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The value that Situational Awareness (SA) brings to the fight has long been overlooked and even discounted. In hindsight, failures and shortcomings in military operations are often attributed to uninformed decisions based on a lack of awareness. Given the complexities of the modern world, strategic decision makers must be able to make informed decisions facilitated by heightened awareness and sound cognitive skills.

Understanding what one is unaware of or does not understand is a critical competency if not the cornerstone of informed decisions. It is essential to understand how SA supports U.S. strategic ends, ways, and means in fulfilling U.S. national interests. Based on the foregoing, the thesis of this paper is that strategic critical thought elevates knowledge which can then heightened situational awareness in order to develop understanding. It is this enlightened understanding that permits the effective employment of U.S. instruments of national power.

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SITUATIONAL AWARENESS

EVOLVING KNOWLEDGE INTO UNDERSTANDING:

A COMPETENCY CRITICAL TO US NATIONAL INTEREST

In order to adapt to changing world
Situational Awareness is a critical competency
to empower Senior Leaders to make informed decisions

by

Nevin J. Taylor

Colonel, United States Air Force Reserve

A paper submitted to the Faculty of the Joint Advanced Warfighting School in partial satisfaction of the requirements of a Master of Science Degree in Joint Campaign Planning and Strategy.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Joint Forces Staff College or the Department of Defense.

Signature: _____

May 2009

Thesis Advisor: Lt Gen Charles Cunningham, USAF (ret), JFSC - NDU

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ABSTRACT

History offers ample evidence that enlightened decisions are at the core of military success in warfare. The synthesis of historical and current information is the basis upon which leaders make informed decisions. By organizing data into information it can then be matured and fused into knowledge. Through the benefits of the cognitive process, the opportunity to leverage one's awareness in correlation to their frame of reference derives the antithesis of enlightened decisions. It is through the maturation of knowledge into understanding that strategic leaders cut through the fog and mitigate the resulting friction of war.

The value that Situational Awareness (SA) brings to the fight has long been overlooked and even discounted. In hindsight, failures and shortcomings in military operations are often attributed to uninformed decisions based on a lack of awareness. Given the complexities of the modern world, the strategic decision maker must be able to make informed decisions facilitated by heightened awareness and sound cognitive skills.

Understanding what one is aware of and what they are unaware of, or does not understand, is a critical competency if not the cornerstone of informed decisions. It is essential to understand how SA supports U.S. strategic ends, ways and means in fulfilling U.S. national interests. Based on the foregoing, the thesis of this paper is that strategic critical thought elevates knowledge which through heightened situational awareness and a good Frame of Reference (FOR) develops understanding. It is this enlightened understanding that permits the effective employment of U.S. instruments of national power.

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GLOSSARY

CCIR - Commander's Critical Information Requirements

COA - Course of Action

COP - Common Operational Picture

DIME - Diplomatic, Information, Military, Economic

EOT – Elements Of Thourght

FOR - Frame of Reference

IM -Information Management

JIPOE - Joint Intelligence Preparation of the Operational Environment

JFC - Joint Force Commander

NETOPS - Network Operations

OODA - Observe, Orient, Decide, Act

PME – Professional Military Education

RAND - Research and Development

SA - Situational Awareness

UDOP - User Definable Operational Picture

US - United States

USSR - Union of Soviet Socialist Republics

UM – Understanding Model

VUCA - Volatile, Uncertain, Complex, Ambiguous

INTRODUCTION

Everything in strategy is very simple, but that does not mean that everything is very easy. [1]

Clausewitz

All too often, leaders have failed to learn from the lessons offered by history. Hindsight shows clearly the results of previous actions and the impact of decisions that have been made with less than full awareness. Now and in the future, it is increasingly important that we learn from and apply lessons from the past. The future is indeed revealed through a concerted assessment of history which provides a pathway for overcoming the challenges we face in the present. The development of sound strategy, elevated by a heightened awareness of past actions and current circumstances, offers the opportunity to confront emerging threats successfully.

