

# **Enabling Learning through the Assessment Process**

**A Monograph  
by  
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<p>The problem facing practitioners of emerging Army doctrine is how to expand the use of assessments beyond detailed planning to support conceptual planning during design. This raises the question, will the use of assessments enable the commander to use design throughout the operations process? Based on emerging Army doctrine, no gap exists between design, assessments, and the operations process. However, using assessments to support design may fail if commanders and their staffs do not expand the use of assessments beyond detailed planning. This study focuses on three areas: design, assessments, and reframing criteria. This study assesses the linkage between assessment and design based on enabling reflection in action, expanding the narrative and supporting discourse.</p> <p>This study shows that employing the methodology of design is required to understand ill-structured problems and that inclusion of collaboration and dialogue during assessments suggests when to reframe. Furthermore, incorporating the environmental and problem narratives during collaboration and dialogue enables the hypotheses testing required to continue to apply the design methodology during execution. The conclusion demonstrates that emerging doctrine provides sufficient tools for commanders and their staffs to remain innovative, adaptable, and execute continual learning. This study recommends that the Army incorporate more training on collaboration and dialogue during professional military education, and conduct future research on the application of emerging doctrine in current operations.</p>				
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## **Abstract**

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The problem facing practitioners of emerging Army doctrine is how to expand the use of assessments beyond detailed planning to support conceptual planning during design. This raises the question, will the use of assessments enable the commander to use design throughout the operations process? Based on emerging Army doctrine, no gap exists between design, assessments, and the operations process. However, using assessments to support design may fail if commanders and their staffs do not expand the use of assessments beyond detailed planning. This study focuses on three areas: design, assessments, and reframing criteria. This study assesses the linkage between assessment and design based on enabling reflection in action, expanding the narrative and supporting discourse.

This study shows that employing the methodology of design is required to understand ill-structured problems and that inclusion of collaboration and dialogue during assessments suggests when to reframe. Furthermore, incorporating the environmental and problem narratives during collaboration and dialogue enables the hypotheses testing required to continue to apply the design methodology during execution. The conclusion demonstrates that emerging doctrine provides sufficient tools for commanders and their staffs to remain innovative, adaptable, and execute continual learning. This study recommends that the Army incorporate more training on collaboration and dialogue during professional military education, and conduct future research on the application of emerging doctrine in current operations.

## Table of Contents

Table of Illustrations .....	iii
Introduction .....	1
Design.....	11
Assessments.....	21
Reframing Criteria.....	39
Conclusion.....	44
Bibliography.....	48

## Table of Illustrations

Figure 1: Depiction of Complexity in Afghanistan .....	2
Figure 2: Battle Command .....	6
Figure 3. Cognitive Hierarchy .....	8
Figure 4: Planning Continuum .....	10
Figure 5: The Operations Process.....	23
Figure 6: Evaluation Questions .....	24
Figure 7: Identification of Variance .....	25

## Introduction

In a recent news article, General Stanley McCrystal, the United States (US) and North Atlantic Treaty Organization (NATO) commander in Afghanistan highlighted the challenges of ill structured problems. During a briefing, General McCrystal remarked on a diagram depicting the complexity of the war in Afghanistan, “When we understand that slide, we’ll have won the war.”<sup>1</sup> (see Figure 1.) The briefing slide presented to General McCrystal attempted to portray the complex nature of the problems facing the United States and the North Atlantic Treaty Organization in Afghanistan. However, understanding complex adaptive problems requires more than a two dimensional picture. Applying design methodology when faced with complex, ill-structured problems can help commanders understand ill-structured problems, anticipate change, create opportunities, and recognize and manage transitions.<sup>2</sup>

The United States Army anticipates that in the 21<sup>st</sup> century, persistent conflict will dominate the emerging strategic environment.<sup>3</sup> Furthermore, the Army acknowledges that “conflict is invariably complex because it is fundamentally human in character.”<sup>4</sup> Emerging Army doctrine suggests that “Today’s operational environment presents situations so complex that understanding them – let alone attempting to change them – is beyond the ability of a single

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<sup>1</sup> Meghan O’Hara, “Diagram of a War Strategy: The Pentagon’s PowerPoint Misses the Big Picture in Afghanistan,” *The Huffington Post* (9 April 2010, [http://www.huffingtonpost.com/meghan-ohara/diagram-of-a-war-strategy\\_b\\_555389.html](http://www.huffingtonpost.com/meghan-ohara/diagram-of-a-war-strategy_b_555389.html) (accessed 29 April 2010)).

<sup>2</sup> U. S. Army, *FM 5-0: The Operations Process*. U. S. Department of the Army Field Manual (FM) (Washington, DC: Headquarters Department of the Army, March 2010), para. 3-7.

<sup>3</sup> *Ibid.*, para. 1-1.

<sup>4</sup> *Ibid.*, para 3-20.

individual.”<sup>5</sup> Perhaps General McChrystal’s comments reflect this understanding about the complexity of Afghanistan.

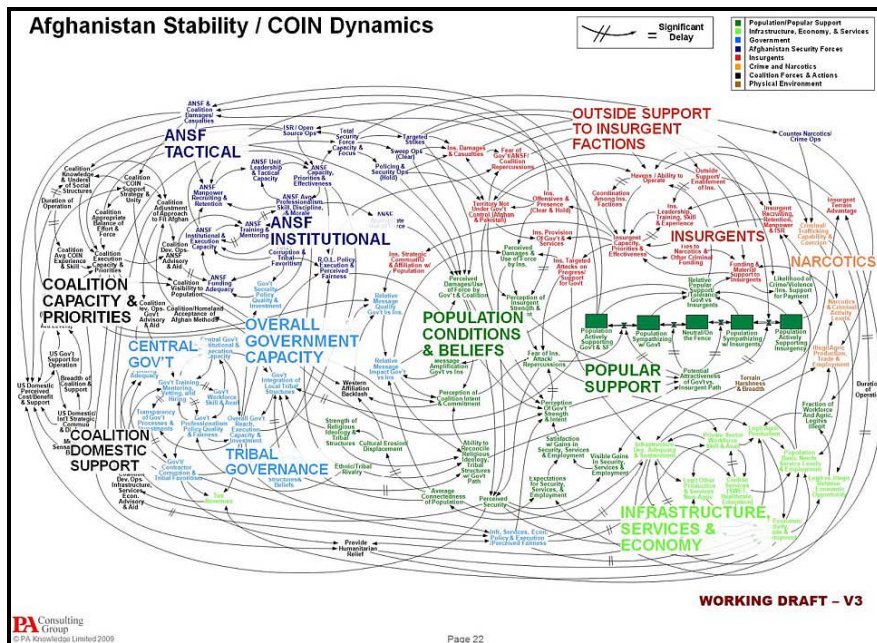


Figure 1: Depiction of Complexity in Afghanistan.

Source: Meghan O’Hara, “Diagram of a War Strategy: The Pentagon’s PowerPoint Misses the Big Picture in Afghanistan,” *The Huffington Post* (9 April 2010), [http://www.huffingtonpost.com/meghan-ohara/diagram-of-a-war-strategy\\_b\\_555389.html](http://www.huffingtonpost.com/meghan-ohara/diagram-of-a-war-strategy_b_555389.html) (accessed 29 April 2010)

The fundamentals of design are: applying critical thinking, understanding the operational environment, solving the right problems, adapting to dynamic conditions, and achieving designated goals.<sup>6</sup> The Army recognized that “Plans are based on imperfect understanding and

<sup>5</sup> Ibid., para. 3-21.

<sup>6</sup> U. S. Army, *FM 5-0*, para. 3-21.



assumptions of how the commander expects the situation to evolve.”<sup>7</sup> Therefore, emerging Army doctrine emphasizes the importance of continuous assessments in the operations process. Using assessments enables commanders to recognize shortcomings in the plan and changes in the commander’s visualization.<sup>8</sup> Ultimately, the design methodology relies on continuous assessments to reveal minor and significant variances from a commander’s original visualization.<sup>9</sup> Assessments are critical to learning about and adapting to changes in the operational environment.

This study seeks to understand how assessment supports design methodology as a function of the operations process. Furthermore, this study seeks to reveal how the use of assessments enables the conceptual understanding of ill-structured problems. Additionally, this study seeks to understand how assessments support a commander’s ability to reframe a problem when faced with significant variance from an original visualization.

The problem facing practitioners of emerging Army doctrine is how to expand the use of assessment beyond detailed planning to support conceptual planning during design. Army doctrine states, “Design provides an approach for how to generate change from an existing situation to a desired objective or condition.”<sup>10</sup> Moreover, Army doctrine points out that assessment “involves continuously monitoring and evaluating the operational environment to

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<sup>7</sup> Ibid., vii.

<sup>8</sup> Ibid.

<sup>9</sup> U. S. Army, *FM 5-0*, vii.

<sup>10</sup> Ibid., para. 3-3.

determine what changes might affect the conduct of operations.”<sup>11</sup> Based on emerging Army doctrine, no gap exists between design and assessment, as part of the operations process. However, this study will show that using assessments to support design may fail if commanders and their staffs do not incorporate effective collaboration and dialogue.

This raises the question, will the use of assessments enable the commander to use design throughout the operations process? The use of assessments during conceptual planning provides a commander with a tool that supports the use of design throughout the operational process. Army doctrine suggests that “Innovation, adaptation, and continuous learning are central tenets of design.”<sup>12</sup> However, an understanding of how assessments support conceptual planning is necessary to achieve the goals outlined in Army doctrine.

There are five concepts central to this study that are important to understand: design, assessments, learning and adaptation, conceptual and detailed planning, and reframing. Understanding what design and assessments are sets the backdrop for this paper. Developing a better understanding of learning and reframing provides the props used during the operations process. Understanding the purpose of conceptual and detailed planning provides the lighting that illuminates how and when assessments support design, learning, and reframing.

Army doctrine defines design as a “methodology for applying critical and creative thinking to understand, visualize, and describe complex, ill-structured problems and develop

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<sup>11</sup> Ibid., para. 6-2.

<sup>12</sup> U. S. Army, *FM 5-0*, para. 3-5.

approaches to solve them.”<sup>13</sup> Critical thinking captures the reflective and continuous learning essential to the design methodology. The purpose of critical thinking is to determine the truth in situations where direct observation is insufficient, impossible, or impractical. An understanding of reflective thinking theory helps to support the importance of this form of learning. Creative thinking involves creating something new or original. It leads to new insights, approaches, perspectives, and understanding. Creative thinking supports the foundations that design theorists highlight.<sup>14</sup>

The Army defines assessment as the “continuous monitoring and evaluation of the current situation, particularly the enemy, and progress of an operation.”<sup>15</sup> The process helps commanders determine progress towards attaining the desired state. It precedes, guides, and concludes each operations process through monitoring, evaluating, and then recommending changes. (see Figure 2.) Monitoring allows staffs to collect relevant information through continuous observation to provide an accurate understanding of the current situation. Evaluating conditions consist of using criteria to judge progress toward desired conditions and determining why the current degree of progress exists. By creating measures of effectiveness (MOE) and measures of performance (MOP) the staff aids in determining progress towards the desired state.

