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14. ABSTRACT

U.S. Army Intelligence doctrine and training regarding Intelligence Preparation of the Operational Environment (IPOE) and Intelligence Estimates do not adequately address the complex, Contemporary Operating Environment (COE). Intelligence doctrine and training overly focuses on linear reduction, and provide an imbalanced approach to addressing novel problems or complex adaptive systems that morph over time. Intelligence doctrine is also de-linked from Army Operations field manuals that have begun to advocate holistic approaches to problem-solving. General systems concepts offer promising methods to better address the challenges of the COE, and enhance the quality of intelligence estimates, operational planning, and their value to commanders. Systemic thinking concepts attempt to not only understand subsystems, but understand the system as a whole and how each piece relates to one another. Systemic thinking also acknowledges complex systems change over time, and encourage users to reevaluate and reframe the problem before planning. This paper critiques current U.S. Army Intelligence doctrine, gives a short explanation of systems theory and associated concepts, and explains how incorporating systemic thinking into intelligence doctrine and training will enhance operational design, operational planning, and tactical planning.

15. SUBJECT TERMS

Intelligence Estimate Process, Operational Design, Systemic Operational Design, Systems Theory, Intelligence Preparation of the Operational Environment, Contemporary Operating Environment

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Systemic Thinking:
Enhancing Intelligence Preparation and Estimates

by

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Major, US Army

A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

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ABSTRACT

U.S. Army Intelligence doctrine and training regarding Intelligence Preparation of the Operational Environment (IPOE) and Intelligence Estimates do not adequately address the complex, Contemporary Operating Environment (COE). Intelligence doctrine and training overly focuses on linear reduction, and provide an imbalanced approach to addressing novel problems or complex adaptive systems that morph over time. Intelligence doctrine is also de-linked from Army Operations field manuals that have begun to advocate holistic approaches to problem-solving. General systems concepts offer promising methods to better address the challenges of the COE, and enhance the quality of intelligence estimates, operational planning, and their value to commanders. Systemic thinking concepts attempt to not only understand subsystems, but understand the system as a whole and how each piece relates to one another. Systemic thinking also acknowledges complex systems change over time, and encourage users to reevaluate and reframe the problem before planning. This paper critiques current U.S. Army Intelligence doctrine, gives a short explanation of systems theory and associated concepts, and explains how incorporating systemic thinking into intelligence doctrine and training will enhance operational design, operational planning, and tactical planning.

Introduction.

The U.S. Military is currently operating in an extremely complex environment.[1] While war has always been an imprecise activity that's nature was discussed at length by Clausewitz, its character has arguably become more dynamic. Cyber-warfare, non-state actors, terrorism, criminal activity, and globalization (among other things) blend together with regular and irregular warfare to create new points of friction and uncertainty.[2] This Contemporary Operational Environment (COE) extends beyond the operational paradigm of counterinsurgency (COIN) in which the military is currently operating. It is the full spectrum of operations containing high intensity, "conventional" conflict, COIN, stability operations and so forth, often simultaneously occurring in a dynamic hybrid.[3]

U.S. Army Intelligence doctrine has been challenged to adequately address the dynamic operational environment.[4] Consequently, Intelligence doctrine and training regarding Intelligence Preparation of the Operational Environment (IPOE) and intelligence estimates must incorporate more holistic thinking to properly prepare our intelligence soldiers. Army intelligence manuals teach users to conduct IPOE or, Intelligence Preparation of the Battlefield (IPB) using traditional, step-by-step, template approaches to problem-solve. The associated Intelligence doctrinal templates work well in short term, tactical applications against known entities, similar to what units face at Combat Training Centers (CTC).

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[1] John F. Schmitt, "Command and (Out of) Control: The Military Implications of Complexity Theory," in *Complexity, Global Politics and National Security*. (Edited by David S. Alberts and Tom Czerwinski. Washington D.C.: National Defense University, 1997), 4.

[2] Gary Luck and Mike Findlay, *Joint Operations Insights and Best Practices, 2nd ed.* (Joint Warfighting Center: United States Joint Forces Command, July 2008), 1.

[3] Frank G. Hoffman, "Hybrid Warfare - Defined," (information paper, Quantico, VA: U.S. Marine Corps Strategic Vision Group, 12 February 2008), 1-3, available at http://www.quantico.usmc.mil/download.aspx?Path=./Uploads/Files/SVG_Hybrid%20Warfare-%20defined.doc, (accessed 20 March 2010).

[4] Wayne M. Hall and Gary Citrenbaum, *Intelligence Analysis: How to Think in Complex Environments* (Santa Barbara, CA: Praeger Security International, 2010), 7-25.

However, the manuals do an inadequate job addressing the temporal character of warfare, how templates for a particular problem can become stale over longer durations, or how the problem is often entirely original. The Army intelligence manuals devote little attention to assessment, proper identification of the character of the conflict, or the threat center of gravity (COG). They also do not place enough emphasis on how a threat organization and the environment interact, adapt, and behave as a complex system.[5]

The new FM 2-01.3, *Intelligence Preparation of the Battlefield*, and FM 2-0 *Intelligence* have incorporated some up-to-date Techniques, Tactics, and Procedures (TTP's) based on recent operations in Iraq and Afghanistan.[6] However, these TTP's only partially address the nature of the complex environment, and may not be completely applicable in all situations. Thus the manuals, while relevant in many ways, remain incomplete. There is also a break in linkage between the Intelligence FM's and JP 5-0, *Joint Operational Planning*, and FM 5-0, *The Operational Process*, which incorporate systemic concepts into operational design and planning. The Operational planning manuals both highlight the importance of systems thinking during the intelligence process to understand environmental complexity, identify indicators and early warnings, and identify centers of gravity (COGs).[7] This break in

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[5] Robert Jervis, "Complex Systems: The Role of Interactions," Edited by David S. Alberts and Tom Czerwinski, *Complexity, Global Politics, and National Security* (Washington D.C.: National Defense University 1997), 1. A system is said to exist when a set of elements are inter-connected so that changes in one element or their relationship with others results in a change elsewhere and the entire system exhibits properties and behaviors different from the parts.