Given the dynamic and interlinked world environment, the necessity to apply all instruments of U.S. national power in a collaborative manner is absolutely critical to success. Concise strategic objectives are essential in developing a strategy that focuses resources and efforts adequately in light of the complexities associated with the cultural, paradoxical and diverse motivations of the current environment. Cognition coupled with heightened awareness which is infused with a good frame of reference (FOR) is essential in developing the necessary understanding to fulfill these strategic objectives.

Within the context of the DIME (diplomatic, information, military and economic), information is typically the least leveraged but potentially the most

[1] Carl von Clausewitz, On *War*, Michael Howard and Peter Paret eds. and trans. (Princeton: Princeton University Press, 1976), 178.

valuable element of national power. The information revolution and the knowledge age are clearly upon us, thus it becomes critical to determine what information is relevant when seeking to fulfill strategic objectives. To assist in this endeavor, technology can be leveraged to provide a timely and accurate means to manage and organize accumulated data from which useful information can be produced. As the demand and necessity for intellectual capital grows, so does our reliance upon the information age since it feeds the rapidly unfolding knowledge age. Strategists must leverage this knowledge, cultivated by awareness, to actualize the asymmetric advantage offered through intellectual enlightenment.

Given that war is an extension of politics by other means, it becomes essential that political as well as military leaders possess and hone the competencies needed to develop awareness. U.S. national interests can be met by acquiring the knowledge that will foster our understanding of the likelihood to leverage resources and capabilities to fulfill those objectives. It is this ability—military genius—that Clausewitz defines as "a very highly developed mental aptitude for a particular occupation."[2]

As the complexities of the world continue to compound, so does the military's need to evolve. While the world flattens and the information society grows exponentially, it becomes imperative that a heightened awareness of circumstances is both available and utilized. Indeed, the actions taken today must be committed to with a full understanding of their second and third order effects to preclude unintended consequences. Thus the fog and resulting friction

[2] Ibid, 43.

and misunderstanding caused by cultural, language and intelligence barriers could lead to insurmountable obstacles to progress.

The globally interconnected world environment has increased the intensity of once simple dilemmas due to the confluence of diverse perspectives, expectations and perceptions. By developing an appreciation for the conditions, cultures and world expectations inherent in an open system, military leaders will be suitably prepared to overcome evolving threats and challenges. Joint Publication 3-0 cautions that "history has shown that cultural awareness cannot be sufficiently developed after a crisis emerges and must be a continuous and proactive element of theater intelligence and engagement strategies."[3]

Understanding and agreeing on U.S. objectives and by developing the knowledge necessary to achieve them, speaks to an important aspect of what Clausewitz referred to as *military genius.*[4] It is therefore incumbent upon strategic leaders to establish good SA and an expansive FOR in which to make sound decisions. In order to prepare adequately for the art of the possible, given the affects of the current environment on the open system, it is crucial to leverage the ways and means with which information is accumulated. When properly fused, information elevates awareness and serves as a catalyst to facilitate understanding. Cultivating this knowledge yields an appreciation of the complexities of this interconnected environment.

Research concludes that all too often, the magnitude of a given situation is underestimated due to a lack of awareness. By effectively leveraging this

[3] U.S. Joint Chiefs of Staff, Joint Publication 3-0, Joint Operations (September 10, 2001), VII-10.
[4] Carl von Clausewitz, On *War*, Michael Howard and Peter Paret eds. and trans. (Princeton: Princeton University Press, 1976), 43.

knowledge with heightened SA and a sound FOR, decision makers are afforded the opportunity to mitigate risk in order to fulfill U.S. national interest. Therefore, to tackle the difficult strategic problems that will affect the U.S. now and into the future and to obtain a full understanding of their second and third order affects, SA is essential in preparing strategic leaders to formulate sound strategic decisions that support U.S. national ends.

Within the context of this paper, a Model For Enlightened Understanding Process (UM) will be presented to enable the reader to conceptualize the process upon which informed decisions can be made with a high level of acuity. The paper will walk the reader through the steps of data assimilation in accordance with Bloom's Taxonomy in order to elevate the process of critical thought. It will then outline how information is fused into knowledge through the cognitive process. Finally, the UM will then establish how past SA enveloped into a FOR coupled with current SA develops understanding. It is through the maturation and refinement of understanding which becomes the catalyst for informed decisions.

