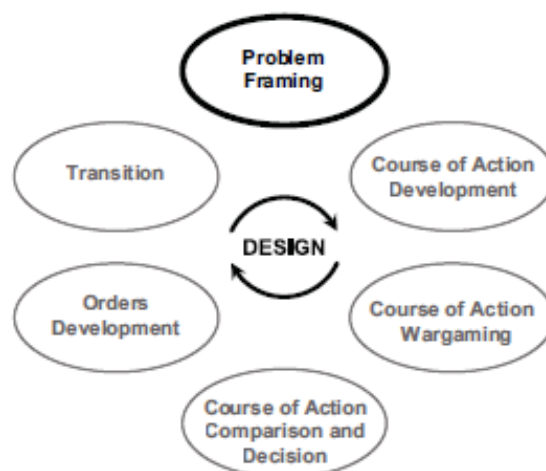

Figure 3. The Marine Corps Planning Process.[27]

Design at the Strategic Level

The most effective use of systemic Design is at the theater strategic level. This is where the majority of complex and ill-defined 'wicked' problems exist, and where understanding the interaction between systems is most important. If the world is an inherently complex open system, theater commanders must understand the strategic situation and correctly define the problem before planning operations or campaigns. An incorrectly identified strategic problem can have long-lasting consequences, as demonstrated in Iraq from 1991 to 2011. By incorrectly identifying the problem, then failing to reframe the system over time, the U.S. failed to achieve theater strategic objectives during two conflicts there. While Desert Storm achieved its military objectives, it did not identify the Saddam Hussein regime as the strategic problem. Twelve years later Operation Iraqi Freedom solved the original problem, but planners failed to reframe Iraq's system, basing its causality in the context of 1991. Iraq's downward spiral following Hussein's removal came as a surprise when it should not have, due to a failure to understand the differences between 1991 and 2003. Some use Iraq and other post-2001 military involvements as evidence that U.S. grand strategy has become ad-hoc and vague, creating ambiguous conditions where Design processes will be increasingly useful for strategic leaders.[28]

Design is a necessary conceptual process for the military operating across an ever widening conflict continuum. It allows the theater commander to develop approaches to accomplish ill-defined, unfamiliar, and potentially non-military objectives with the means available. When faced with rapidly changing missions and operational environments, theater strategic commanders require a way of thinking that accounts for the effects of both domestic and global systems on their operational environment. Recent stability and nation-building missions have created situations in which military means are applied before the environment is

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understood, resulting in a misalignment of ends, ways and means. "Lack of effective support from non-military sources of national power creates the need for more expansive military missions in which general purpose forces (conduct) tasks once left to…civil government and non-governmental organizations."[29] According to Milan Vego, Design functions as "an artificial bridge between policy and strategy on the one hand and operational warfare on the other. It includes many elements normally in the domain of policy and strategy."[30] In these cases, Design supplements vague strategic guidance and highlights the unforeseen effects of current strategies, allowing the commander to advise policy makers on how to align ends and means appropriately.

Design methodologies facilitate holistic understanding that generates a dialogue between commanders and civilian leaders, identifying and highlighting approaches to solve deeply rooted strategic problems. The Design process is superior to reductive analysis in developing situational understanding at the strategic level since it considers multiple lenses of interaction and perspective while avoiding a focus on endstate conditions that may be impossible to bring about.

Design at the Operational and Tactical Level

Design is more difficult to apply at the operational and tactical level. At the lower levels of war problems are better defined, lending themselves to linear solutions and the application of reductive analytical methods. Design's focus on holistic problem solving does not easily translate to action at the tactical level, where clear and concise instructions are required to ensure unity of effort. Mission command doctrine emphasizes simple orders using decentralized control based on clear understanding of commander's intent. Design's use of imprecise language and metaphors impedes this process, as exemplified by Israel's attempts at using SOD at the operational level during its 2006 war with Lebanon.