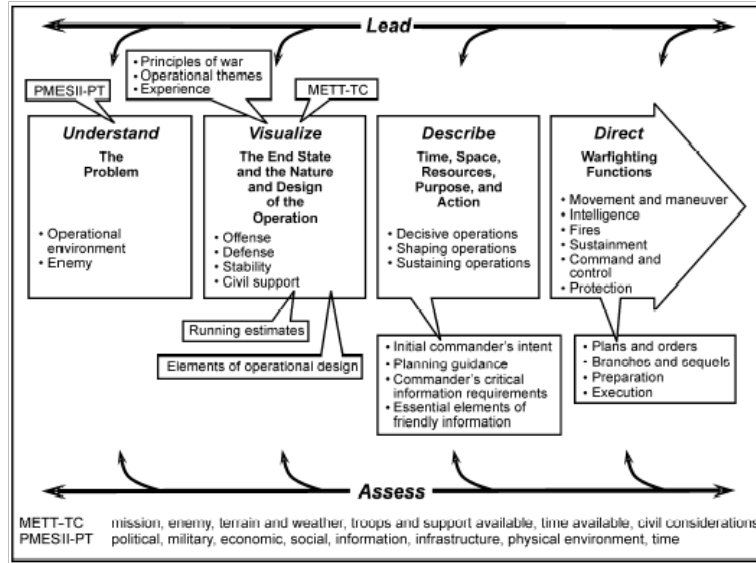
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<sup>13</sup> Ibid., para. 3-1.

<sup>14</sup> Ibid., para. 1-29, 1-30.

<sup>15</sup> Ibid., para. 6-1.

This process can be either formal or informal and is up to the commander to decide the level of detail required from assessments.<sup>16</sup>



**Figure 2: Battle Command**

Source: U. S. Army, *FM 3-0, Operations*, U. S. Department of the Army Field Manual (FM) (Washington, DC: Headquarters Department of the Army, February 2008).

The Army defines learning and adapting in several ways. Doctrine asserts that “Adaptable organizations learn constantly from experience (their own and others’) and apply new knowledge to each situation.”<sup>17</sup> Knowledge is not sufficient because learning and adaptability

<sup>16</sup> U. S. Army, *FM 6-0: Mission Command: Command and Control of Army Forces U.S.* Department of the Army Field Manual (FM) (Washington, DC: Headquarters Department of the Army, August 2003). U. S. Army, *FM 5-0*, para.6-1; 6-2; 6-5; 6-7; 6-12; 6-13; 6-55.

<sup>17</sup> U. S. Army, *FM 7-0: Training for Full Spectrum Operations*. U.S. Department of the Army Field Manual (FM) (Washington, DC: Headquarters Department of the Army, December 2008), para. 1-22.

cannot occur without understanding. Furthermore, doctrine points out that “Incoming data are not information until they have meaning added by processing...These thought processes constitute cognition, the act of learning or integrating various pieces of information. It raises information ...obtained from processing...into knowledge.”<sup>18</sup> Additionally, doctrine specifies that “after applying judgment to understand” learning and adaptability can occur.<sup>19</sup> Then, emerging doctrine highlights a cognitive hierarchy (see Figure3). It suggests that “C2 aims to enhance the commanders ability to make sound and timely decisions” and “C2 must first support the commander in understanding.”<sup>20</sup> The addition of assessments in *FM 5-0, The Operations Process*, incorporates another aspect of learning into doctrine. Assessments include “measuring progress according to the plan... and reexamining the logic and assumptions of the original plan to determine if the plan is still relevant.”<sup>21</sup>

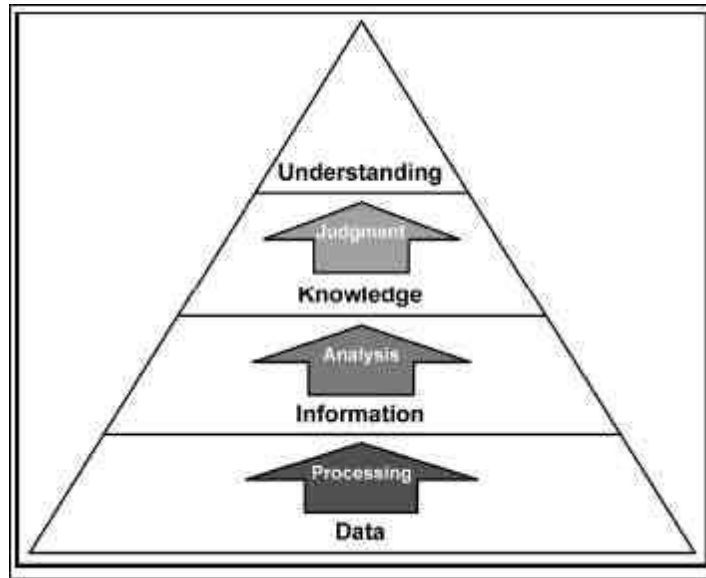
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<sup>18</sup> U. S. Army, *FM 6-0*, para. 3-61.

<sup>19</sup> *Ibid.*, para. 3-61.

<sup>20</sup> U. S. Army, *FM 5-0*, para. 1-17.

<sup>21</sup> *Ibid.*, para. 1-32; 6-37.



**Figure 3. Cognitive Hierarchy**

*Source: U. S. Army, FM 5-0, The Operations Process, U. S. Department of the Army Field Manual, (Washington, DC: Headquarters Department of the Army, March 2010).*

Army doctrine defines reframing as “a shift in understanding that leads to a new perspective on the problems or their resolution.”<sup>22</sup> Understanding the concept of reframing is critical to the analysis of how emerging doctrine incorporates continual learning through assessments. It involves major revisions to the hypotheses or models that the design concept was based on. Additionally, it could involve discarding those hypotheses or models completely. Reframing occurs when significant change to the understanding of the environment or end state is identified and helps the commander make adjustments throughout the operations process. Identifying when a plan is not progressing as envisioned, or reconsidering the logic supporting it

may instigate reframing. These criteria should cue the commander to rethink his understanding of the operational environment resulting in a change to the problem. Three conditions generally result in reframing; catastrophic change, a review identifies a problem, or an assessment and reflection challenges the understanding of the existing problem.<sup>23</sup>

The Army defines conceptual planning as “developing tactical and operational concepts for the overall conduct of military operations.”<sup>24</sup> Conceptual planning consists of understanding the operational environment, problem, and determining the desired end state. These concepts help answer the questions of what to do and why. Therefore, “The battle command activities of understanding and visualization are key aspects of conceptual planning.”<sup>25</sup> Design resides within the realm of conceptual planning by helping commanders understand, visualize, and describe their broad operational approach.

The Army defines detailed planning as planning that “translates the broad operational approach into a complete and practical plan.”<sup>26</sup> In contrast to conceptual planning, which “generally corresponds to the art of operations and is the focus of the commander,” detailed planning is associated with the science of war and “falls under the purview of the staff, focusing on specifics of execution.”<sup>27</sup> If viewed as part of a continuum between conceptual and detailed

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<sup>22</sup> U. S. Army, *FM 5-0*, para. 3-68.

<sup>23</sup> U. S. Army, *FM 5-0*, para. 3-68; 3-69.

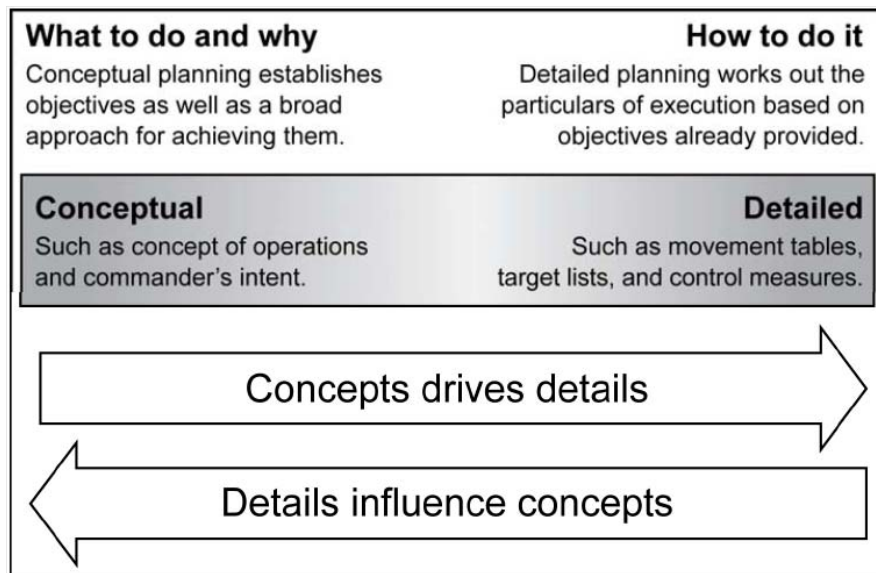
<sup>24</sup> *Ibid.*, para. 2-37.

<sup>25</sup> *Ibid.*

<sup>26</sup> *Ibid.*, para. 2-38.

<sup>27</sup> *Ibid.*, para. 2-37; 2-38.

concepts, the planning process would generally flow from general to detailed planning. Broad operational concepts provide the framework driving the development of detailed planning to achieve the desired state. However, doctrine points out that “the dynamic does not operate in only one direction.”<sup>28</sup> (see Figure 4) Furthermore, the Army highlights several methods to help commanders understand situations and make decisions. Design aids in conceptual planning while the military decision making process (MDMP) and troop leading procedures focus on detailed planning and execution.<sup>29</sup>



**Figure 4: Planning Continuum**

Source: U. S. Army, *FM 5-0, The Operations Process*, U. S. Department of the Army Field Manual, (Washington, DC: Headquarters Department of the Army, March 2010).

<sup>28</sup> Ibid., para. 2-39.

<sup>29</sup> U. S. Army, *FM 5-0*, para. 2-39; 2-40.



Following the introduction, this paper has three sections - design, assessments, reframe criteria - and a conclusion. The purpose of the design section is to assess how the design methodology generates understanding when dealing with ill-structured problems. The purpose of the assessment section is to examine if emerging doctrine's concept of assessment provides a method to conduct both detailed and conceptual learning. The reframing criteria section assesses how collaboration and dialogue provide the necessary feedback to enable reframing to occur. The conclusion demonstrates that emerging doctrine provides sufficient tools for commanders and their staffs to remain innovative, adaptable, and execute continual learning. This study evaluates the linkage between assessment and design based on three criteria: enabling reflection in action, expanding the narrative and supporting discourse.

## **Design**

The purpose of the design section is to assess how the design methodology generates understanding when dealing with ill-structured problems. First, this section will establish how design helps commanders deal with complexity. Next, the section points out how the emerging doctrine develops perspective. Finally, it establishes how narratives enable the commander to visualize and transfer understanding.