The will research explores the impact of the cognitive model on perceptions held at all levels and address the associated liability of being uninformed and unaware. By applying cognitive skills to ascertain the effects of actions taken against results achieved, the opportunity exists to assess measures of performance and measures of effectiveness within the closed system. By considering the injected variable and the implications that surround the dynamics of an open system, the propensity to accurately forecast future

action will reveal themselves. Thus by applying heightened awareness to a sound FOR produces a high degree of reliable predictive analysis predicated upon an open minded approach to the art of the possible.

Finally, the method in which this research was conducted explores the foundation upon how information is assessed and defined. The process of developing knowledge through cognition is formulated to mature the reader's appreciation of how to think. Additionally, those issues, perceptions and paradigms that influences how things are viewed, directly impacts their approach to shape the environment. Conscious competence models are presented to provide the reader the opportunity to assess their cognitive level and provide them the criteria upon which to think critically. Finally, the implications and affects of SA are defined and explored to correlate their contributions to the UM presented in figure #1. A real world example illustrates the cost and potential benefits of properly applying SA. For through an effective development of SA and its associated cost benefit analysis as a competency, the ability to leverage SA reveals the benefits it holds in elevating knowledge that develops understanding.

1. *Data is observed, captured and organized into information*
2. *Information is fused in accordance with Bloom's Taxonomy through critical thinking into knowledge*
3. *Knowledge correlated against one's FOR and current SA is developed into understanding which is the basis upon which informed and enlightened decisions are made*

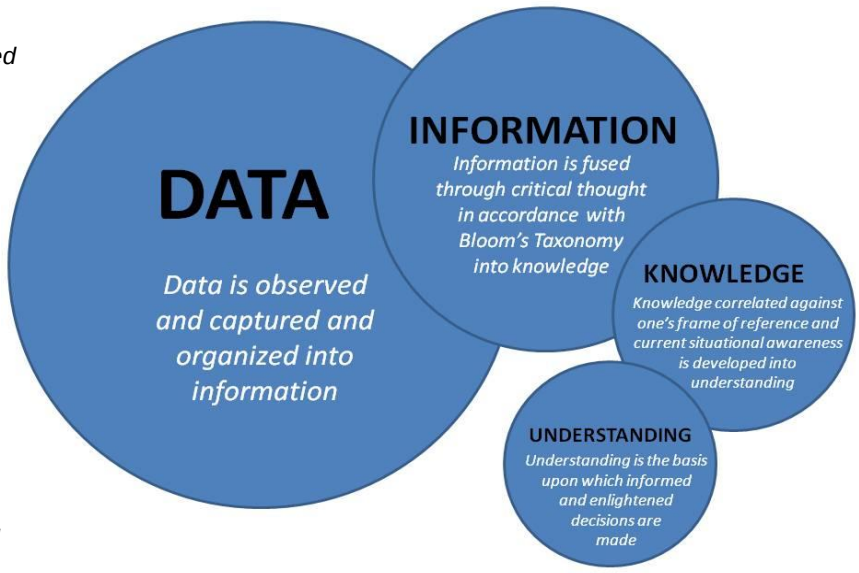

Figure #1 (Author's Representation of an Understanding Model -UM)

CHAPTER 1

If the mind is to emerge unscathed from this relentless struggle with the unforeseen, two qualities are indispensable: first, an intellect that, even in the darkest hour, retains some glimmering of the inner light which leads to truth; and second, the courage to follow this faint light wherever it may lead. [5]

Clausewitz

The *Strategic Leadership Primer* published by the Army War College observes that strategic leaders "must create and maintain absorptive and adaptive capacity in addition to obtaining managerial wisdom." [6] To prepare for ingestion, data must first be organized into information. The information then must be correlated and fused into knowledge that drives understanding. The value offered by strategic leaders is their ability to assimilate understanding sufficiently in an adaptive capacity to effect change that shapes the environment to the desired end state.