It was questionable whether the majority of IDF officers could grasp a design that Naveh proclaimed was "not easy to understand . . . Other officers could not understand why the old system of simple orders and terminology was replaced by one that few could understand…Units were ordered to "render the enemy incoherent," make the enemy feel "distress" or "chased down," or "achieve standoff domination" of the theatre.[31]

To foster comprehension and unity of effort, operational and tactical orders must contain precise, well-defined language that can be easily understood. Design's vague terminology may represent a holistic understanding of the problem at the strategic level; but as the example shows, undefined words can lead to variances in execution as commanders try to understand what 'render incoherent' may mean.

Operational and tactical headquarters have missions and tasks assigned by their higher headquarters. It is inappropriate to conduct a Design 'blank slate' approach when this established hierarchy exists. By conducting Design independently at the strategic, operational, and tactical levels for the same operational environment, it is entirely possible that each will see the problem differently. Units may identify different problems and layer vague operational approaches on top of one another, creating operational paralysis. In these cases, problem framing can generate frustration when staffs identify problems they are not tasked to solve. Linear planning processes that derive mission, intent, and tasks from the analysis of a cascading and nested set of orders is a superior method of planning and conducting operations at lower levels of war.

The medium and well-structured problems faced by operational and tactical commands may be complex, but have easily identifiable solutions that make problem framing approaches unnecessary.[32] This becomes apparent when the tension preventing the current state from reaching its desired state is the enemy force itself. In these cases, the problem statement is

obvious from the outset and adds nothing to the commander's situational understanding that a

JIPOE analysis would not. [33]

However, Design processes do have value in understanding social systems and complex

human terrain. Design becomes an appropriate way to understand systemic complexity at the

operational and tactical levels in ill-structured situations like stability and counterinsurgency

operations. It is important to note that both of these missions are on the low end of the conflict

continuum, perhaps indicating a correlation between limited military objects, a population-

centric operating environment, and interactive complexity. Implementing stability or COIN

operational approaches require integrated and holistic solutions leveraging all means of national

power. The most significant obstacle to solving these types of problems from a Design

perspective is that operational approaches for stability and COIN often require ways and means

beyond the operational or tactical command's capacity and capability. [34] Appendix A contains

three vignettes highlighting the problems encountered when implementing Design approaches

below the theater strategic level. These include, among others, a lack of Design training, issues

with commander involvement, lack of strategic context, and duplication of efforts between

traditional IPB and problem framing.

Problem Framing and Operational Mission Analysis

Assuming that operational and tactical-level units have an assigned mission, the outputs

of problem framing will be repeated by those of mission analysis (MA). This intellectual overlap

creates redundancies since problem identification is often unnecessary; i.e. the operational design

will be derived from specified and implied tasks. MA's JIPOE analysis mirrors framing the

environment, in which the designer describes the operational environment in its current state.

Likewise, the desired future state of the system during problem framing is synonymous with the

commander's desired endstate, a critical part of the refined commander's intent. Even the process of COG derivation is duplicated in problem framing, usually identified as some element of the problem statement.

> One way to exploit tensions…is to identify the capabilities and vulnerabilities resident in the system of opposition. The team begins to discover ways to neutralize capabilities and to exploit vulnerabilities. The same approach applies to tensions with positive implications. Some positive tensions can be left alone as they are already effectively supporting the move toward a friendly desired system.[35]

This describes identifying COG's from a systems perspective rather than determining their critical capabilities, requirements, and vulnerabilities. There is a high likelihood of misidentifying centers of gravity using this method since Design does not necessarily align the identified problem with the operational objective.

When generating an operational approach, problem framing takes on the same linear and reductive approach commonly used in military planning, and one that Design processes seek to avoid, by using an LOE model leading to a defined endstate. Problem framing "resorts back to linear causality by recommending lines of effort as a method to depict transforming the system. Once again…(D)esign doctrine suffers an identity crisis in which holistic approaches to complex systems struggle with an institutional preference for tacticizing all levels of war."[36] By prescribing that problem framing's output be a diagram proposing linear causality as a solution to complex open systems, doctrine does not describe how a systems approach to problem framing produces an output different than traditional mission analysis. Military planning is intentionally both regressive and reductive at the operational level. Current Design doctrine does not significantly break itself out from these proven methods to offer a true alternative.