Complexity hinders the commander's ability to visualize the environment and describe the problem. In their book, *Harnessing Complexity*, Robert Axelrod and Michael Cohen point out that in complex systems "the forces shaping the future do not add up in a simple, systemwide

manner.”<sup>30</sup> Likewise, in his book, *On War*, Carl von Clausewitz asserts that “Efforts were therefore made to equip the conduct of war with principles, rules, or even systems...but people failed to take adequate account of the endless complexities involved.”<sup>31</sup> Furthermore, John Lewis Gaddis suggests in his book, *The Landscape of History*, that “The trouble with the future is that it’s so much less knowable than the past.”<sup>32</sup> Without a methodology to generate understanding, commanders cannot provide conceptual guidance for their staffs.

The complex nature of the current operating environment creates many problems for those who attempt to predict or assess progress. Axelrod and Cohen assert that the non-linear reactions within complex systems, and the inability to “close” these systems simply by drawing boundaries separating them from the environment, increases the difficulty of identifying and tracking change. Complex systems exhibit many unique characteristics: punctuated equilibrium or alternating periods of rapid change and stability; self-restoring patterns that restore equilibrium and relegate major events irrelevant; and butterfly effects, or sensitivity to initial conditions that causes a small change in one part of the system to develop into drastic changes elsewhere in the system.<sup>33</sup>

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<sup>30</sup> Robert Axelrod and Michael D. Cohen, *Harnessing Complexity: Organizational Implications of a Scientific Frontier* (Basic Books: New York, NY, 2000), 14.

<sup>31</sup> Carl von Clausewitz, *On War*, ed. Howard, Michael and Paret, Peter (Princeton, NJ: Princeton University Press, 1976), 134.

<sup>32</sup> John Lewis Gaddis, *The Landscape of History: How Historians Map the Past* (Oxford, NY: Oxford University Press, 2002), 56.

<sup>33</sup> Axelrod and Cohen, *Harnessing Complexity: Organizational Implications of a Scientific Frontier*, 14.

Nearly 200 years ago, Clausewitz recognized the aspects of war's nature that result in the challenges associated with the complexity in the contemporary operational environment. Clausewitz reveals the source of these challenges in his criticism of attempts to develop a theory of war based on rules and principles of predictable, linear systems. Because Clausewitz understood war does not have finite limits and is not a linear, predictable phenomenon, he developed a theory of war that accounts for its nonlinear nature. He explained these insights in several ways, including his description of the realities that prevent war from escalating to its absolute form, and his emphasis on the significance of moral factors in war. Clausewitz explains these aspects of war using various metaphors, such as that of a doctor facing the challenges of dealing with an ever-changing human body, or that of a psychiatrist dealing with highly complex issues of human morality. The scientific attempt to understand actions will always be at odds with reality because war is not a closed system, as seen in its many complex characteristics, including the significance of moral factors.<sup>34</sup>

In *The Landscape of History*, John Lewis Gaddis compares the differences in how historians and social scientists attempt to generate understanding in their respective fields. His analysis contends that social scientists are more likely to use reductionist methods to understand reality than historians would be. He explains that reductionism is a process of understanding reality by breaking it up into its various parts and studying them individually, reassembling the various findings into a supposedly coherent whole. Gaddis demonstrates that most aspects of the real world are too complex for analysis through a reductionist approach, and

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<sup>34</sup> Clausewitz, *On War*, 134; 136; 156 – 174.

describes an ecological approach as an alternative. In an ecological approach, one considers how the various parts of a system interact, and analyzes them holistically rather than individually. Gaddis postulates that the failure of reductionist methods in history results from the fact that history deals with people and the reductionist view neglects the role of human consciousness and free will in the establishment of causality. Gaddis concludes that the most any historian or social scientist can hope to achieve is provisional causation, because it is impossible to know all the facts relevant to the phenomena they are studying. Generating understanding through reductionist methods may introduce flaws because of the lack of fidelity when establishing causation.<sup>35</sup>

The environmental frame described in emerging Army doctrine is the basis for generating understanding about the environment that the ill-structured problem resides. The environmental frame must capture the history, culture, current state, and future goals of all the relevant actors and the operational environment. Expanding the environmental frame through an iterative and recursive process continues to develop understanding of the complex environment. The iterative approach enables the practitioner to shift between relevant actors and the system as a whole, resulting in a broader perspective and an understanding of how change may occur. Continuous learning allows the commander's visualization of the complex environment to adapt as his understanding increases. The environmental frame described by emerging doctrine provides a methodology for the commander to deal with the increased complexity in the current operational environment.<sup>36</sup>

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<sup>35</sup> Gaddis, *The Landscape of History: How Historians Map the Past*, 54-56; 103.

<sup>36</sup> U. S. Army, *FM 5-0*, para. 3-44; 3-37; 3-50.

Using iterative and cyclic processes develops perspective and identifies the approach to solve ill-structured problems. In his book, *Systems Thinking: Managing Chaos and Complexity*, Jamshid Gharajedaghi asserts that “iteration is the key for understanding complexity.”<sup>37</sup> Furthermore, Donald Schoen suggests in his book, *Educating the Reflective Practitioner*, that “Reflection-in-action has a critical function, questioning the assumptional structure of knowing-in-action. We think critically about the thinking that got us into this...opportunity; and we may, in the process, restructure strategies of action, test our tentative understandings of phenomena, or ways of framing problems.”<sup>38</sup> Gaddis suggests that only taking a holistic view “would prevent a historian from knowing anything until he knows everything.”<sup>39</sup> Commanders require a methodology to provide perspective that builds understanding of the complex environment.

In his book, *Systems Thinking*, Gharajedaghi suggests that designers today are faced with two options to address complexity. Designers can either remain being overwhelmed with the complexity of an open system, where everything affects everything else, or use a systems approach to separate the environment from the system to be controlled. Furthermore, he asserts that conducting iterations looking at “structure, function, and process in a given context would examine assumptions and properties of each element in its own right, then in relationship with

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<sup>37</sup> Jamshid Gharajedaghi, *Systems Thinking Managing Chaos and Complexity* (San Diego, CA: Elsevier, 2006), 112.

<sup>38</sup> Donald Schoen, *Educating the Reflective Practitioner* ( San Francisco, CA: John Wiley & Sons, Inc., 1987), 28.

<sup>39</sup>Gaddis, *The Landscape of History: How Historians Map the Past*, 26.

other members of the set.”<sup>40</sup> This process provides a tool to use during the iterative process to provide greater understanding of a complex system and leads towards a holistic understanding of the environment. However, simply establishing a methodology to conduct iterative inquiry does not support learning by itself.

Donald Schoen posits in his book, *Educating the Reflective Practitioner*, that “Reflection gives rise to on-the-spot experiment.”<sup>41</sup> He uses the example of dealing with an architectural problem using an iterative approach to highlight this point. His example suggests that by looking at individual parts in relation to the whole site construction then cycling between macro view and micro view is part of the iterative process. This iterative process leads towards experimentation or hypotheses testing which provides a better understanding of the problem. The results of this could lead to reframing the problem set because of changes observed at the macro level or discovery of new features at the micro level that alter the current understanding of the environment. The process of reflective thinking paves the way to understand the power of the individual frames discussed in design. By viewing this process as an iterative cycle of framed experiments, one could link it back to the continuous assessment process. Learning in action results through disproving the hypothesis used to determine the relationships or interactions within the environment that underpins the logic of the original plan. These shifts force adjustment to the

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<sup>40</sup> Gharajedaghi, *Systems Thinking Managing Chaos and Complexity*, 112.

<sup>41</sup>Schoen, *Educating the Reflective Practitioner*, 28.

holistic environmental frame and can capture adaptation within the system as well as emergence of macro behaviors that assessing micro behavior may not capture.<sup>42</sup>

Additionally, Gaddis suggests that “The part is as great as the whole.”<sup>43</sup> He asserts that complete understanding is not achievable because subsets or subsystems have as many parts as the whole system creating an infinite number. Gaddis points out that James Joyce takes over seven hundred pages in his book *Ulysses* to capture everything that happened to an ordinary person in one day. Gaddis cautions that, “our modes of representation determine whatever it is we’re representing.”<sup>44</sup> Moreover, he posits that “objectivity as a consequence is hardly possible, and that there is, therefore, no such thing as truth.”<sup>45</sup> Understanding is generated though iteration to provide perspective.

Emerging Army doctrine points out that “Even though this understanding will never be perfect, attempting to comprehend its complex nature helps identify unintended consequences that may undermine well-intentioned efforts.”<sup>46</sup> However, the framing concept “scopes the part of the operational environment or problem under consideration.”<sup>47</sup> This allows the commander to understand and act on ill-structured problems. The framing approach relies heavily on the iterative process to continue to challenge hypothesis and reality models thereby increasing the

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<sup>42</sup> Ibid., 27-28; 44-58; 74; 157.

<sup>43</sup> Gaddis, *The Landscape of History: How Historians Map the Past*, 27.

<sup>44</sup> Ibid., 29.

<sup>45</sup> Gaddis, *The Landscape of History: How Historians Map the Past*, 29.

<sup>46</sup> U. S. Army, *FM 5-0*, para. 3-25.

<sup>47</sup> Ibid., para. 3-39.

commander's understanding. The creation of a narrative and graphic depiction of the environment helps establish a perspective to support the commander's understanding.<sup>48</sup>

Narratives synthesize the understanding generated through design. In his book, *The Content of the Form*, Hayden White suggests that "narrative might be considered a solution to the problem of general human concern...the problem of how to translate knowing into telling."<sup>49</sup>

Additionally, Elinor Ochs and Lisa Capps assert in their article, "Narrating the Self" that "Across cultures, narrative...is a fundamental means of making sense of experience."<sup>50</sup> Moreover, Clifford Geertz points out in his book, *The Interpretation of Cultures*, that "thick description" is required to complete understanding.<sup>51</sup> Additionally, Gaddis points out that "narrative...-must command a consensus among those who use it that its correspondence with reality is a close one."<sup>52</sup> By providing the narrative and graphic depiction in the design concept, transfer of understanding to subordinates can occur.

White asserts that narratives help solve the problems of translating knowledge and meaning to others. His concepts are critical to passing information that transcends cultural barriers, enabling a shared reality to be constructed. Additionally, he suggests that an effective narrative must have a plot and moral background that helps it provide meaning. First, the plot enables transference of a seemingly coherent and understandable whole out of data or

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<sup>48</sup> Ibid., para. 3-44.

<sup>49</sup> Hayden White, *Content of the Form* (Johns Hopkins University Press, Baltimore, MD, 1987): 1.

<sup>50</sup> Elinor Ochs and Lisa Capps, "Narrating the Self," *Annual Review of Anthropology* 25, (1996): 19.