[6] U.S. Army, *Intelligence Preparation of the Battlefield*, Field Manual (FM) 2-01.3. (Washington D.C.: Headquarters, Department of the Army, 2009); U.S. Army, *Intelligence*, Field Manual (FM) 2-0. (Washington D.C.: Headquarters, Department of the Army, March 2010). PMESII and ASCOPE are some of the newer TTP's these manuals have adopted to assist in evaluating the operational environment.

[7] U.S. Army, *The Operations Process*, Field Manual (FM) 3-0. (Washington D.C.: Headquarters, Department of the Army, 2008), Ch. 1-1 to 1-7, 2-1 to 2-7, 3-1, 3-11, 6-6 to 6-8; U.S Office of the Chairman of the Joint Chiefs of Staff. *Joint Operational Planning*. Joint Publication (JP) 5-0. (Washington, DC: CJCS, 26 December 2006), III-16 to III-19.

linkage can lead to a disparity in the quality of the intelligence product analysts provide to the operational commander.

General Systems Theory (GST) and associated concepts when properly applied to the intelligence processes offer promising methods to better address the challenges of the COE, and improve the quality of the intelligence products that support operational design and planning.[8] Systemic thinking when used effectively moves beyond viewing a problem through a purely systematic manner, and examines the interactions between the parts of the system in a changing environment.[9] It is an approach to understanding systems in holistic manner and regularly reassessing the operating environment, in contrast to traditional methods, which are conducted in isolation of potential change over time. Systemic thinking also focuses on identifying the root problems, and building plans to address them, rather than merely attacking a symptom. In essence, systemic thinkers attempt to ensure the military is "doing the right things", which is arguably much more important than just "doing things right".[10] Supplementing the current intelligence doctrine and training with systemic thinking can therefore provide a more balanced approach to IPB/IPOE, improve critical thinking in our intelligence personnel, and provide better situational understanding during the design and planning process.

[8] William T. Sorrels, et al, "Systemic Operational Design: An Introduction," (Monograph, Ft. Leavenworth, KS: US Army Command and General Staff College: School of Advanced Military Studies AY 04/05), 7, http://cgsc.cdmhost.com/cgi-bin/showfile.exe?CISOROOT=/p4013coll3&CISOPTR=1869&filename=1870.pdf (accessed 01 April 2009).
[9] G. E. Reed, "Leadership and Systems Thinking," in *Defense AT&L* (May-June 2006), pp. 10-13.
[10] Huba Wass De Czege, "Systemic Operational Design: Learning and Adapting in Complex Missions," *Military Review*, January-February 2009, p. 5- 6.

Shortcomings in Army Intelligence Doctrine.

U.S. Army Field Manuals 2-0 and FM 2-01.3 are the primary publications that address IPOE/IPB and intelligence estimates at the operational and tactical level.[11] FM 2-0 and FM 2-01.3 have recently been updated, however they still lack some of the emphasis on newer holistic concepts presented in the Joint Publications, Army Plans, and Army Operations manuals.[12]

Field Manual (FM) 2-0, *Intelligence* is the principle guide for intelligence operations conducted by the U.S Army.[13] It contains a broad overview of everything the U.S. Army Intelligence branch is supposed to provide, from planning, to the execution of collection missions, to collection management and information sharing. Of particular note, FM 2-0 focuses on the intelligence process and how it supports the commander and planning in a full spectrum operational environment, (See Figure 1).[14]

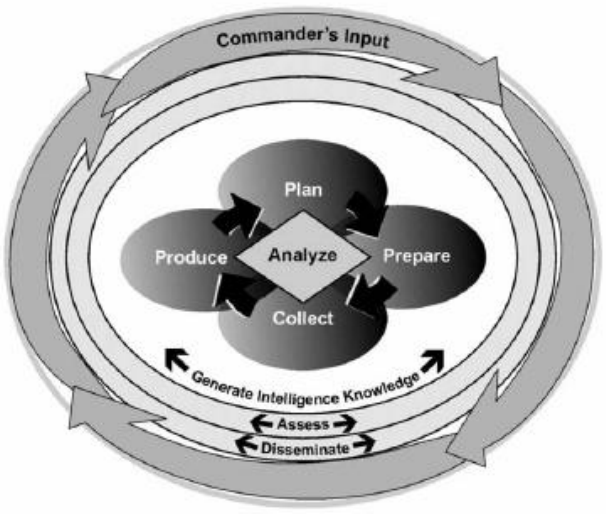

Figure 1: Intelligence Cycle (Source: FM 2-0, March 2010)

[11] FM 2-01.3, 1-1 to 1-12 *and* Field Manual (FM) 2-0. (Washington D.C: Headquarters Department of the Army, May 2004).
[12] Huba Wass de Czege, *Lessons From the Past: Making the Army's Doctrine "Right Enough" Today*, AUSA, Institute of Land Warfare Essay, No. 06-2, (Arlington, VA: AUSA, September 2006), 1-3.
[13] U.S. Army, *Intelligence*, Field Manual (FM) 2-0. (Washington D.C: Headquarters Department of the Army, May 2010).
[14] Ibid., Chapter 4.