It is important to understand that the information, which is so critical to the decisionary process, is derived from data. Data as defined by Webster's Dictionary is "information output by a sensing device or organ that includes both useful and irrelevant or redundant information and must be processed to be meaningful."[7] Through the proper organization and validation of data, one is able to present reliable information. Information as defined by Webster's is "a signal or character which represents data."[8] It is through a learned and layered approach

[5] Carl von Clausewitz, On *War*, Michael Howard and Peter Paret eds. and trans. (Princeton: Princeton University Press, 1976), 558.
[6] United States War College, *Strategic Leadership Primer*, 2004, http://www.carlisle.army.mil/USAWC/dclm/slp2ndEd.pdf (Accessed March 12, 2009).
[7] *Webster's Collegiate Dictionary*, 11th ed., s.v. "data," http://www.merriam-webster.com/dictionary/data (accessed November 21, 2008).
[8] Ibid, s.v. "information," http://www.merriam-webster.com/dictionary/information (accessed November 21, 2008).

outlined by Bloom's Taxonomy that the cognitive process begins to develop this information into knowledge. Webster's defines this knowledge as "the fact or condition of knowing something with familiarity gained through experience or association."[9] Hence, the experience related to circumstances shapes how one interprets and uses information.

COGNITIVE ENLIGHTENMENT

The first goal of awakened consciousness is to develop one's cognitive enlightenment. Cognition is defined as "the mental process of knowing, including aspects such as awareness, perception, reasoning and judgment."[10] Bloom's Taxonomy presents a framework upon which to examine and facilitate an understanding of the cognitive process. It consists of the following six levels necessary to elevate levels of intellectual acuity.

1. ***"Knowledge*** – The capacity to recall or recognize pertinent learned information associated with terminology and facts.
2. ***Comprehension*** – Obtaining a level of understanding through oral, written, or symbolic representation to translate, interpret, or extrapolate upon a level of knowledge that demonstrates the assimilation of the presented concept. It allows one to grasp the meaning of information.
3. ***Application*** – The capability derived from the fully matured understanding of a concept.
4. ***Analysis*** – One's ability to break down information and correlate its relevance and implications to its derivative of intent.
5. ***Synthesis*** – Formulating and organizing the individual parts of information such that it collectively imparts a newly matured meaning.
6. ***Evaluation*** – The action based on judgment influenced by cultural norms, academic teaching and personal biases."[11]

[9] *Webster's Collegiate Dictionary*, 11th ed., s.v. "data," http://www.merriam-webster.com/dictionary/data (accessed November 21, 2008).
[10] Benjamin S. Bloom, *Taxonomy of Educational Objectives* (Cognitive Domain), Longman, New York, 1956, 18.
[11] Ibid., 184.

Within this cognitive domain, knowledge and comprehension enables problem solving skills necessary to overcome uncertainty and ambiguity. Knowledge is thus the set of foundational skills honed by one's ability to comprehend and apply information. The utilization of knowledge by recalling facts and concepts permits the identification of trends. Thus observable patterns are correlated through cognitive analytical analysis, which lies at the heart of comprehension. It is this synthesis of information and the resulting perspective gained that represents the crux of the cognitive process.

LEVERAGING INFORMATION

Current and historical facts must be assessed against pertinent assumptions so that perceived inferences can be determined in order to appreciate the scope and implications of the problem. The conditions that feed a problem that clearly define the potential and relevant variables surrounding it are essential to its resolution. Thus, the teachings of Karl Weick, an American organizational theorist, encourage leaders to explore the properties of improvisation and enlightenment.[12] It is through improvisation that the benefits of experience and knowledge can become apparent. Questions can be raised throughout the enlightenment process which clarifies the elements of thought (EOT) as they relate to the three-step concept offered by Haridimos Tsourkas, a professor of Organization Studies at the Warwick Business School.

[12] Karl Weick, Gretchen Spreitzer and Thomas Cummings, *Leadership as the Legitimating of Doubt*, 2001, 91-102.