Design literature give two examples of commanders applying Design at the operational level, but fail to describe what is novel, unique, or different about its methodologies. Schmitt

uses General Mattis' transition between conventional combat and stability operations in western Iraq,[37] while Kem uses General Ridgeway's mental processes after taking command of the 8th Army in Korea as proof of Design thinking.[38] However, most of the processes described in both examples occur during mission analysis: understanding the military situation, assessing enemy and friendly strengths and weaknesses, appreciating the terrain, establishing commander's priorities, and developing a shared understanding between commander and staff.[39] It is unclear how these commanders' activities represent Design or problem framing rather than traditional methods of reductive analysis and reasoning. The authors infer through deductive reasoning that since these leaders successfully dealt with complex environments, they were applying Design methodologies. A more believable narrative is that these commanders' vision and estimate of the operational situation allowed them to develop effective courses of action.

Counterargument

Some argue that Design should be *the* analytical method used to help leaders understand the problems that exist at all levels of war and generate COAs unique to each specific situation. They argue that linear, reductionist planning processes are no longer valid in today's complex world. Advocates feel that "(D)esign is a military paradigm that is currently transforming operational and strategic doctrine while challenging traditional linear casualty...design theory may emerge as a dominant methodology for operational art as the 21st century progresses."[40] The proper application of Design theory will overcome the military's institutional bias for linear thinking and inform a more intuitive decision-making process that develops novel solutions to wicked problems.

Design's value lies in the importance of thinking about thinking, rather than applying rote processes at all levels of war. Design questions why the military thinks the way it does and

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refutes the notion that the next war can be understood by studying the last. It is a system of thought that starts with a blank slate every time, ensuring that strategic thought does not adhere to the dogma of doctrine, or relying on past lessons that will be inapplicable to the changing character of future war. "Design's system of logic delivers solutions that often are uncomfortable. Instead of rejecting them, military organizations should think critically about why the solutions are uncomfortable to begin with.".[41] By reducing the military's adherence to linear thought processes, planners can understand the true nature of complex social systems through narratives and graphical representations as shown in Figure 4.
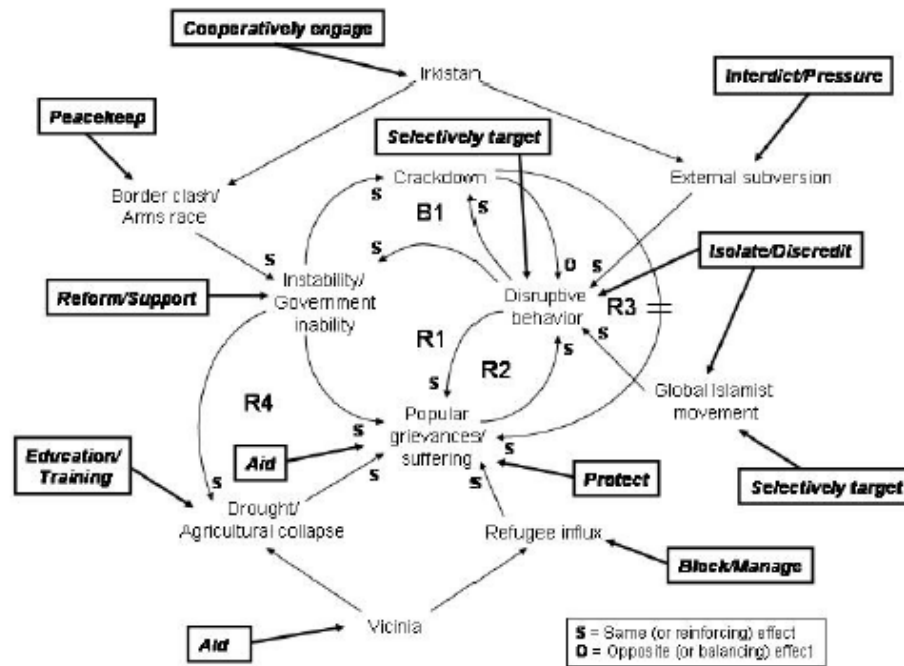