While the intelligence cycle may appear comprehensive, FM 2-0 and FM 2-01.3 provide an incomplete foundation for analysis and assessment. Both FM 2-0 and FM 2-01.3 use IPOE/IPB and the intelligence estimate models that overly rely on systematic logic to base their conclusions, though FM 2-0 also advises the analyst to consider civil considerations and a broader set of environmental impacts than its predecessor.[15] Like its companion, FM 2-01.3, *Intelligence Preparation of the Battlefield* addresses intelligence from an extensively systematic approach. The manual shares much of its information with that of its predecessor of the same title, FM 34-130, and is a compilation of templates as well as a breakdown of duties and responsibilities of the intelligence analyst during the Military Decision Making Process (MDMP). The manual's templates and force ratio tables are very useful during planning and base-lining against relatively well understood problem sets such as conventional, Soviet threat models. However, FM 2-01.3 is inadequate in addressing how to think about ill-defined, new problems. When applied too literally, the templates presented in FM 2-01.3 are less effective in more dynamic, complex environments that have emerged post 9/11. In each of these cases, the adversaries and environments are amorphous, and the root problem less well defined. They could be a "mosaic" of peace-keeping, conventional high-intensity fighting, urban guerilla warfare, and COIN - often at the same time and in different locations within a unit's area of responsibility.[16]

[15] Ibid., Chapter 1.
[16] U.S. Army, *Counterinsurgency*, Field Manual (FM) 3-24 (Washington D.C.: Headquarters Department of Defense, December 2006), pp 1-37, 1-39, 2-13, 3-5, 3-123, 4-20, 4-23. FM 3-24 uses the term "mosaic" to describe the diverse character of the COIN environment. However, the concept is extended further within the context of this paper to present a potential operational environment that includes conventional warfare, humanitarian, and stability operations occurring in a concurrent fashion.

FM 2-0 also provides an incomplete view of assessment, focusing mostly on support to targeting and measuring effectiveness.[17] This is only part of what assessment and reevaluation should include. The intelligence manual makes very little mention of assessing to determine if one's environment has changed, if the threat has adapted, or consideration of the second and third-order effects of friendly operations.[18] The threat is in fact receiving input from the environment, its rival (The U.S. and allies), and adjusting its operations accordingly.[19] Thus, the original assumptions and facts that governed the plan may have changed, or be incorrect.

Army Intelligence FM 2-0 and FM 2-01.3 provide an imbalanced approach to intelligence preparation of the operational environment. While they present great systematic, reductionist models, FM 2-0 and FM 2-01.3 do not adequately address synthesis and potential change. The unintended effect of the shortcomings in FM 2-0 and FM 2-01.3 is many intelligence analysts become overly focused on the process and think about a problem in a short-term, linear and mechanistic manner. This practice is fairly understandable, given the method in which military service-members are trained, and their desire to understand and to solve a problem by reducing it into subcomponents and subtasks.[20] However, an overly mechanistic method can result in analysts approaching war in a manner in which Clausewitz cautioned against - war by algebra.[21] Analysts can become bogged down with trying to gather as much information as possible about their environment, to find the perfect solution.

[17]U.S. Army, *Intelligence*, Field Manual (FM) 2-0. (Washington D.C: Headquarters Department of the Army, May 2010) , 1-70 to 1-83.
[18] Hall and Citrenbaum, 10.
[19] Sorrels et al., 82.
[20] U.S. Army, *Commander's Appreciation and Campaign Design*, 8.
[21] Carl von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret, (Princeton, NJ, Princeton Press, 1976), pp 76-81.

In doing so, they subordinate critical evaluation of the operational environment and the threat, lose their agility, and their ability to rapidly identify and adapt to novel situations.

Intelligence doctrine and associated training must teach intelligence personnel to open their apertures and view their environment more comprehensively, in a way that incorporates not just linear, but also spatial and abstract methods. Systemic thinking is the missing piece in doctrine that allows intelligence personnel to operate effectively in the current and future operating environments, where problem sets are incredibly complex, inter-related, and less predictable as the complexity level increases.[22]

Systems Thinking.

Systemic thinking and General Systems Theory (GST) is generally attributed to Dr. Paul Weiss, Dr. Ludwig von Bertalanffy, and other contemporaries at the University of Vienna in the early 20th Century.[2324] Bertalanffy's studies involving GST essentially attempted to look at biological organisms beyond a purely mechanistic, linear analysis and into that of a metaphysical and systemic one as well.[25] GST acknowledges that life is very unpredictable, even after you break an organism down into its subcomponents in order to understand what it is comprised of. The whole of the system, or how the subcomponents mutually interact, is what is of utmost importance for understanding the system.[26]

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[22] U.S. Army, *Commander's Appreciation and Campaign Design,* TRADOC Pamphlet 525-5-500. (FT. Monroe, VA: US Army Training and Doctrine Command, 28 January 2008), pp. 5-6.
[23] Manfred Drack, "Is Paul Weiss' and Ludwig von Bertalanffy's Systems Thinking Still Valid Today?" (monograph, Vienna, Austria: University of Vienna - Theoretical Biology Department, 2009), available at http://www.isssbrasil.usp.br/pdfs/2006-250.pdf , (accessed 23 March 2010).
[24] Manfred Drack, "Ludwig von Bertalanffy's Early System Approach," (monograph, Vienna, Austria: University of Vienna - Theoretical Biology Deparment, 2009) .
[25] Ibid, 3.
[26] Ludwig von Bertalanffy, *Theoretische Biologie: Band 1: Allgemeine Theorie, Physikochemie, Aufbau und Entwicklung des Organismus*. (Berlin, Germany: Gebrüder Borntraeger, 1932), 351f, quoted in Drack, 4.