- **Step 1:** Individual A externalizes a portion of their tacit knowledge in the symbolic form of information that can be shared with others. Individuals B and C do likewise.
- **Step 2:** Individuals A, B and C engage in the exchange of their externalized information elements, or combine it to form new elements (theories, models, or reflected understandings).
- **Step 3:** Each individual then internalizes the new information elements, thereby modifying or adding to their own existing tacit knowledge structure.[13]

FRAME OF REFERENCE

As information is amassed and correlated, it builds upon itself to elevate the relational effect. The results of lived experiences establish perspectives and perceptions that become elements of one's frame of reference (FOR). It is important to note, that we have all developed a FOR with which we filter, assess, relate and understand information that is presented. Outside influences and an individual's breadth of observed and learned experiences shape their internal perspective and the manner in which they see the problem. Thus it is important to assess the validity of this information and the context in which it is presented since the foundation upon how one establishes the framework they will use to make decisions must be both solid and reliable. Therefore, by assessing the validity and applicability of the acquired experiences of others, one can quickly establish an extensive and diversified depth of experience that consists of a layered framework for successful decisions.

As noted in the Fontana Dictionary of Modern Thought, a Frame of Reference is defined as "the context, viewpoint, or set of presuppositions or of evaluative criteria within which a person's perception and thinking seem always

[13] Tsoukas, H., *Do We Really Understand Tacit Knowledge?* 14 June 2002, 6.

to occur and which constrains selectively the course and outcome of these activities"[14] In the process of framing the solution to a problem, an appropriate FOR is critical to fully understanding and defining an accurate awareness of cultural perceptions, paradigms and expectations. One's FOR is therefore related directly to past SA relative to actual courses of events. Given technological means to acquire, organize, correlate and assess information from a prescriptive perspective, the validity of action taken against results achieved becomes a key determinant to achieving future objectives. By documenting, observing and validating the quality of past SA, the benefit of heightened awareness becomes actualized. However, the prevailing motivation and the effects derived from their intention will seldom if ever be fully revealed.

ELEMENTS OF THOUGHT

It is from this FOR that information is filtered by the taxonomy of one's perceptions and biases. With this in mind, one can begin to appreciate the value of relationships inherent with the associated information in order to synthesize knowledge into understanding.

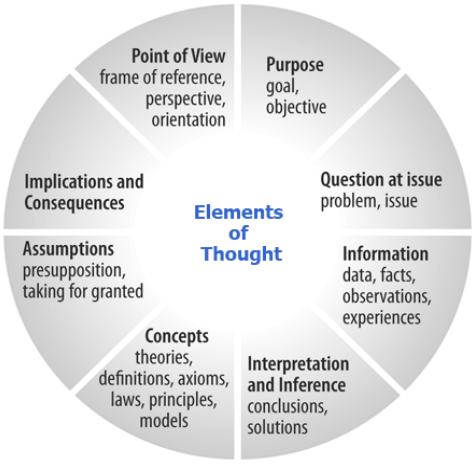

Figure #2: Elements of Thought[15] (EOT)

The resulting synthesis provides unique and innovative perspectives on capabilities upon which one evaluates information to formulate it into knowledge. The six areas addressed previously in Bloom's Taxonomy provide the structure

[14] Alan Bullock, *Fontana Dictionary of Modern Thought,* 1988.
[15] Foundation for Critical Thought, 2007, http://www.criticalthinking.org/CTmodel/CTModel1.cfm#, (Accessed April 3, 2009).

on which we are able to formulate and elevate information into knowledge. For as one assess the issues and acquires information, in order to interpret the implications and the consequence of actions taken against results achieved, they must be able to adequately interpret their understanding based upon their point of view or FOR.[16]

It is important to note that our experiences, expectations and perceptions influence the manner by which we become aware. Once data is organized into information that is ultimately correlated and fused into knowledge that drives understanding, the strategic leader becomes an empowered decision maker. A cross-correlation assessment is necessary to develop a single operational picture and it is from the resulting shared awareness that trends are identified from lessons learned, thus permitting deterministic actions to be derived from cognitive awareness. However, caution must be taken to preclude the introduction of inferences and assumptions that can cloud and distort one's point of view. Therefore, consideration of these biases, perceptions, viewpoints and motivations in sharing the information will establish the validity and resulting credibility of these shared experiences. Once these experiences are applied to the decision-making process, discretion must be employed to preclude becoming overly reliant on misleading or biased information that can distort the FOR being used. Thus by reflecting on the validity of one's SA one can determine the context in which the information was interpreted and applied.

[16] Ibid.