Figure 4. Representation of a Systems-Based Operational Approach.[42]

Theoretical Design advocates believe the continued use of reductionist planning methods will generate strategic failure from their reliance on linear causality and habitual processes over original thought. These systems value describing a situation rather than explaining it,.[43] and rely on a series of assumptions.

First, the model assumes that the problem or goal is clearly definable. Second, the information that is required to make a decision is available or can be acquired. Third, there is an expectation that all options generated can be adequately considered, compared, and evaluated to identify an optimal solution. Fourth, the environment is presumed to be relatively stable and predictable.[44]

With a focus on challenging previously held assumptions and questioning why systems resist change, Design draws upon sociological and scientific theories to better understand how and why the world is more complex, and how military actions can impel systems to change their behavior. Designing operations with these methods may even be considered a new type of operational warfare. "This operational level of warfare resists reductionism and teleological approaches…holistic and ontological methods featured in Design offer greater potential for explanation and understanding of complex adaptive systems."[45] Designers hold that current planning methods, while adequate for 20th-century conflicts, do not acquit themselves well in today's more complex era.

True Design adherents believe that its methodologies should replace military decision-making processes entirely as a new method of planning operations. Practitioners can develop intuitive solutions to complex problems without the COA development and analysis process. These solutions will come about via a rigorous and systematic understanding of an environment and its underlying tensions. "This concept thus includes no steps intended to methodically build a course of action or to compare multiple courses of action. The suitability of the decision is based on how well it relates to the problem, not on how well it compares to other solutions according to some set of criteria."[46] Designers believe that by studying a problem sufficiently, logical solutions will become self-evident and remove the need for analytical reductionism.[47]

Should Design Replace Reductive Approaches to Planning?

Rather than believing that the modern operational environment is new and 'wickedly' complex, a historical look at America's 20th-century wars also shows high complexity, yet the need for Design was not evident.[48] Instead, modern limited conflicts present different *types* of complexity; ones that the United States has not been successful at dealing with. In fact, the new complexity of 21st-century environment may be self-imposed. "The complexity experienced in the context of new wars is mostly complexity generated by specifically American factors—grand strategic uncertainty, the growing doctrinal problem of "compression" and its relationship to a dysfunctional "whole of government" approach, and geopolitical shifts in American strategic primacy."[49] Rather than seeing the world as more complex, a lack of clearly defined strategic objectives may complicate military planning to the point that Design seems like the required solution. However, Design may actually oversimplify complex situations in a way that reductive methods do not.

Reductive military logic breaks problems apart into constituent pieces to understand the system through an analysis of its parts.[50] "The JOPP …focus(es) organizations towards a linear ends, ways, and means structuring where they solve the identified problem through a series of actions resulting in the desired end-state. Reductive planning uses a teleological approach where the entire process is purpose driven; the end is determined first and then directed by action (ways) with means."[51] This process manages complex systems without losing details, making them easier to understand and allowing regressive planning to take place. Conversely, Design's approach to critical thinking simplifies systems without breaking them apart, removing much of their nuance and detail in favor of simplistic graphical representations.[52]

Design holds that each problem is novel and unique, therefore requiring a one of a kind, unrepeatable solution. By treating every problem this way, Designers threat doctrinal frameworks as a hindrance. Design's critique of doctrine states that it is used as an overly scripted, checklist-style approach devoid of critical thinking.   However, in reality, military doctrine serves an essential purpose by creating common thought leading to repeatable action across the force. Producing similar ways of thinking is the strength, not weakness, of the doctrinal system.[53] It would be a dangerous practice to forgo existing planning methods in favor of a highly intellectual technique that was meant to generate unrepeatable, trial and error solutions. Design may offer a holistic way of understanding human social systems, but it does not currently possess the capability to turn this understanding into a better way of planning at the operational level of war.[54]