Organisms in effect, are not closed systems like machines, and often not in an enclosed environment such as a laboratory. Organisms (not to mention great ecological environments) are open systems that interact continuously.[27] Organisms and biological systems attempt to take in energy, exude energy, exhibit metabolic functions, and adapt to the environment in order to survive. Biological systems can also develop some hierarchal functions and specialized subsystems that allow the organism or, system to grow and avoid a state of equilibrium, which would lead to death.[2829] GST also accounts for the chaotic nature of complex systems, based on Paul Weiss' famous "butterfly effect" and other associated studies involving chaos theory.[30] While complex systems may exhibit some general trends, GST and the associated chaos theory postulate specific prediction and forecast is extremely difficult, if not impossible.[31]

Like Bertalanffy and Weiss, intelligence practitioners are analyzing a complex system comprised of physical environments, mechanical constructs, technology, and biological systems - notably human beings. All of these factors (and others as well) continuously interact and change each other. Humans, like other organisms, have hierarchal physiological, cultural, and psychological factors that make completely predicting their behavior extremely difficult. Further, human beings as well as the organizations they comprise seek to take in energy, survive, and avoid destruction. This survival instinct, as noted in (then) MAJ Abb's

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[27] Ludwig von Bertalanffy, "Vorschlag zweier sehr allgemeiner biologischer Gesetze – Studien über theoretische Biologie III", in *Biologisches Zentralblatt*, (Vienna, Austria: University of Vienna, 1929) 49:83-111, quoted in Drack, 4.

[28] Ludwig von Bertalanffy, *Theoretische Biologie: Band 1: Allgemeine Theorie, Physikochemie, Aufbau und Entwicklung des Organismus*. (Berlin, Germany: Gebrüder Borntraeger, 1932), 351f, quoted in Drack, 4-5.

[29] Drack, "Ludwig von Bertalanffy's Early Systems Approach," 5.

[30] Paul A. Weiss, *Richtungbestimmende Einflüsse äusserer Faktoren: Die Ruhestellung der Vanessiden,"* (PhD thesis, Vienna, Austria: University of Vienna, 1922). quoted in Drack, Manfred. *Is Paul Weiss' and Ludwig von Bertalanffy's Systems Thinking Still Valid Today"*, 2-3.

[31] Larry Bradley, "Chaos and Fractals", Space Telescope Science Institute, http://www.stsci.edu/~lbradley/seminar/index.html (accessed 25 March 2010)

monograph, indicates why an organization, be it a conventional military unit, political organization, terrorist group, or other often tries to continue to operate long after some analysts would presume the organization should have dissolved.[32]

Applied Systems Thinking Concepts.

Beginning in the 1990s, U.S. military planners began to look at ways of understanding complex problems to better prepare for future combat operations. One concept that has been over the years, met with controversy was Effects Based Operations (EBO).[33] Colonel Deptula's concept asserted by identifying various subsystems of an organization, identifying critical nodes the organization needed to operate, and eliminating those critical nodes, a military force could bring about paralysis and defeat upon their adversary.[34] Colonel Deptula's examples focused heavily on the capabilities of air-power to strike an adversary's Air Defense Networks, Command and Control (C2) Networks, and critical infrastructure such as power grids and substations. The intent again was to eliminate a threat's ability to control its armies, power its critical sensors, and protect itself from attack. Unfortunately, EBO's utility was over-extended and misapplied.

Traditional EBO for all of its analysis of the enemy's subcomponents and nodes, assumed the threat system being analyzed was closed an unchanging with respect to time. It viewed an adversary's system in a mechanistic way. For the purposes of analyzing how to strike an air-defense network, this EBO approach may be satisfactory. However, Integrated Air-Defense Systems and other similar networks are complicated, they are not truly

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[32] Madelfia A. Abb, "*A Living Military System on the Verge of Annihilation*." (Monograph, School of Advanced Military Studies, US Army Command and General Staff College Fort Leavenworth, Kansas, AY 99-00), 17.
[33] David A. Deptula, *Effects-Based Operations: Change in the Nature of Warfare*, Aerospace Education Foundation, (Arlington, VA: Aerospace Education Foundation, 2000), 24-26, available at http://www.aef.org/pub/psbook.pdf , (accessed 09 February 2010).
[34] Ibid, 24-26.

complex.[35] When EBO was employed against complex systems like tribal insurgencies and regional politics, it became considerably less predictive. Many early proponents of saw it as a way of fighting and winning a war with air-power alone. The first Gulf War and Kosovo only reinforced the notion of EBO's absolute utility. Israel's over-reliance on air-power and EBO met with adverse results in particular during the 2006 Israel - Hezbollah conflict.[36] Military planners in the CENTCOM area of operations have since adjusted EBO concepts to be used in a more systemic manner that attempt to account for change and the uncertainty of human behavior and societal factors.[37]