<sup>51</sup> Clifford Geertz, *The Interpretation of Cultures* (Basic Books, New York, NY, 1973), 6.



information. The narrative provides a common understanding from which dialogue and discussion emerges to challenge the understanding and enable learning. Second, the moral background provides authority for the narrator and establishes a means to provide closure or bound the system. However, this only occurs once synthesis of the varied viewpoints or realities takes place. Challenging a hypothesis and the moral background can lead to a reconstruction of a new understanding. A structured plot can highlight variance or difference establishing perspective for the reader. White's foundation for what constitutes a narrative provides only part of the requirement that design requires of it.<sup>53</sup>

Ochs and Capps point out that “narrators alternate between two fundamental tendencies—either to cultivate a dialogue between diverse understandings or to lay down one coherent, correct solution to the problem.”<sup>54</sup> Moreover, these tendencies offer “potentially infinite range of interpretive frames for organizing experience and promotes alterity and relative openness to new ideas.”<sup>55</sup> Additionally, narratives must have a thick description to enable critical discourse. In his book, *The Interpretation of Cultures*, Clifford Geertz suggests that thick description is all the background data required beyond the plot and moral authority to provide understanding.<sup>56</sup>

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<sup>52</sup> Gaddis, *The Landscape of History: How Historians Map the Past*, 107.

<sup>53</sup> White, *Content of the Form*, 5; 1; 15.

<sup>54</sup> Ochs and Capps, “Narrating the Self,” 32.

<sup>55</sup> Ibid.

<sup>56</sup> Geertz, *The Interpretation of Cultures*, 6.

Gaddis asserts that “until we begin looking for evidence with the purposes of our narrative in mind” we will not know how much information is relevant.<sup>57</sup> Additionally, he writes that “Composing the narrative will then produce places where more research is needed.”<sup>58</sup> Gaddis suggests that shifting between induction and deduction to determine what else must be known or researched. He cautions that “new evidence will still have to fit within the modified narrative, so we’re back to deduction. And so on...until...it feels right.”<sup>59</sup> The iterative process builds consensus for the development of effective narratives.

Emerging doctrine asserts that “The operational environment and problem, text and graphics, provide the expanded context with which an understanding of the environment is attained; as well as transmitting the common understanding or meaning to superiors and subordinates.”<sup>60</sup> The environmental frame establishes a plot and moral background through explaining “the actors and relationships within a system.”<sup>61</sup> By analyzing “groupings of actors that exert significant influence in the operational environment knowing that individual actors rarely share common goals” sense can be made out of the complex environment.<sup>62</sup> Furthermore, doctrine states that “The environmental frame’s narrative captures a more detailed understanding

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<sup>57</sup> Gaddis, *The Landscape of History: How Historians Map the Past*, 107.

<sup>58</sup> Ibid.

<sup>59</sup> Ibid.

<sup>60</sup> U. S. Army, *FM 5-0*, para. 3-44.

<sup>61</sup> Ibid.

<sup>62</sup> Ibid., para. 3-45.

of the relevant actors and their interactions and relationships.”<sup>63</sup> Continuing to develop understanding of the relevant actors generates a thick description. Furthermore, doctrine suggests that “The commander and staff challenge their hypotheses and models to identify motivations and agendas among the relevant actors.”<sup>64</sup> This highlights the shifts between inductive reasoning in the environmental frame and deductive reasoning establishing the problem frame.

The design methodology enables commanders to generate understanding and conceptualize their plan through narratives and graphics. Furthermore, the environmental frame is the basis for generating understanding about the environment where the ill-structured problem resides. The environmental frame captures the history, culture, current state, and future goals of all the relevant actors and the operational environment. Because the environmental frame shifts throughout the process as the iterative and recursive process, it enables reflection in action to occur and creates greater understanding. Moreover, the design methodology uses discourse to conduct hypotheses testing when identifying the relevant actors. Furthermore, the narrative and graphic help the commander to convey his understanding of the environment. Next, this paper will focus on the assessment process described in emerging Army doctrine.<sup>65</sup>

## **Assessments**

The purpose of this section is to determine if emerging doctrine’s concept of assessment provides a method to support both detailed and conceptual planning. First, this section evaluates

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<sup>63</sup> Ibid., para. 3-50.

<sup>64</sup> U. S. Army, *FM 5-0*, para. 3-54.

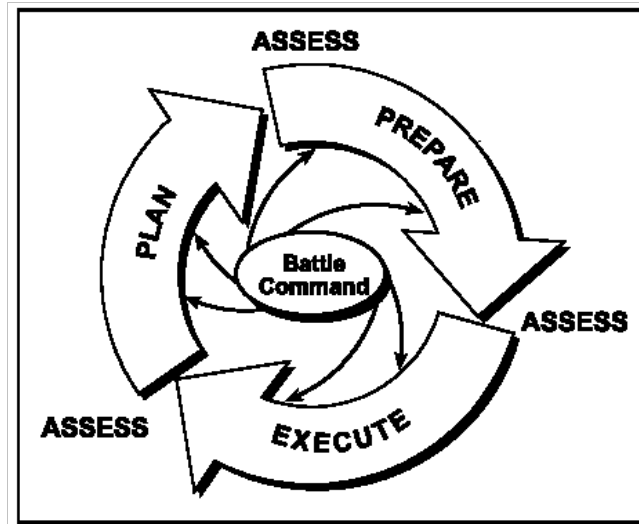
<sup>65</sup> Ibid., para. 3-44; 3-37; 3-50.

how the assessment relies on causality to determine progress towards a desired state. Second, it analyzes the weaknesses in applying causation that can result in commanders making conclusions for the wrong reasons. Third, it analyzes how deductive logic can identify adaptation or emergent behavior. Finally, it examines how collaboration and dialogue to enable reflective learning. Understanding how assessment provides feedback for conceptual and detailed planning reveals how emerging doctrine incorporates collaboration and dialogue to enable conceptual learning.

Causality is required to assess the detailed plan's progress towards the desired state. Current doctrine lays the foundation for how the commander incorporates assessment into the operations process. Doctrine suggests focusing on the three primary activities of planning, preparing for, and executing operations while continuously assessing within a cyclical and continuous system. Doctrine asserts that these processes are non-linear, and multiple elements are assessed simultaneously. (see Figure 5) Commander's visualization is one of the primary means for planning and assessing operations. The information required for commanders to conduct assessments comes from various sources including the common operational picture, commanders' observations, running estimates, and the assessment plan. Commanders continually update their visualization through monitoring the current situation and evaluating indicators and criteria in the operational environment. Monitoring requires the commander to ensure that the facts and assumptions identified during planning remain valid. Evaluating focuses on assessing progress towards the success criteria.<sup>66</sup>

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<sup>66</sup> U. S. Army, *FM 6-0*, 6-5.



**Figure 5: The Operations Process**

*Source:* U. S. Army, FM 6-0, *Mission Command: Command and Control of Army Forces U.S.* Department of the Army Field Manual (FM), U. S. Army, (March 2010).

Current doctrine provides ten questions to help commanders and their staffs determine if a change is necessary to accomplish the mission (see Figure 6). Doctrine suggests that “By evaluating the answers to questions such as these, commanders and staffs determine variances and their significance.”<sup>67</sup> Furthermore, doctrine points out that this process focuses on commanders quickly determining what needs to be changed and acting first on it. However, doctrine warns that challenging the commander’s understanding and determining delayed effects can be difficult through this process and does not provide the feedback to determine variances that shift the commander’s understanding of the environment. The ten questions provide a means

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<sup>67</sup> U. S. Army, *FM 6-0*, para. 6-11.

for a commander and his staff to employ deductive logic to adjust to how the commander is responding within his current understanding.<sup>68</sup>

- **Can the force achieve the commander's intent?**
- **Where is the enemy? Doing what? How?**
- **Where are friendly forces? Doing what? How?**
- **What is the posture of the enemy force now and what will it be at the time being considered?**
- **Where will friendly forces be at the time being considered?**
- **What are the enemy's problems and how can we exploit them?**
- **What are our problems and how can we correct them?**
- **What are the enemy's opportunities and how can we deny them?**
- **What are our opportunities and how can we exploit them?**
- **Are there any changes needed to the task organization concept of operations or mission?**

**Figure 6: Evaluation Questions**

Source: U. S. Army, FM 6-0, *Mission Command: Command and Control of Army Forces* U.S. Department of the Army Field Manual (FM), U. S. Army, (March 2010).

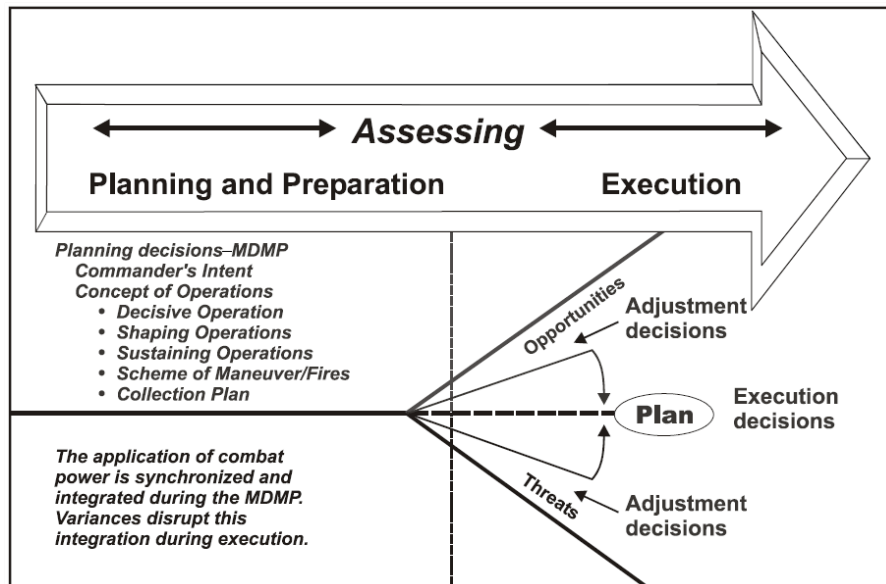
Emerging doctrine provides six additional questions that commanders should address when determining what to assess: “What will be assessed and to what detail? How will a particular task, objective, end state condition, or assumption be assessed? What MOEs and MOPs will be used? What information requirements (indicators) are needed to support a particular assessment? Who on the staff has primary responsibility for assessing a particular area? What is the collection plan?”<sup>69</sup> Doctrine warns that “Commanders must be careful, however, not to over

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<sup>68</sup> Ibid., 6-1, 6-3, 6-4, 6-5.

<sup>69</sup> U. S. Army, *FM 5-0*, para. 6-57.

assess. Staffs can easily get bogged down in developing formal assessment procedures for numerous tasks and objectives.”<sup>70</sup> Moreover, doctrine suggests that “A key aspect of evaluation is determining variances—the difference between the actual situation and what the plan forecasted



**Figure 7: Identification of Variance**

*Source:* U. S. Army, FM 5-0, *The Operations Process*, U. S. Department of the Army Field Manual, (Washington, DC: Headquarters Department of the Army, March 2010).

the situation would be at the time or event.”<sup>71</sup> Staffs plan for future actions by assessing the variance between intended outcomes and actual events, recommending adjustment decisions or execution decisions as the situation warrants.<sup>72</sup> (see Figure 7)

<sup>70</sup> Ibid., para. 6-58.