Conclusion and Recommendations

Design methodology should be given credit for generating thought about a problem's nature before taking action to solve it, but it is not a cure-all solution. Design advocates often take the systemic approach too far into the realm of complex scientific theory, making it inaccessible for the average staff or operational planning team. One of the primary reasons Design efforts fail is the difficulty in translating a conceptual non-linear approach into concrete action. Its use of narrative, graphics, and metaphors make planning an operation from Design outputs very difficult.

The four recommendations below serve as a starting point to integrate Design theory more effectively into currently existing military planning processes. They are meant to remedy Design's oversimplified doctrinal treatment and clarify the differences between systemic Design, problem framing, and operational design. Additionally, by emphasizing Design's use at the

theater strategic level through planning staff augmentation, strategic commanders will reinforce mission command doctrine by ensuring operational and tactical commands clearly understand when and how to apply Design-based processes. These recommendations will address the most pertinent issues with Design methodology as contained in doctrine and implemented by the joint force.

1. Resolve the terminology discrepancies between operational design and Design concepts in FM 5-0. Traditional doctrinal terms like 'problem' and 'end state' have a dual use that confuses the transition from conceptual and detailed planning.[55] Due to Design's extensive use of metaphors to describe systems and their tensions, Design language should be separate and distinct from military terminology. Tactical units cannot become inculcated by Design language; it is the duty of operational headquarters to make the transition from conceptual Design language to detailed planning language during the COA development process.

2. The separation between problem framing and mission analysis should be removed, combining both processes into the first step of planning. Due to the inherent similarities between mission analysis and problem framing considerations, the two should be combined into one doctrinal step that uses the problem statement and operational approach as a method of guiding the commander's initial estimate of the situation. This will complement, not replace, the standard mission analysis steps and be used at all levels of planning.

3. Augment geographic and functional combatant command headquarters with trained strategists who function as Designers. Separate from J-5 and J-35 planners, Designers will be responsible for leading the Design process at the theater strategic level. Due to the specific expertise these personnel require, a mix of military, OGAs, and contracted civilians should be used. Contractors should have backgrounds in systems theory, anthropology, sociology, or

politics to complement the holistic understanding of the operational environment. When appropriate, Designers and planners would conduct a handover from Design outputs to conceptual and detailed plans.

4. Formally separate Design from military planning processes with its own joint doctrinal publication. This publication would capture the aspects of conceptual Design, not problem framing which "depicts the environmental frame, problem frame, and operational approach with minimal insight on how they function, or how operational artists actually transform the system."[56] This publication will serve as the basis for a systems approach to operational Design. Breaking Design out into a full-length treatment will provide a "unique vocabulary, rich explanation concerning the various conceptual aspects of open systems, non-linear approaches to transforming a system, and extensive application of analogies to convey understanding of design methodology to the target audience."[57] This new doctrine will describe Design in detail and guide its application across the joint force as a conceptual precursor to theater strategic planning.

Appendix A: Design Challenges at the Operational and Tactical Levels

A-1: Tactical Problem Framing

This vignette describes the nature of problem identification at the tactical level of war. At this level, military problems are structurally rather than interactively complex. This means that many tactical problems tend to be easily identifiable without a deliberate framing process. In these cases, problem framing efforts will identify the enemy force as the problem. The statement below highlights the similarity between the 'problem statement' and steps three and four of the intelligence preparation of the battlefield (IPB) process at the tactical level. Step three specifies enemy capabilities, limitations and intent, while step four derives possible enemy courses of action. The example below is a fictional problem statement for an Army Brigade conducting conventional combat operations. Note the METT-TC characteristics and description of enemy capabilities, disposition, and strength as they would be described in an IPB rather than as systemic, tensions-based problem.