Brigadier General, Dr. Shimon Naveh of the Israeli Defense Force (IDF) developed Systemic Operational Design (SOD) in contrast to EBO, based on his observations of the 1973 Israeli-Arab conflict as well as urban conflicts with Palestinian militants in Gaza and the West Bank. Rather than relying on the traditional, classical models that are viewed as becoming too rigid and narrow focused, Dr. Naveh's concept proposes looking at the environment, the threat, and one's own assets in a more naturalistic manner.[38] SOD acknowledges that while complicated systems may have linear reactions associated with an event, complex systems do not. Complex systems actually gain complexity when the subcomponents and subsystems interact, and change how the system functions. This

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[35] Jurgen Appelo, "Simple vs. Complicated vs. Complex vs. Chaotic," *NOOP.nl - Management, Development, Complexity, and Me*, entry posted 20 August 2008, http://www.noop.nl/2008/08/simple-vs-complicated-vs-complex-vs-chaotic.html, (accessed 24 March 2010). Jurgen Appelo provides good analogies of the differences between simple, complicated and complex systems.

[36] James N. Mattis, "Guidance For Effects Based Operations," *Joint Forces Quarterly*, Issue 51 (4th Quarter 2008), 106, available at http://www.ndu.edu/inss/Press/jfq_pages/editions/i51/4.pdf (accessed 24 March 2010).

[37] MAJ Derek Knuffke (US Army, 2nd Stryker Cavalry Regiment, Targeting Officer and Operations Officer in Iraq with the author from 2007 to 2008), in discussion with author, 2010. Variations of Effects Based Operations (EBO) are still employed in Iraq for non-lethal, "whole of government" campaign planning as well as some precision targeting. The variations deviate from the traditional, mechanistic system of systems approach to EBO, and attempt to identify relationships between the various sub-systems of the environment.

[38] Matthew Lauder, *Systemic Operational Design: Freeing Operational Planning from the Shackles of Linearity*, Canadian Military Journal, (Ottowa, Ontario), Vol. 9, No. 4, 2009, 41-42, available at http://www.journal.dnd.ca/vo9/no4/08-lauder-eng.asp, (accessed 8 February 2010).

interactive complexity creates an unpredictable and non-linear system that does not exhibit a predictive cause and effect reaction the way a complicated system does.[39]

SOD calls for a military commander plus a small operational design team of staff and experts to use discourse and a cyclical, seven domain model to understand and appreciate what the problem is first and foremost, before planning to resolve it (See Figure 2).[40]

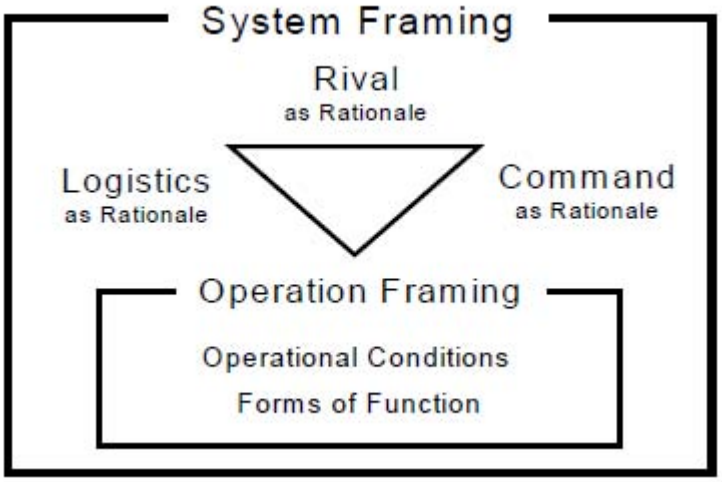

Figure 2: Systemic Operational Design Overview (Source: SOD Operational Command Workshop, Feb 2007)[41]

Through system framing, the design team examines the environment as a whole, with relationships and tensions existing between the environment and the various actors inside it (See Figure 3).

[39] Shimon Naveh, *In Pursuit of Military Excellence: The Evolution of Operational Theory* (Portland, OR: Frank Cass, 1997), 7.
[40] Victor J. Delacruz, "Systemic Operational Design: Enhancing the Joint Operation Planning Process" (monograph, Fort Leavenworth, KS: United States Army Command and General Staff College, School of Advanced Military Studies Department, 2007), p. 30, http://cgsc.cdmhost.com/cgi-bin/showfile.exe?CISOROOT=/p4013coll3&CISOPTR=1258&filename=1259.pdf , (accessed 09 February 2010), also available at Defense Technical Information Center Report (DTIC) ADA470655.
[41] Ibid, 30.

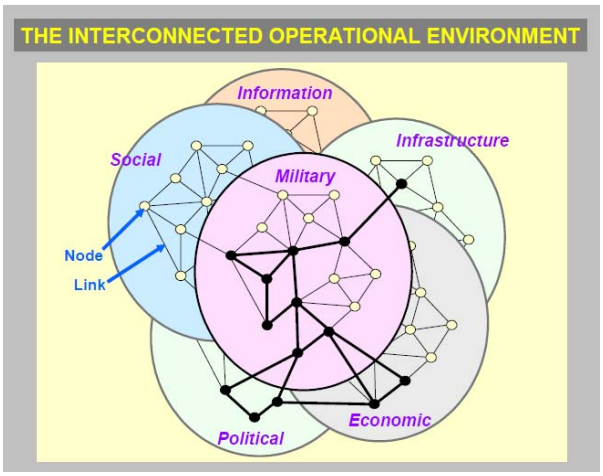

Figure 2: The Interconnected Operational Environment (Source: JP 5-0)

Tensions could be moral, physical, psychological, or of other natures. These tensions according to SOD, can be exploited and used to create systemic shock within the rival system, and bring about reduction in capabilities, defeat, or at least acceptable change in the rival systems behavior.[42]

What are of great importance in SOD are the concepts of "emergence" and "learning", and what they imply for reassessing a problem.[43] SOD maintains that each problem model design teams develop is framed within a particular time and space, and decisions made to affect the problem create variable change and ultimately can alter the problem entirely. The problem frame and associated solution is a "one-shot operation".[44] Therefore, it is imperative for the unit conducting operations in a complex environment to constantly learn what about themselves, the rival system, and the environment has changed that may affect their plan. Additionally, the rival organization may reveal more about its true shape based on operations, actions, and re-actions that reframe the way a unit understands their opponent.