Emerging doctrine asserts that “A key aspect of any assessment is the degree to which it relies upon human judgment and the degree to which it relies upon direct observation and mathematical rigor.”<sup>73</sup> Additionally, doctrine points out that “Evaluation is the heart of the assessment process where most of the analysis occurs.”<sup>74</sup> Doctrine relies on MOEs and MOPs to assess progress, requiring both quantitative and qualitative data.<sup>75</sup> The commander requires causation to analyze why an operation is making progress, or not, towards the desired state. The mathematical rigor highlighted in doctrine suggests the application of statistics to determine correlation. Moreover, doctrine points out that Operations Research and Systems Analysts staff sections “confirm or rule out suspected trends in a statistically rigorous manner.”<sup>76</sup> Emerging doctrine relies on causation when analyzing MOPs effects on MOEs to determine variances from forecasted outcomes. However, doctrine warns that “establishing cause and effect is sometimes difficult, but is crucial to effective assessment.”<sup>77</sup>

Causal relationships can result in conclusions drawn for the wrong reasons. In his book, *Causality and Explanation*, Wesley Salmon points out that “Formal reasoning cannot reveal causation because we cannot deduce the nature of an effect from a description of the cause or the

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<sup>71</sup> U. S. Army, *FM 5-0*, para. 6-19.

<sup>72</sup> *Ibid.*, para. 6-57; 6-58.

<sup>73</sup> *Ibid.*, para 6-45.

<sup>74</sup> *Ibid.*, para. 6-12.

<sup>75</sup> *Ibid.*, para. 6-47; 6-52.

<sup>76</sup> *Ibid.*, para 6-66.

<sup>77</sup> *Ibid.*, para. 6-40.



nature of the cause from a description of and effect.”<sup>78</sup> Additionally, in his book, *Philosophy of Social Science*, Alexander Rosenberg asserts that “folk psychology is still the best theory we have for predicting the behavior of people around us, and it’s the one we employ when we explain our own and others’ behavior.”<sup>79</sup> Furthermore, Gaddis highlights that “consciousness – perhaps I should say willfulness – can override the kinds of laws that govern the behavior of molecules, or air flows, or celestial objects.”<sup>80</sup> Emerging Army doctrine retains the limitations of deductive logic when assessing progress towards the desired state.

Salmon refutes earlier arguments about causality by positing a physical explanation for causal relationships, and describes a test to establish causal relationships. Salmon suggests that by adding a counterfactual condition as part of explanation helps determine causality. He asserts that “two intersecting processes, each of which would have proceeded without modification in the absence of an intersection, interact causally if and only if both are modified at the intersection in ways that persist beyond the locus of intersection.”<sup>81</sup> His test involves determining whether modification of two physically intersecting processes required the intersection; he asserts the test demonstrates causal linkage of the intersecting processes if the intersection is required for the modification to occur.<sup>82</sup> Furthermore, Salmon points out people may feel the need to identify

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<sup>78</sup> Wesley C. Salmon, *Causality and Explanation* (Oxford, NY: Oxford University Press, 1998), 13.

<sup>79</sup> Alexander Rosenberg, *Philosophy of Social Science* (Boulder Colorado: Westview Press, 1995), 19.

<sup>80</sup> Gaddis, *The Landscape of History: How Historians Map the Past*, 38.

<sup>81</sup> Salmon, *Causality and Explanation*, 18.

<sup>82</sup> Salmon, *Causality and Explanation*, 15; 18; 23.

causality because they rely on a deterministic viewpoint for understanding. This forms the basis of the “principle of sufficient reason” that dictates our viewpoint on causality: “a thing cannot occur without a cause that produces it.”<sup>83</sup> By contrast, the use of inductive explanation, or explanation with statistical laws verse deductive ones that use universal laws, leads to a view of causality based on the behavior patterns of a larger whole. However, the fundamental problem with this form of causation is that statistical correlation does not necessarily demonstrate genuine causation. Salmon asserts that “The danger in confusing statistical correlation with genuine causation is the danger of confusing symptoms with causes.”<sup>84</sup> Furthermore, he points out that even identifying all the relevant conditions may not provide a causal chain because “some relevant conditions can render others irrelevant by what is called ‘screening off.’”<sup>85</sup> Salmon’s explanation of causality provides further insight into the challenges facing military commanders attempting to determine their progress using the assessment process.

Rosenberg highlights the reliance on common sense to determine cause for actions that are, or could be, under conscious control as “folk psychology.”<sup>86</sup> Furthermore, he asserts that “It is a theory we use everyday to form our expectations about the behavior of others and to explain to others our own behavior.”<sup>87</sup> Rosenberg suggests that folk psychology may be the best that humans can do in the search for causes. He asserts that reliance on folk psychology often results

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<sup>83</sup> Ibid., 34.

<sup>84</sup> Salmon, *Causality and Explanation*, 45.

<sup>85</sup> Ibid.

<sup>86</sup> Rosenberg, *Philosophy of Social Science*, 19.

<sup>87</sup> Ibid., 29.

from the fact that humans do not act linearly, thus making our understanding of why an action or behavior occurred subject to interpretation causing problems when determining causation. Moreover, the important question becomes “how we can know the private mental states of others, if all we have access to is their behavior.”<sup>88</sup> He points out another problem with establishing causal linkages in social activity: behaviorism. Human actions are teleological, oriented on the desired outcome rather than preceding decisions. Moreover, Rosenberg suggests that “Desires and beliefs may be causes, but it is their content—the statements they are about—that does the explaining in an explanation of action.”<sup>89</sup> He argues that without intimate knowledge of the desires of the various actors within a system, one cannot know the reasons for their current behavior or their most likely future behavior, rendering determination of causal linkages problematic. This provides an example of the danger of linking military actions to effects observed in the system.<sup>90</sup>

In a like manner, Gaddis asserts that “we can’t expect the methods of science to work with equal precision, or to command comparable broad assent, when it comes to the study of human affairs.”<sup>91</sup> Gaddis points out that when dealing with people, “the awareness of self: the capacity to think as an individual about one’s own situation, to determine a distinctive response, and to communicate it to others” can render causation doubtful. Another aspect that Gaddis suggests is human consciousness and free will, factors that reductionism attempts to rule out or

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<sup>88</sup> Ibid., 61.

<sup>89</sup> Rosenberg, *Philosophy of Social Science*, 64.

<sup>90</sup> Ibid.

simply ignore. He suggests that looking at human behavior through the lens of two categories, conscious control and perceptions, provides some insight into the challenges that human consciousness poses to analysts attempting to establish causality.

Causation retains many limitations as a foundation to understand human behavior. This section assesses the limitations of using reductionist methods to generate understanding. First, the teleological nature of human behavior limits the ability to determine causation. Furthermore, this highlights the need to acknowledge that correlation, while a convenient source of clues about complex human behavior, is not the same thing as causality. The temptation to explain systems' behavior using a reductionist method results in deterministic meaning when conducting assessments. The attempt to link friendly actions to observed effects is a dangerous trap; rational choice will always limit the usefulness of statistical assessments. Emerging doctrine agrees with the challenges of causality and points out that "Commanders and staffs must guard against drawing erroneous conclusions" when dealing with "human behavior, attitudes, and perception."<sup>92</sup>

Deductive logic fails to identify adaptation or emergent behavior. In his book, *Complexity: The Emerging Science at the Edge of Order and Chaos*, Mitchell Waldrop asserts that "living systems are machines, . . . but machines with a very different kind of organization from ones we're used to"<sup>93</sup> In his book, *Emergence*, Steven Johnson's States that "tackling such

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<sup>91</sup> Gaddis, *The Landscape of History: How Historians Map the Past*, 38.

<sup>92</sup> U. S. Army, *FM 5-0*, para. 6-40.

<sup>93</sup> Mitchell M. Waldrop, *Complexity: The Emerging Science at the Edge of Order and Chaos* (New York, NY: Simon and Schuster, 1992), 278

problems required a new approach,” referring to organized complexity.<sup>94</sup> Likewise, MAJ Ketti Davison points out in her article, “From Tactical Planning Operational Design,” that “Complex adaptive systems are systems that contain agents or populations that seek to adapt to improve their fit to the environment.”<sup>95</sup> Moreover, in her report, “The Success or Failure of Adaptation,” Dr. Anne-Marie Grisogono points out that “Adaptation is a powerful mechanism displayed in many forms by living systems.”<sup>96</sup>

Johnson differentiates between organized and disorganized complexity. He equates disorganized complexity to a billiard ball table with a million balls. He asserts that “A system of disorganized complexity would be that same table enlarged to include a million balls, colliding with one another millions of times a second. Making predictions about the behavior of any individual ball in that mix would be difficult, but you could make some accurate predictions about the overall behavior of the table.”<sup>97</sup> His example suggests that if one injects a known amount of energy into this system, some generic predictions about the behavior of the whole are possible. Additionally, Johnson asserts that “Organized complexity, on the other hand, is like our motorized billiards table, where the balls follow specific rules and through their various interactions create a distinct macrobehavior, arranging themselves in a specific shape, or forming

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<sup>94</sup> Steven Johnson, *Emergence: The Connected Lives of Ants, Brains, Cities, and Software* (Penguin: New York, NY, 2001), 48.

<sup>95</sup> Ketti Davison, “From Tactical Planning to Operational Design,” *Military Review* (September-October 2008), 35.

<sup>96</sup> Anne-Marie Grisogono, “The Success or Failure of Adaptation,” (report for *Defence Science and Technology Organization*, Land Operations Division, Edinburgh Australia, 2006). 1.

<sup>97</sup> Johnson, *Emergence: The Connected Lives of Ants, Brains, Cities, and Software*, 47.

a specific pattern over time.”<sup>98</sup> Johnson provides an example of this when discussing the computer simulation of slime mold growth. He asserts that since the designers understood the underlying interactions between the individual slime molds, they could increase or decrease the density of individual mold cells and the aggregating chemical that is required for the molds to group together. Furthermore, Johnson suggests that this knowledge enabled the scientists to predict turning points when the molds would aggregate into larger groups. However, the ability to predict mathematically the points when this should occur did not predict where the groupings would occur. The lack of fidelity in the predictions on where the groupings would occur shows the danger of solely relying on linking MOPs and MOEs together to determine progress towards end-states. Additionally, because commander’s face organized complexity, assessment of micro behaviors may not develop accurate predictions of future results. Even with increased knowledge about the system and relationships, predicting the true outcome of actions conducted by friendly forces is not deterministic.<sup>99</sup>

Adaptability further complicates the process of attempting to predict outcomes, effects, or shifts within complex adaptive systems. Davison highlights the difficulty in determining or predicting outcomes when interacting with a complex adaptive system. She asserts that “Complex adaptive systems operate in a state of continual change as new information is learned and assimilated.”<sup>100</sup> Furthermore, Davison compares the ability to predict effects based on friendly

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<sup>98</sup> Ibid., 48.

<sup>99</sup> Ibid., 46-47.