How does 2/1 Armored Brigade Combat Team (ABCT) seize crossing sites along the Cottonwood River to support 18 Field Artillery (FA) Brigade fires when wooded and rolling terrain favor the enemy's defense and security operations? The terrain frequently constricts unit movement to platoon-sized mobility corridors. A hybrid threat enemy composed of fully-manned conventional forces with anti-tank systems and shoulder-fired surface-to-air missiles as well as an effective guerilla forces operate in territory familiar to them. Civilians are intimidated towards working with coalition forces. Enemy weapons threaten the ABCT's armored and limited aviation capabilities. 2/1 ABCT must not only seize crossings, but also secure those crossings and 18 FA Brigade's units during fire missions. The ABCT must have no less than 85% combat power remaining and complete operations within 24 hours before the enemy can reinforce its security zone.[58]

In this case, problem framing activities are redundant to the mission planning process, resulting in a duplication of effort that does not enhance the commander's situational understanding beyond that of a properly conducted mission analysis considering the operational factors of space, time, and force. Rather than conducting problem framing prior to mission analysis, a more efficient use of time and staff effort would be to combine the two steps into one to reduce the duplication of effort and enhance the planner's ability to integrate the problem statement into their proposed mission and COA development process.

A-2: Design Training Challenges

A case study of the Army's 5th Squadron, 7th Cavalry while on a rotational deployment to Europe in 2016 highlights Design challenges at the tactical level.[59] The squadron commander chose to conduct ADM to understand his unit's task: "Task Force 5-7 Cav conducts unified land operations…to improve U.S./North Atlantic Treaty Organization (NATO) force-training readiness, promote regional stability and security, strengthen the NATO alliance and foster trust while improving interoperability with the multinational forces."[60] Doctrine suggests a Design approach be used to understand this mission since its broad scope and lack of operational direction creates confusion as to what the squadron should accomplish.. However, the unit struggled through a non-doctrinal ADM process because it was not manned or trained to conduct Design activities. The squadron contained three field grade officers with Design training, one being the commander. This meant that the ADM process could not proceed without significant educational efforts.[61] As a result, the commander developed the operational approach *before* any framing was conducted, essentially providing the answers rather than allowing the staff to develop them through analysis. The case study concluded that the ADM process contributed to mission success.[62] However, a more critical look shows that capability gaps exist at the tactical

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level that inhibits ADM from being conducted. These gaps include a lack of Design-trained staff, and limited contextual understanding of the bigger picture when conducting Phase 0 operations. The operational approach 5/7 Cav developed during ADM contains all the LOE-based content required by ADRP 5-0, as well as individual graphics representing environmental frames for each line of effort. However, the operational approach describes internal squadron activities and reads more like the commander's command philosophy than an approach to accomplish the problem.
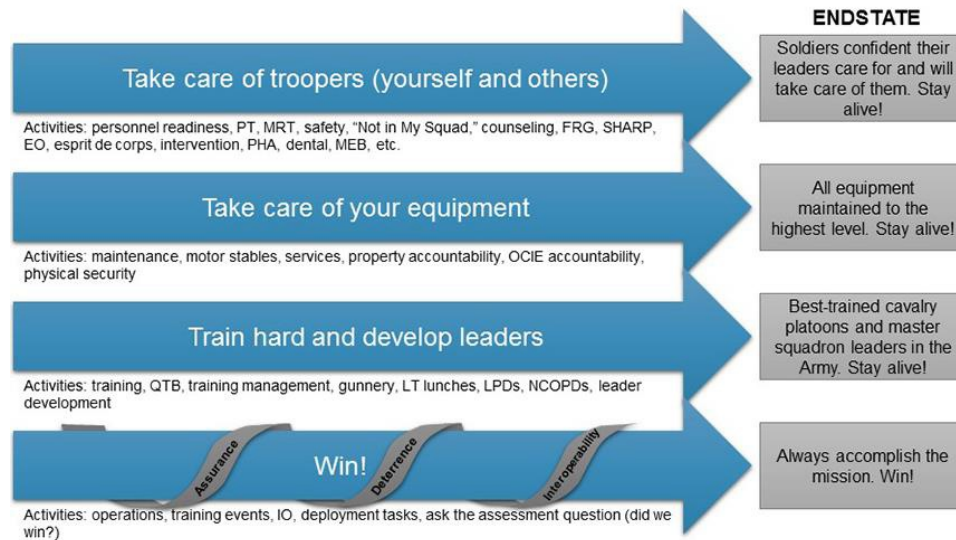