[42] Naveh, 7-19.
[43] Sorrels et al, 19-22.
[44] TRADOC Pamphlet 525-5-500, 11.

Solutions, objectives, and endstates likewise must be flexible - they are on a scale of better to worse rather than one solidified outcome.[45]

In recent conflicts such as Iraq and Afghanistan, military intelligence planners have intuitively begun incorporating aspects of systemic thinking into design and planning.[46] However, intelligence staff participants on design teams and planners need more formalized training and professional development at the unit level in systemic concepts prior to deployment to maximize its used and effectiveness. Furthermore, the concepts like other TTP's deserve to be incorporated into institutional knowledge preserved in the Army's intelligence doctrine, and ensure it is properly nested with Army operations manuals.

Systems Thinking in Intelligence Operations.

Intelligence doctrine has relied on reductionist methodology and focused more on "how" to look at problems as opposed to "what".[47] Even doctrine's "how" is missing the holistic aspect. Methodology, the incorporation of "what" and "how", is what Army intelligence doctrine should become, and what incorporating systems thinking into doctrine can provide.[48] Systemic thinking incorporates operational art back into the intelligence operations, rather than focusing purely on the science aspect. A certain amount of reductionism is necessary for analysts to understand components of a system and establish a baseline. However, overemphasis in doctrine and training on reduction can lead analysts to focus on pure analysis and not effectively synthesize the data they collect to understand

[45] Ibid, 10.
[46] MAJ Brigham J. Mann, Regimental Intelligence Officer (S2), 2nd Stryker Cavalry Regiment (2SCR) (personal experience, OIF 07-09). While deployed with 2SCR to Iraq, the author's unit intuitively used some systemic concepts and incorporated them into EBO concepts during lethal and non-lethal operations planning. However, this was conducted very informally based on previous combat experience of the staff participants.
[47] Peter Checkland, *Systems Thinking, Systems Practice* (John Wiley & Sons: Chichester, 1981), 162.
[48] Ibid, 162.

environment as a whole.[49] Many intelligence practitioners have thus become accustomed to gathering facts rather than striving for holistic understanding and determining what information they possess is actually relevant to the problem and what is not.[50] This is an issue that needs to be addressed.

Systemic thinking and SOD teaches its users to not just identify subcomponents and collect data, but to with time and practice, identify what key aspects of the data are important for the commander to make a decision. Malcolm Gladwell refers to this concept as "thin-slicing", and provides case studies that reinforce while experience matters, what also matters is knowing what important aspects to look for when identifying a problem.[51] The ability to identify these key points as Lt. Gen (Ret.) Paul Van Riper points out can lead to a faster decision cycle - important in operational agility and critical in crisis action planning.[52] Properly trained intelligence personnel can, like SOD advocates for design teams, assemble a group of specialists that understanding their environment, can rapidly develop potential threat models, identify tensions in relationships, and design intelligence products that better address the problem. Intelligence fusion teams can include not just analysts, but regional experts, civil affairs, PSYOPS, and State Department personnel as but a few examples.

While conducting threat analysis, systemic thinking will encourage intelligence personnel to understand the interaction between the subcomponents and subsystems and how they relate to the threat as a whole, vice merely a collection of subcomponents and

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[49] Hall and Citrenbaum, 314-325.

[50] Hall, Wayne M. *"Shaping the Future: A Holistic Approach to Planning."* (monograph, Washington DC , United States National War College, March 1992), pp 3-6, http://www.dtic.mil/cgi-bin/GetTRDoc?Location=U2&doc=GetTRDoc.pdf&AD=ADA436857 , (accessed 07 March 2010).

[51] Malcom Gladwell, *Blink: The Power of Thinking Without Thinking*, (New York, NY: Backbay Books, 2005), 18-48.

[52] Van Riper, Paul. " *Self Organizing Groups and How Combat Applies to Business*, 2009; 10 min, 37 sec; http://www.youtube.com/watch?v=keBMZsJzFDY&feature=player_embedded, (accessed 27 March 2010).

capabilities. A threat organization may not be a true adversary, but merely a rival or "peer competitor", or a set of conditions that need to be changed.[53] The rival system may have competing ideologies or rationales behind why it behaves the way it does based on societal, tribal, or familial norms. These competing ideologies may be the tension that can be exploited, just as another tension can be caused by a shortage of fuel for instance, that causes a rival system to have to choose between which supported organization it supplies.

Systemic tensions that intelligence personnel identify can lead to opportunities for exploitation in the rival system, identify sources of strength, critical capabilities and the COG. Through reevaluation, systemic thinking will also assist intelligence personnel in identification of potential changes in the COG over time - a factor many analysts and planners likely do not take into consideration. Identification of these critical capabilities, exploitation points (or vulnerabilities) and the COG are essential to effective operational design and planning. Accounting for change and in these factors is a way intelligence personnel can proactively contribute to operations.