<sup>100</sup> Davison, “From Tactical Planning to Operational Design,” 35.

forces actions, to that of predicting long-range weather forecasting. Additionally, she asserts that “The system’s emergent structures constantly adjust and readjust in response to input from the environment because they are open systems.”<sup>101</sup> Her article suggests that mathematical calculations of the interactions cannot predict the future outcomes, not only because of the emergent evolutionary adaptation, but also because of the non-linear interactions within the open system. Only through evaluation of both the macro and micro reality can assessments provide a means to continue to learn, adapt, and reduce the occurrence of fundamental surprise.<sup>102</sup>

In her report, “The Implications of Complex Adaptive Systems Theory for C2,” Dr. Anne-Marie Grisogono points out the challenges and implications of adaptability with regard to military operations and planning. She asserts that “a system which has the property of being adaptive is a system which is always changing by virtue of this adaptive process which is executing.”<sup>103</sup> Grisogono further defines the adaptability of a system as possessing a structure of behavior that changes over time and tends to increase its success. Initially, she sets five requirements to determine if a system is complex or complex adaptive which makes future predictions more difficult. There must be a concept of success or failure in the context of the environment that she refers to as fitness. Furthermore, there must be variation in some areas of the system and a selection process for the system to retain or discard variations that increase or

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<sup>101</sup> Ibid.

<sup>102</sup> Ibid.

<sup>103</sup> Anne-Marie Grisogono, “The Implications of Complex Adaptive Systems Theory for C2,” (report for *Defence Science and Technology Organization*, Land Operations Division, Edinburgh Australia, 2006). 4.

decrease the system's concept of fitness. Likewise, the system must be able to use external feedback loops to determine or assess the effects of a variation to the fitness. She suggests that over time the system will internalize variations that increase the fitness of the system and thus create a new system. This further erodes the usefulness of MOEs within the system and reinforces retired general Wass de Czege's argument that hard systems thought fails to account for adaptation within the environment that counters the logic of the plan.<sup>104</sup>

Grisogono suggests that "Complex adaptive systems (CAS) have all the properties of Complex Systems, and in addition, display some characteristic hallmarks of adaptivity."<sup>105</sup> Grisogono highlights some of these characteristics as: resilience or robustness to perturbations; sustain flexible responses to attain the goals or execute the strategies towards those goals; the agility to shift quickly to effective behaviors; and innovation or the creation of new strategies or interactions. However, she asserts that "learning from experience, is a defining characteristic of CAS, and distinguishes complex adaptive systems from those which are simply reactive."<sup>106</sup> Grisogono recommends thinking of predictability and chaos as two poles and understanding that the ability to control or predict will slide along this scale.<sup>107</sup>

Generating understanding of the relationship between the system's characteristics and its balance is critical to enabling the commander to solve ill structured problems. An adaptive environment reduces the commander's attempts to generate accurate predictions and erodes the

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<sup>104</sup> Grisogono, "The Implications of Complex Adaptive Systems Theory for C2," 2.

<sup>105</sup> Ibid., 4.

<sup>106</sup> Ibid., 5.



ability to control interactions within the system. Because the commander only has limited control, assessments may retain errors from assumptions supporting causal linkages. Increasing the level of understanding as well as looking for less finite and shorter-term predictions enhances the staff's ability to provide relevant information to the commander. Applying this approach to assessments suggests that continual adjustment and refinement of MOEs is necessary to achieve better understanding.

Assessments that incorporate collaboration and dialogue enable reflective learning. In his book, *The Semantic Turn: A New Foundation for Design*, Klaus Krippendorff asserts that "All concerns are asserted in dialogue between real people."<sup>108</sup> Furthermore, Peter Senge suggests in his book, *The Fifth Discipline: The Art & Practice of the Learning Organization*, that "to manage knowledge you need to address collaboration and tools that help people collaborate."<sup>109</sup> However, Schoen points out that to avoid learning binds people must be "able and willing to search actively for convergence of meaning through a dialogue or reciprocal reflection-in-action."<sup>110</sup> Emerging doctrine must provide a method to support inductive learning with assessments.

Krippendorff suggest that "discourses...are not merely spoken and written, they are social systems with a life of their own." Furthermore, he asserts that "A discourse surfaces in a body of textual matter, in the artifacts it constructs and leaves behind to be (re)examined,

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<sup>107</sup> Ibid., 4; 5.

<sup>108</sup> Klaus Krippendorff, *The Semantic Turn: A New Foundation for Design* (Boca Raton, FL, CRC Press, 2006), 22.

<sup>109</sup> Peter M. Senge, *The Fifth Discipline, The Art & Practice of the Learning Organization* (Doubleday, New York 1990), 270.

(re)searched, (re)articulated, and (re)produced with variations.” Moreover, Krippendorff points out that “A discourse is kept alive within a community of its practitioners, in whose conversations (a) textual matter is continuously (re)read, (re)written, (re)produced, (re)worked, (re)searched, (re)articulated, (re)designed, and appraised for its exemplary nature or discarded.”<sup>111</sup> However, he highlights that while discourses can be enormously productive, they can “run out of steam, or vegetate by merely reproducing themselves.”<sup>112</sup> His definition of discourse suggests that only through discourse can experiences develop meaning that is shared and transferrable.

Senge asserts that “without reflective and interpersonal learning skills, learning is inevitably reactive, not generative.”<sup>113</sup> He suggests that “Generative learning...requires people at all levels who can surface and challenge their mental models before external circumstances compel them to do so.”<sup>114</sup> Additionally, Senge highlights three dimensions of team learning. First, “there is the need to think insightfully about complex issues. Here teams must learn how to tap the potential for many minds to be more intelligent than one mind.”<sup>115</sup> Second, “There is the need for innovative, coordinated action.”<sup>116</sup> Finally, “there is the role of team members on other teams...Thus a learning team continually fosters other learning teams through inculcating the

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<sup>110</sup> Schoen, *Educating the Reflective Practitioner*, 137.

<sup>111</sup> Krippendorff, *The Semantic Turn: A New Foundation for Design*, 25.

<sup>112</sup> *Ibid.*, 26.

<sup>113</sup> Senge, *The Fifth Discipline, The Art & Practice of the Learning Organization*, 177.

<sup>114</sup> *Ibid.*

<sup>115</sup> *Ibid.*, 219.

<sup>116</sup> *Ibid.*

practices and skills of team learning more broadly.”<sup>117</sup> Furthermore, Senge argues that organizations must master both dialogue and discussion. He points out that dialogue requires “the free and creative exploration of complex and subtle issues...and suspending of one’s own views.”<sup>118</sup> Additionally, Senge states that during discussion “different views are presented and defended and there is a search for the best view to support decisions that must be made at this time.”<sup>119</sup>

Schoen warns that some of the contextual features of dialogue can “hinder the work of reciprocal reflection in action” that is required for continued learning.<sup>120</sup> He asserts that “The party’s stance toward the interaction impedes the exercise and development of competences for reciprocal reflection-in-action.”<sup>121</sup> Furthermore, Schoen points out that learning binds can produce “a behavioral world within which it is not possible to isolate troublesome phenomena so as to discover and juxtapose the different descriptions that each participant would construct for those phenomena.”<sup>122</sup> Moreover, he suggests that “Communication about designing is always subject to the impediments of ambiguity, vagueness, and inexpressibility.”<sup>123</sup> Ensuring that a behavioral world exists to enable effective reflection in action is critical to executing dialogue and discussion.

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<sup>117</sup> Ibid.

<sup>118</sup> Ibid., 220.

<sup>119</sup> Ibid.

<sup>120</sup> Schoen, *Educating the Reflective Practitioner*, 119.

<sup>121</sup> Ibid.

<sup>122</sup> Schoen, *Educating the Reflective Practitioner*, 136.

Emerging doctrine provides a method to incorporate inductive learning into assessments. Doctrine asserts that “Effective collaboration includes continuous dialog that leads to increased understanding of the situation, including the current problems.”<sup>124</sup> Furthermore, doctrine points out that “The commander creates a learning environment by allowing participants to think critically and creatively and share their ideas, opinions, and recommendations without fear of retribution.”<sup>125</sup> Moreover, doctrine recognizes that “Effective collaboration requires candor and a free, yet mutually respectful, competition of ideas. Participants must feel free to make viewpoints based on their expertise, experience, and insight; this includes sharing ideas that contradict the opinions held by those of higher rank.”<sup>126</sup> Collaboration and dialogue enable reflection-in-action to occur and help support inductive learning during the assessment process.

Emerging Army doctrine provides a means to conduct conceptual and detailed learning by incorporating collaboration and dialogue during the assessment process. Emerging doctrine highlights that collaboration and dialog with higher, subordinate, and adjacent commanders and staffs, backed up by quantitative and qualitative assessments, contribute to this learning.”<sup>127</sup> Moreover, doctrine acknowledges the need for causation while warning of the difficulty of establishing causation. Furthermore, doctrine warns that “Careful consideration and judgment are

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<sup>123</sup> Ibid., 137.

<sup>124</sup> U. S. Army, *FM 5-0*, para. 1-31.

<sup>125</sup> Ibid., para. 1-32.

<sup>126</sup> U. S. Army, *FM 5-0*, para. 1-32.

<sup>127</sup> Ibid., para. 1-65.

required, particularly when asserting cause-and-effect relationships.”<sup>128</sup> More importantly, doctrine highlights that “collaboration and dialog enable the force to adapt more quickly in changing conditions. Assessment, which occurs continuously throughout the operations process, is also enhanced when commanders and subordinates collaborate in assessing the progress of the operation, to include sharing ideas on what is or is not working and how to modify plans to better accomplish the mission.”<sup>129</sup>

Emerging doctrine’s concept of assessments supports continuous design. Conducting assessments supports reflection in action by evaluating progress towards the desired state with MOEs and MOPs, and hypotheses testing through collaboration and dialogue. Furthermore, collaboration and dialogue expand the understanding of the environment and support the concept of discourse. However, the assessment process does not directly support expansion of the narrative. Continuous execution of design linked to assessments through reframing criteria resolves this shortfall enabling conceptual learning to continue.

## **Reframing Criteria**

The purpose of this section is to analyze how collaboration and dialogue provide sufficient feedback to enable reframing to occur. First, this section assesses how dialogue and discussion support critical and creative thinking. Second, this section assesses how collaboration and dialogue build perspective to enable commanders to understand tendencies and potentials. Finally, it assesses how the incorporation of design products enables continuation of discourse.

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<sup>128</sup> U. S. Army, *FM 5-0*, para. 6-44.

<sup>129</sup> *Ibid.*, para. 1-36.

Analyzing how collaboration and dialogue support the assessment process points out what the commander requires to reframe.