Figure 5: 5/7 Cavalry Operational Approach.[63]

Rather than one problem, the squadron identified a separate set of tensions for each LOE, thus the multiple environmental frames. This process directly contravenes ADM's intent of holistically framing the environment and a single overarching problem to be solved. In retrospect, 5/7 Cav attempted to generate products that looked like those described in ADRP 5-0 and contained ADM phraseology, but lacked actual content. This in turn negates Design's ultimate purpose and falls in line with designer's critique of organizations that follow doctrine while not really understanding it. "Confidence in the form of the product should not translate

into confidence of the *content.* The heretical aspects of *problematization* avoid superficial formatting concerns and instead take aim at meaning, purpose, and metacognition concerning the operation itself.".[64] By shallowly adhering to ADM doctrinal graphics, terms, and outputs over original thought, 5/7 Cav was unable to conduct operations outside the limited box of their own understanding.

A-3: Design Team Execution Challenges in Afghanistan

The article "A Tale of Two Design Efforts (and why they both failed in Afghanistan)".[65] by Grant Martin, an officer in the CJ5 at NTM-A/CSTC-A (NATO Training Mission/Combined Security Transition Command-Afghanistan) is an illustrative look at Design challenges at the operational level of war. The author conducts two Design efforts, one to plan Operation Omid II in 2010, the other to resolve issues within the Afghan National Police. The article recounts Martin's processes, results, and lessons learned. As the title portrays, neither effort was a success. The following two excerpts, though out of context, illustrate two of the common pitfalls of implementing Design in an operational level headquarters:

> At the very beginning we did what I thought was the right thing and began to question all of our underlying assumptions about Afghanistan. There was plenty of resistance to that, however, and I took it to be a combination of the perception of how far our leadership was willing to deviate from the current operational direction and some professional hubris: the same people who had been working under these assumptions found it difficult to have their worldviews questioned..[66]

> Although the commander had authorized for the effort to commence, he never did participate himself…All the commander got from the effort was a backbrief once the final product was completed. While this was perhaps better than no involvement-it was too little too late: at that point he was already divorced from the logic that had driven us to our solutions. As I was to conclude myself later on, a perhaps greater piece our solutions

required was the commanders' mark on them in terms of any logic that was unknown to us: for instance politics that he was privy to, but had not shared with the entire command.[67] Without buy-in from the top, without the commander leading the effort and giving input all along the way, and without the trust and openness with the staff conducting the Design effort, the recommendations were mostly ignorant, flying without radar, making assumptions on top of assumptions.[68]

As the excerpts demonstrate, conducting Design at the operational level of war requires significant assumptions about the environment, both the external environment of Afghanistan and the effected southwest Asian region, and the internal environment of the military and U.S. politics. Without a complementing Design product from a strategic headquarters or specific insight from the commander, the OPT was largely in the dark about the greater context of its operational problem. The amount and type of assumptions made by an OPT will have a detrimental effect on the outcome of the Design effort and prevents the development of true systemic understanding. The problem frame must include more than the operational environment; it must understand the effects of politics, policy, and strategy of both friendly, neutral, and adversary systems. This level of nuance and detail may be impossible at all but the theater strategic level of war, where policy and strategy are most closely linked to operations.

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