The templates presented in FM 34-130, the new FM 2-0, and the new FM 2-01.3 offer good starting points for attempting to understand the character of the conflict a unit is engaged in. However, intelligence analysts must be instructed that systemically speaking, these templates are imperfect interpretations of the system framework they are investigating. The chosen templates can become less useful over time as the threat evolves. Consequently, intelligence personnel must be prepared to reframe their intelligence model of the operating environment, as they receive and process information about the operational area. Information may reveal changes the threat or rival organization has adopted, changes in the

[53] J.R. Groen, "Systemic Operational Design: Improving Operational Planning for the Netherlands Armed Forces,"(monograph, Fort Leavenworth, KS: U.S. Army Command and General Staff College: School, 25 May 2006), 31-32.

physical or social environment, as well as erroneous assumptions that may have shaped the previous intelligence estimate. Intelligence practitioners must in essence develop an epistemic approach to their intelligence estimate as well as the information, reports, and methods they used to collect the data.[54]

When planning ECOA's, doctrine and individual training must instruct analysts to realize the limit to the predictive nature of their threat courses of action in complex environments, and not become wedded to them.[55] Given the complex character of the operating environment, it may also be advisable to look at capabilities or vignettes of possible enemy actions, rather than firm courses of action.[56] Exceptions to this might be if the intelligence practitioner has what they consider reliable information regarding threat activities or intent.[57] Intelligence personnel must understand that once a friendly organization executes a course of action, the action creates a new situation on the ground and likewise effects the threat or rival's intentions, capabilities, and course of action.[58] Like the military planner, intelligence personnel must review and re-assess their understanding of the threat's capabilities and intent. If necessary, the threat model must be altered or outright abandoned.[59]

Systemic thinking and associated concepts also have value during intelligence operational planning, which builds collection plans for human and technical sensors the U.S. Army employs during operations. SOD for instance, advises the use of "meta-questions" during design, which can be directly related to the development of Commander's Critical

[54] Wikipedia, "Epistemology", http://en.wikipedia.org/wiki/Epistemology (accessed 10 February 2010).
[55] Hall and Citrenbaum, 167-185. BG (Ret.) Hall recommends the term "anticipatory analysis" rather than prediction, to account for the inherent *un-predictive* nature of complex adaptive systems.
[56] Milan N. Vego, *Joint Operational Warfare*, (2007; repr., Newport, RI: U.S. Naval War College, 2009), IX-41-42.
[57] Ibid, IX-42.
[58] U.S. Army, *Commander's Appreciation and Campaign Design*, 10-12.
[59] Vego, IX-85.

Information Requirements (CCIR).[60] These questions focus on identifying the relationships and tensions between the various components of a system, to ultimately help identify the rationale and intent of the threat or rival system. They can also assist in identifying the root cause of the problem. For instance, a meta-question may ask why attacks are occurring in a particular area versus another. Doing so might uncover anthropological aspects, financial aspects, or terrain considerations (as but a few examples) the intelligence analysts and planners can use to shape their plans. This conceptual way of thinking about how a commander and the intelligence professional builds their recommended CCIR can increase the effectiveness of intelligence collection plans and support to the commander. The insight gathered can also assist in shaping trend analysis, and help the analyst identify what to consider in situations with a similar problem frame.[61]

In the contemporary environment, many tactical level commanders find themselves making operational level decisions.[62] Additionally, tactical operations and intelligence often have operational and strategic effects.[63] If tactical commanders are to design and plan operations in a holistic manner to account for the complex operating environment, they must have intelligence personnel who at the very least, have a basic understanding and training in systemic thinking, that is reinforced in the doctrine the intelligence practitioners employ. Another benefit to early training is discussed in Malcom Gladwell's book, *Outliers: The Story of Success.* In it, Gladwell addresses a key measure of success which is practice and experience. Gladwell points out that most professionals do not reach a level of mastery until

[60] Stefan J. Banach and Alex Ryan, "The Art of Design: A Design Methodology", *Military Review*, March-April 2009, 108.
[61] Hall and Citrenbaum, 155-166. Trend analysis works in tandem with "anticipatory analysis" and pattern analysis to better identify most likely threat courses of action and associated indicators.
[62] U.S. Army, *Commander's Appreciation and Campaign Design*, TRADOC Pamphlet 525-5-500, 12.
[63] Vego, VIII-29.

they have 10,000 hours of practice (using the right methodology).[64] Given this hypothesis, instructing only senior intelligence personnel who will generally be working at the operations level on systems thinking wastes valuable time, when those same personnel could be learning and practicing systemic concepts earlier. Therefore, while the United States Army can continue to train its intelligence leaders in courses such as Advanced Analytics, rudimentary systemic thinking needs to be incorporated into the basic doctrine and training of junior analysts.[65] At the unit level, it is incumbent upon the experienced commanders and principle staff leads to professionally develop junior intelligence personnel and improve their depth of understanding, ability to thin-slice, critical thinking capability.[66] For additional professional development, intelligence analysts can assume over-watch early on of a forward deployed unit, talk to topical subject matter experts, and glean knowledge and understanding of their potential future environment, to further improve their thin-slicing abilities.[67]

Counterpoints.