Use of dialogue and discussion is fundamental to critical and creative thinking. Schoen asserts that “When the practitioner reflects-in-action in a case he perceives as unique, paying attention to phenomena and surfacing his intuitive understanding of them, his experimenting is at once ...and hypothesis testing.”<sup>130</sup> Additionally, Senge points out that “learning involves mastering the practices of dialogue and discussion.”<sup>131</sup> Furthermore, he suggests that “Reflective practice is the essence of the discipline of mental models” and it requires people “who can surface and challenge their mental models.”<sup>132</sup> Emerging doctrine defines critical thinking as “a deliberate process of thought whose purpose is to discern truth in situations where direct observation is insufficient, impossible, or impractical.”<sup>133</sup> Furthermore, doctrine points out that “Creative thinking leads to new insights, novel approaches, fresh perspectives, and new ways of understanding and conceiving things.”<sup>134</sup> Emerging doctrine offers that, “Dialog is a way to collaborate that involves the candid exchange of ideas or opinions among participants that encourages frank discussions in areas of disagreement.”<sup>135</sup> Donald Schoen’s learning in action and reflection in action elaborates on the need for increased dialogue and discussion to enable

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<sup>130</sup> Schoen, *Educating the Reflective Practitioner*, 72.

<sup>131</sup> Senge, *The Fifth Discipline: The Art & Practice of the Learning Organization*, 220.

<sup>132</sup> *Ibid.*, 177.

<sup>133</sup> U. S. Army, *FM 5-0*, para. 1-29.

<sup>134</sup> *Ibid.*, para. 1-30.

<sup>135</sup> *Ibid.*, 1-31.

learning instead of reliance on formal measures and criteria. Emerging doctrine's explanation of the uses of collaboration and dialogue supports the concept of reflection-in-action. Furthermore, emerging doctrine supports Senge's assertion that challenging mental models is critical to creative thought. Critical and creative thinking provide additional insight into the environment and problem facing the commander.

Incorporation of collaboration and dialogue in emerging doctrine builds perspective to understand tendencies and potentials. In his article "Emergence, Creativity, and the Logic of Following and Negating," Jeffrey Goldstein highlights that "a theory of creativity based on a process of 'conceptual blending' whereby cognition moves among 'mental spaces' that map concepts according to such elements as points of view, presuppositions, beliefs, analogies, counterfactuals and so on."<sup>136</sup> He suggests that "this process creates an emergent structure of cognition that is not predictable from the inputs alone."<sup>137</sup> Emerging doctrine asserts that "Clarifying the relationships among actors requires intense effort since relationships must be examined from multiple perspectives."<sup>138</sup> Furthermore, doctrine highlights that "Developing understanding of interactions and relationships of relevant actors in the operational environment, commanders and staffs consider natural tendencies and potentials in their analysis."<sup>139</sup> Additionally, doctrine suggests that tendency is not deterministic, but describes the current

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<sup>136</sup> Jeffrey Goldstein, "Emergence, Creativity, and the Logic of Following and Negating", *The Innovation Journal*, 10(3), 3.

<sup>137</sup> Ibid.

<sup>138</sup> U. S. Army, *FM 5-0*, para. 3-50.

<sup>139</sup> Ibid., para. 3-51

understanding of how the actor or group of actors interacts within the environment without external intervention. Likewise, the potential of the system focuses on what applying external pressures to the actor, group, or system could cause. Another way of looking at potential is what is the actor, group, or system's inherent capability for growth, adaptation, or evolution. Both the tendencies and potentials are not finite, but cover a range or spread of future states. Moreover, emerging doctrine asserts that in assessment working groups "Minority views are heard and dissenters speak up...sections debate vigorously on the proper understanding of observed trends and their associated causes. Minority views often create critical insights."<sup>140</sup> Doctrine highlights collaboration and dialogue during design and assessment to provide perspective on relevant actors and build understanding of their tendencies and potentials.<sup>141</sup>

Incorporating the environmental and problem narratives enables continuation of discourse. Krippendorff asserts that "discourse surfaces in a body of textual matter, in the artifacts it constructs and leaves behind."<sup>142</sup> Furthermore, he suggests that "Textual matter is the literal heritage of a discourse."<sup>143</sup> Additionally, White suggests that narratives solve "the problem of how to translate knowing into telling, the problem of fashioning human experience into a form assimilable to structures of meaning."<sup>144</sup> In his book, *How Designers Think*, Bryan Lawson points out that "narrative "can be used to link the main features of the design...there is considerable

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<sup>140</sup> Ibid., para. 6-63.

<sup>141</sup> U. S. Army, *FM 5-0*, para. 3-51; 6-63.

<sup>142</sup> Krippendorff, *The Semantic Turn*, 23.

<sup>143</sup> Ibid., 24.

<sup>144</sup> White, *Content of the Form*, 1.



evidence that this technique is quite widely used and genuinely seems to help some designers.”<sup>145</sup>

Lawson supports White’s assertions about the use of the narrative as the primary tool, which conflicting claims of perceived and true realities are resolved, reinforces the importance of the narrative in discourse.

Deconstruction and reconstruction of narratives can also help provide greater understanding by shifting the logic supporting the current reality, which enables the building of knowledge in context. This process can use numerous models and frameworks providing the difference or asymmetry that builds a thick description. The thick description that Geertz described enables the attainment of the knowledge in context.<sup>146</sup> Emerging doctrine suggest that “The design concept is the link between design and detailed planning.”<sup>147</sup> Additionally, doctrine asserts that “The design concept promotes mutual understanding and unity of effort throughout the echelons and partner organizations. Thus, the design concept is the rationale linking design to detailed planning.”<sup>148</sup> Doctrine specifies that design products will include “the text and graphics of the operational environment and problem.”<sup>149</sup> Including the narratives, or text and graphics of both the environment and problem, commanders and staffs are able to begin discourse. The narrative provides a means to transfer understanding and support Schoen’s model of hypothesis

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<sup>145</sup> Bryan Lawson, *How Designers Think* (Elsevier Ltd., Kidlington, Oxford, 2006), 205

<sup>146</sup> Schoen, *Educating the Reflective Practitioner*, 71; White, *Content of the Form*, 4; Lanir Tzvi Lanir and Gadi Sneh, “The New Agenda of Praxis”, *Praxis*, (2000): 11; 15; Geertz, *The Interpretation of Cultures*, 6.

<sup>147</sup> U. S. Army, *FM 5-0*, para. 3-63.

<sup>148</sup> *Ibid.*, para. 3-67.

<sup>149</sup> *Ibid.*, para. 3-64.

testing. Without the environment and problem narrative, discourse could not continue during assessments.

Discourse in the assessment process supports the hypotheses testing needed to identify when the commander should reframe. First, emerging doctrine highlights how collaboration and dialogue supports reflection in action that is required to build understanding and challenge the hypotheses supporting the logic of the plan. Second, continued dialogue and discussion over the relevant actors and their interrelations provides new perspectives as part of a discourse that further challenges the hypotheses supporting the plan. Third, the environmental and problem narratives provide the foundation of discourse. Through effective collaboration and dialogue, the discourse supporting the commander's understanding and visualization is updated enabling the commander to recognize when his understanding is not sufficient and he must reframe.

## Conclusion

With persistent conflict predicted for future decades, the Army had to develop a means to cope with ill-structured problems. General Dempsey states that “With the publication of *FM 5-0, The Operations Process*, and the introduction of design into our doctrine, we highlight the importance of understanding complex problems more fully before we seek to solve them through our traditional planning process.”<sup>150</sup> Additionally, General Dempsey asserts that “this manual holistically addresses planning, preparation, execution, and assessment in the continuous learning cycle of the operations process.”<sup>151</sup> Emerging Army doctrine incorporates design to harness

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<sup>150</sup> U. S. Army, *FM 5-0*, Foreword.

<sup>151</sup> *Ibid.*

critical thinking, understand the operational environment, solve the right problems, and adapt to dynamic conditions to enable achieving designated goals. Furthermore, doctrine incorporates assessment to provide a feedback mechanism throughout the operations process to enable continual learning and adaptation.

This study sought to understand how assessments support the design methodology, reveal how the use of design enables understanding of ill-structured problems, and understand how assessments support the commander's ability to reframe when faced with significant variance from his original visualization. The problem this research sought to answer was how to expand the use of assessments beyond detailed planning to support conceptual planning during design. The question this study focused on was, will the use of conceptual assessments enable the commander to use design throughout the operations process? Based on emerging Army doctrine no gap exists between design, assessments, and the operational process. However, using assessments to support design may fail if commanders and their staffs do not include collaboration and dialogue over the environmental and problem narratives.

This study defined design, assessments, learning and adapting, reframing, and conceptual and detailed planning to enable the reader to understand these key concepts that are referenced throughout the study. This paper focused on three main sections: design, assessments, and reframe criteria. The design section addressed the question of how the design methodology generates understanding when dealing with ill-structured problems. The assessment section addressed if emerging doctrine's concept of assessment provided a method to conduct both detailed and conceptual learning. The reframing criteria section analyzed if collaboration and dialogue provided sufficient feedback to enable reframing.

The design section assessed that the design methodology helps to develop understanding for the commander. First, it used theory to show that the environmental frame provides the commander a method to begin to understand complexity. Second, it noted that through cyclic and iterative processes generating understanding helped the commander to continue to challenge

hypotheses and reality models increasing his understanding. Finally, this section used theory to emphasize the importance of the narrative to build and transfer understanding.

The assessment section determined that emerging doctrine provides a method to conduct both detailed and conceptual learning. First, it explained that quantitative and qualitative methods help provide feedback to determine if detailed planning is progressing towards the desired state. Second, this section found that commanders should use caution when applying causation because of its limitations when dealing with human behavior. Third, it found that deductive logic does not provide a means to identify adaptation or emergent behavior. Finally, this section concluded that collaboration and dialogue during assessment enables reflective learning.

The reframing criteria section pointed out that collaboration and dialogue provide sufficient feedback to enable reframing to occur. First, this section highlighted that dialogue and discussion provide support to creative and critical thinking. Second, it noted that collaboration and dialogue help to build perspective and determine tendencies and potentials of relevant actors. Finally, it showed that the incorporation of the environmental and problem narratives enables the discourse to continue through the assessment process.

This study shows that employing the methodology of design is required to understand ill-structured problems. Additionally, that inclusion of collaboration and dialogue during assessments suggests when to reframe. Furthermore, incorporating the environmental and problem narratives during collaboration and dialogue enables the hypotheses testing required to continue to apply the design methodology during execution. Moreover, this study shows that emerging doctrine supports reflection in action through collaboration and dialogue during design and assessments. Doctrine's focus on collaboration and dialogue when combined with the environmental and problem narratives enhances the discourse that is required to expand the commander's understanding and visualization. Linking the design to execution through collaboration and dialogue during assessments enables the commander to recognize when to reframe his understanding.

This study recommends that the Army incorporate more training on conducting effective collaboration and dialogue during professional military education. Previous doctrinal references to assessments focused on MOEs and MOPs to determine progress towards the desired state, without increased training on conducting effective discourse assessments will not provide the necessary feedback to reframe. Additionally, development of a format or standardization of how to capture the relevant actors tendencies, potentials and facts and assumptions would help information dissemination.

Areas for further research to support the findings of this study would include studies of application in current operations. Collection of after action reviews from Iraq and Afghanistan would provide the necessary information to conduct case studies to determine the success or failure of commanders to implement both design and assessments. Furthermore, research into distributed networking would provide insight into procurement of future technologies and systems. Future research should focus on identification of technological advancements that could improve the commander's ability to visualize and conduct distributed collaboration and dialogue in de-centralized operations globally

## Bibliography

### Books

- Axelrod, Robert and Michael D. Cohen. *Harnessing Complexity: Organizational Implications of a Scientific Frontier*. New York, NY: Basic Books, 2000.
- Bar-Yam, Yaneer. *Making Things Work: Solving Complex Problems in a Complex World*. Massachusetts: NECSI Knowledge Press, 2004.
- Checkland, Peter and John Poulter. *Learning for Action: A short Definitive Account of Soft Systems Methodology and its use for Practitioners, Teachers and Students*. Chichester: John Wiley & Sons, 2006.
- Clausewitz, Carl von. *On War*, ed. Howard, Michael and Paret, Peter. Princeton, NJ: Princeton University Press, 1976.
- Cohen, Eliot. A. and John Gooch. *Military Misfortunes: The Anatomy of Failure in War*. New York: Free Press, 1991.
- Gaddis, John Lewis. *The Landscape of History: How Historians Map the Past*. Oxford, NY: Oxford University Press, 2002.
- Geertz, Clifford. *The Interpretation of Cultures*. New York, NY: Basic Books, 1973.
- Gharajedaghi, Jamshid. *Systems Thinking Managing Chaos and Complexity*. San Diego, CA: Elsevier, 2006.
- Johnson, Steven. *Emergence: The Connected Lives of Ants, Brains, Cities and Software*. London: Penguin, 2001.
- Krippendorff, Klaus. *The Semantic Turn: A New Foundation for Design*. Boca Raton, FL: CRC Press, 2006.
- Lawson, Bryan. *How Designers Think*. Kidlington, Oxford: Elsevier Ltd., 2006.
- Pearl, Judea. *Causality: Models Reasoning, and Inference*. Cambridge, UK: Cambridge University Press, 2000.
- Rosenberg, Alexander. *Philosophy of Social Science*. Boulder Colorado: Westview Press, 1995.
- Salmon, Wesley C. *Causality and Explanation*. Oxford, NY: Oxford University Press, 1998.
- Schoen, Donald. *Educating the Reflective Practitioner*. San Francisco, CA: John Wiley & Sons, Inc., 1987.
- Senge, Peter M. *The Fifth Discipline, The Art & Practice of the Learning Organization*. New York: Doubleday, 1990.
- Waldrop, Mitchell M. *Complexity: The Emerging Science at the Edge of Order and Chaos*. New York, NY: Simon and Schuster, 1992.
- White, Hayden. *Content of the Form*. Baltimore, MD: Johns Hopkins University Press, 1987.
- \_\_\_\_\_. *Tropics of Discourse: Essays in Cultural Criticism*. Baltimore, MD: Johns Hopkins University Press, 1978.

### Articles

- Banach, Stefan J. "Educating by Design: Preparing Leaders for a Complex World." *Military Review*, March-April 2009, 96-104.
- Blommaert, Jan and Chris Bulcaen, Chris. "Critical Discourse Analysis." *Annual Review of Anthropology* 29, 2000, 447-466.
- Cheung, Martha P.Y. "From 'Theory' to 'Discourse': the Making of a Translation Anthology." *Bulleting of the School of Oriental and African Studies, University of London* 66, no. 3, (2003): 390-401.
- Clancy, James and Chuck Crossett. "Measuring Effectiveness in Irregular Warfare." *Parameters*, Summer 2007, 88-100.
- Davison, Ketti. "From Tactical Planning to Operational Design." *Military Review*, September-October 2008, 33-39.
- Goldstein, Jeffrey. "Emergence, Creativity, and the Logic of Following and Negating." *The Innovation Journal* 10 (3): 2-9.
- Kurtz, C.F. and D. J. Snowden. "The New Dynamics of Strategy: Sense-making in a Complex and Complicated World." *IBM Systems Journal* 42, (2003): 462-483.
- Lehrer, Keith. "Discursive Knowledge." *Philosophy and Phenomenological Research* 60, no 3, (May 2000), 637-653.
- Ochs, Elinor and Lisa Capps. "Narrating the Self." *Annual Review of Anthropology* 25, (1996): 19-43.
- Purvis, Trevor and Alan Hunt. "Discourse, Ideology, Ideology, Discourse, Ideology..." *The British Journal of Sociology* 44, no. 3, (September 1993): 473-499.
- Rittel, Horst W. J. and Melvin M. Webber. "Dilemmas in General Theory of Planning." *Policy Sciences* 4, (1973): 155-169.
- Skillington, Tracey. "Politics and the Struggle to Define: A Discourse Analysis of the Framing Strategies of Competing Actors in a 'New' Participatory Forum." *The British Journal of Sociology* 48, no. 3 (September 1997): 493-513.
- Lanir, Tzvi and Gadi Sneh. "The New Agenda of Praxis." *Praxis*, (2000): 1-32.
- Wass de Czege, "Systemic Operational Design: Learning and Adapting in Complex Missions." *Military Review*, January February 2009, 2-12.
- Weick, Karl E., Kathleen M. Sutcliffe, and David Obstfeld. "Organizing and the Process of Sensemaking." *Organization Science* (July-August 2005): 409-421.

#### Government Publications

- U. S. Army. FM 3-0, *Operations*. U.S. Department of the Army Field Manual (FM). Washington, DC: Headquarters Department of the Army, February 2008.
- \_\_\_\_\_. FM 3-24, *Counterinsurgency*. U.S. Department of the Army Field Manual (FM). Washington, DC: Headquarters Department of the Army, December 2006.
- \_\_\_\_\_. FM 5-0, *Army Planning and Orders Production Final Approved Draft*. U.S. Department of the Army Field Manual (FM). Washington, DC: Headquarters Department of the Army, February 2010.
- \_\_\_\_\_. FM 6-0, *Mission Command: Command and Control of Army Forces*. U.S. Department of the Army Field Manual (FM). Washington, DC: Headquarters Department of the Army, August 2003.

- \_\_\_\_\_. FM 6-22, *Army Leadership*. U.S. Department of the Army Field Manual (FM). Washington, DC: Headquarters Department of the Army, October 2006.
- \_\_\_\_\_. FM 7-0, *Training for Full Spectrum Operations*. U.S. Department of the Army Field Manual (FM). Washington, DC: Headquarters Department of the Army, December 2008.
- \_\_\_\_\_. FM 5-0.1, *The Operations Process*. U.S. Department of the Army Field Manual Interim (FMI). Washington, DC: Headquarters Department of the Army, March 2006.
- \_\_\_\_\_. DRAFT FMI 5-2, *Design*. U.S. Department of the Army Field Manual Interim (FMI). Washington, DC: Headquarters Department of the Army, February 2009.
- \_\_\_\_\_. TRADOC Pamphlet 525-5-500, *Commander's Appreciation and Campaign Design*. Fort Monroe, VA: Headquarters Training and Doctrine Command, January 2008.

#### Reports, Monographs, Papers, and Thesis

- Bullock, Xander L. "Engineering Design Theory: Applying the Success of the Modern World to Campaign Creation." Monograph, School of Advanced Military Studies, Fort Leavenworth, KS: US Army Command and General Staff College, 2008-2009.
- Davison, Ketti C. "Systemic Operational Design (SOD): Gaining and Maintaining the Cognitive Initiative." Monograph, School of Advanced Military Studies, Fort Leavenworth, KS: US Army Command and General Staff College, 2006.
- Delecruz, Victor J. "Systemic Operational Design: Enhancing the Joint Operation Planning Process." Monograph, School of Advanced Military Studies, Fort Leavenworth, KS: US Army Command and General Staff College, 2006-2007.
- Dixon, Robert G. "Systems Thinking for Integrated Operations: Introducing a Systemic Approach to Operational Art for Disaster Relief." Monograph, School of Advanced Military Studies, Fort Leavenworth, KS: US Army Command and General Staff College, 2005-2006.
- Duczynksi, Guy. "Making Information Operations Effects-Based: Begin with the End (-State) in Mind!" Edith Cowan University Perth (Australia), 2005.
- Grisogono, Anne-Marie. "The Implications of Complex Adaptive Systems Theory for C2." Report for Defence Science and Technology Organization, Land Operations Division, Edinburgh Australia, 2006.
- \_\_\_\_\_. "The Success or Failure of Adaptation." Report for Defence Science and Technology Organization, Land Operations Division, Edinburgh Australia, 2006.
- Fuqua, Donovan O. "Understanding the Role of Chaos Theory in Military Decision Making." Monograph, School of Advanced Military Studies, Fort Leavenworth, KS: US Army Command and General Staff College, 2009.
- Gill, Johathan B. "Enabln Design." Monograph, School of Advanced Military Studies, Fort Leavenworth, KS: US Army Command and General Staff College, 2009.
- Grothe, Glenn K. "Innovation Versus Adaptability: Seizing the Initiative Through Creative Thinking Versus Reacting to the Enemy." Monograph, School of Advanced Military Studies, Fort Leavenworth, KS: US Army Command and General Staff College, 2006.
- Hayward, Edward P. "Planning Beyond Tactics: Towards a Military Application of the Philosophy of Design in the Formulation of Strategy." Monograph, School of Advanced Military Studies, Fort Leavenworth, KS: US Army Command and General Staff College, 2008.



- Johnson, Neil. "Complexity in Human Conflict." *University of Miami Physics Department*, Berlin: Springer 2008.
- Levis, Stewart W., Alexander H. Wagenhais, and Lee W. Liles. "Design of Adaptive Organizations for Effects Based Operations." Fairfax, VA: George Mason University School of Information Technology, 2009.
- O'Hara, Meghan. "Diagram of a War Strategy: The Pentagon's PowerPoint Misses the Big Picture in Afghanistan." *The Huffington Post* (9 April 2010). Available at [http://www.huffingtonpost.com/meghan-ohara/diagram-of-a-war-strategy\\_b\\_555389.html](http://www.huffingtonpost.com/meghan-ohara/diagram-of-a-war-strategy_b_555389.html) (accessed 29 April 2010).
- Pasquarrette, Jim. "Effects Based Operations in Iraq--A Case for Army Acceptance." Carlisle Barracks, PA: US Army War College, 2008.
- Perez, Celestino LTC, Jr. "Design Overview." Power Point Presentation, Department of Joint, Interagency, and Multinational Operations U.S. Army, Command and General Staff College, Fort Leavenworth, KS, 29 January 2010.
- Tromblee, Mark L. "Strategic Communication Through Design: A Narrative Approach." Monograph, School of Advanced Military Studies, Fort Leavenworth, KS: US Army Command and General Staff College, 2009.
- Weil, Shawn A., Georgiy Levchuk, Stephen Downes-Martin, Frederick J., Elliot E. Entin, Katrina E. See, and Daniel Serfaty, Daniel. "Supporting Organizational Change in Command and Control: Approaches and Metrics." Woburn, MA: Aptima Incorporated, 2005.