Not every military professional views SOD and associated systemic thinking as a positive advancement for the U.S. Military. Critics have argued SOD for instance, is based on pseudo-scientific concepts, post-modern philosophies, and other ill conceived ideas that have no place in warfare.[68] However, systems thinking and SOD if anything, support Clausewitz' theories on the nature of war, rather than oppose it. Clausewitz long argued against believing that mathematical equations could somehow remove all fog and friction

[64] Malcolm Gladwell, *Outliers: The Story of Success*, (New York, NY: Backbay Books, 2008),35-69.
[65] Advanced Analytics is BG (Ret.) Hall's course of instruction based off the teachings found in his book *Intelligence Analysis: How to Think in Complex Environments*. This course has been offered on a limited basis at the United States Army Intelligence Center (USAIC), Fort Huachuca, AZ.
[66] LTC James Isenhower, (Commander, 2-14 Cavalry Squadron (RSTA), 2-25 Infantry SBCT), telephone conversation with author, 16 April 2010.
[67] Many intelligence organizations supporting combat units conduct this prior to OIF and OEF deployments.
[68] Milan N. Vego, "A Case Against Systemic Operational Design," *Joint Force Quarterly.* Issue 53 (2nd Quarter 2009): 74.

from war.[69] He also noted that the character of a war constantly changes, the implications being the requirement of adaptation and constant reassessment. Systems thinking and complex, ill-structured problems only reinforce Clausewitz' belief in the interconnected nature of actions on the battlefield.[70] Thus, systems thinking is not in contest with classical military theory. If anything, the U.S. military's excessive reliance on perfect data, information dominance, and linear templates that is in violation of the teachings of Clausewitz.

Other critics might argue as to the value of including systemic concepts into intelligence doctrine, when FM 2-0 and FM 2-01.3 already presumably advise their user to be flexible and use broad analytical approaches to understanding the environment. Critics instead would cite poor professional development of intelligence practitioners as the primary reason for rigidity, not a problem with the doctrine itself. While professional development is a critical aspect to improving systemic thinking, the argument above does not address the overwhelming focus of intelligence doctrine on templates and how to systematically analyze short term problems, versus synthesis, assessment, or reevaluation of a problem over time.[71] Followers of the doctrine can infer from it in its current form, the template and precision in data is more important than determining what the real underlying problem may be, the interrelated nature of war, politics, and society, or how conditions might have changed in the operational environment. To the contrary, all of these aspects are of equal importance in operational design.

[69] Clausewitz, 86.
[70] Ibid, 158-159.
[71] Paul Bracken, "Strategic Planning for National Security: Lessons from Business Experience" (Santa Monica, CA: Rand Corporation, 1990), 4-5.

Conclusion and Recommendations.

While U.S. Joint Forces doctrine, TRADOC planning manuals, and Army operational planners have begun to incorporate systemic thinking, basic U.S. Army Intelligence training and doctrine has at present not been updated to follow suit. This is problematic given the enormity of the importance intelligence plays in operational design and planning, and the aforementioned effects tactical actions have on operations. U.S. Army Intelligence doctrine must therefore be revised along with the associated professional education to get our intelligence personnel to think more critically, creatively, and better adapt to the changing environment. The US Army Intelligence Center has established vast virtual libraries and forums that, combined with various organizations and over-watch centers, can support this holistic learning and situational understanding.[72] Analysis and reductionist methods are not in and of themselves bad techniques - they are essential parts of intelligence estimates, planning, and operations. Army Intelligence doctrine has done an admirable job of providing templates, analytical tools, and guidelines to facilitate this. However, classic reductionist techniques are imperfect and will never be able to completely account for uncertainty and chance, even at the tactical level.[73] Longer duration operations in complex, hybrid environments create additional fog and friction that defeat a rigid, mechanistic template. Even with the best computer modeling and information sharing tools available, military professionals will not be able to completely account for all of the inter-related factors of a system, or the variable change that occurs.

[72] Isenhower and Mann. The Tactical Over-watch Support Team (TOST), the Counter-IED Operations Integration Center (COIC), and Human Terrain Teams (HTT) are but three of the numerous over-watch centers and organizations available for improving holistic understanding of the current operational environments.
[73] Luck, Gary, and Findlay, Mike. "Joint Operations Insights and Best Practices", (2nd ed., Washington, DC: United States Joint Forces Command: Joint Warfighting Center, July 2008), 9-15. GEN (Ret) Luck and COL (Ret) Findlay make similar arguments about the limits mechanistic techniques in predicting behavior of complex systems - including using some systems of systems and EBO approaches.

Systemic thinking therefore, is part of the methodology we must teach our intelligence personnel to employ throughout the intelligence process and incorporate in our U.S. Army intelligence doctrine. Systemic thinking concepts have tremendous value for members of the intelligence community, who provide the critical linkage between understanding the problem through intelligence preparation of the operating environment, and operational design.[74] Incorporating systemic thinking into U.S. Intelligence doctrine and training is a way bridge the gap between what doctrine instructs intelligence personnel to do, what is actually being employed in current conflicts, and what will likely have applicability in the future. Holistic assessment teaches our intelligence soldiers to look at relationships, tensions, and possible second or third order effects of actions against a system. Systemic thinking teaches our intelligence personnel that no template or assumption is perfect, and those that may be valid for a particular problem model lose relevance over time. Continual reassessment of the problem is thus required. Incorporation of these concepts will help foster an adaptive intelligence staff that not only provides a commander with better initial analysis, but a staff that is better able to synthesize information, rapidly seize and maintain the initiative, and maintain operational agility.

[74]U.S. Army, *Intelligence*, Field Manual (FM) 2-0. (Washington D.C: Headquarters Department of the Army, May 2010) 4-1 to 4-5.

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