HOW AND WHAT TO THINK ABOUT

The level of awareness achieved directly affects the quality of the decision being made. Timely and accurate assessment of information provides the basis for sound decisions and ultimately results in cognitive enlightenment. In order to learn and evolve from previous experiences, it is essential to assess and analyze problems. Hence an astute and consciously aware individual possesses the ability to reflect on the outcomes of an opportunity as well as the range of options available to mold and shape the environment. The following questions have been developed and presented by Richard Paul and Linda Elder, as a means to identify the issues involved and in-turn, formulate one's initial thoughts:

Elder's disciplines of how to think and guide toward a strategic end state:

- What precise question are we trying to answer?
- Is that the best question to ask in this situation?
- Is there a more important question we should be addressing?
- Does this question capture the real issue we are facing?
- Is there a question we should answer before we attempt to answer this question?
- What information do we need to answer the question?
- What conclusions seem justified in light of the facts?
- What is our point of view? Do we need to consider another?
- Is there another way to look at the question?
- What are some related questions we need to consider?
- What type of question is this: an economic question, a political question, a legal question, etc.? [17]

Within the context of examining the implications related to these questions, the parameters, scope and intent regarding the problem set is established. By framing the problem in order to clarify the focus being applied to the objectives, the cognitive process correlates the assessment from the questions asked. Ultimately, the propensity to acquire knowledge relative to the situation at hand affords the opportunity to elevate SA in order to develop useful understanding.

[17] Richard Paul and Linda Elder, *Critical Thinking: Tools for Taking Charge of Your Learning & Your Life* (2nd Edition), (Prentice Hall, 2001).

CHAPTER 2

"A leader who can decisively and intelligently make decisions within the context of understanding… has the ability to recognize patterns and changes and is comfortable with uncertainty and ambiguity. Versatile and creative, able to develop innovative solutions, thinking in time and context within the complex environment to bring about desired effects. Thinks in terms of systems/linkages (effects) and is an expert learner." [18]

Peter Pace
CJCS Vision for Joint Officer Development

CRITICAL THINKER

An adept critical thinker raises vital questions and problems based on the relevant information that has been gathered and assessed. The individual then interprets and organizes it to a given level of maturity, at which point it is tested against relevant criteria and standards. By using an open-minded perspective and employing alternative systems of thought, the individual validates assumptions and identify practical consequences. Finally, the critical thinker disseminates his or her findings to others in a dialectic manner to determine solutions to complex problems before assimilating the resulting antithesis into the general knowledge base.[19]

"A well cultivated critical thinker:

- *raises vital questions and problems and formulates them clearly and precisely*
- *gathers and assesses relevant information using abstract ideas to interpret the problem effectively*
- *comes to well-reasoned conclusions and solutions and then tests them against relevant criteria and standards*
- *thinks using an open-minded approach within alternative systems of thought, recognizing and assessing as need be their assumptions, implications and practical consequences*
- *Communicates effectively with others in determining solutions to complex problems."* [20]

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[18] Pace, Peter, *CJCS Vision for Joint Officer Development* (November, 2005), 4.
[19] Ibid.
[20] Richard Paul and Linda Elder, *Critical Thinking: Tools for Taking Charge of Your Learning & Your Life* (2nd Edition), (Prentice Hall, 2001).

From analysis, the critical thinker develops a presumption of their unique perspective. Paul and Elder posit this to be "whenever we reason, we must reason within some point of view or frame of reference. Critical thinkers strive to adopt a point of view that is fair to others, even to opposing points of view."[21] Hence, critical thinkers must adopt the philosophy that critical thinking is a process of understanding the circumstances with which you are faced and then determining "the lay of the land" as situations present themselves. From this, decisions must be made and in the presence of good awareness, informed decisions will ultimately fulfill expectations. Thus the framework of thinking is related directly to the benefit derived from how information is processed in accordance with the disciplines to derive at a strategic endstate as illustrated in figure 3 below. [22]

- **"IDENTIFY**: Recognize and clearly define the root problem, situation/question
- **GATHER**: Sort/assemble information
- **EXAMINE**: Analyze pertinent information
- **FORMULATE**: Devise a plan
- **APPLY**: Implement the plan
- **EVALUATE**: Judge the results objectively
- **REFLECT**: Think about thinking"[23]

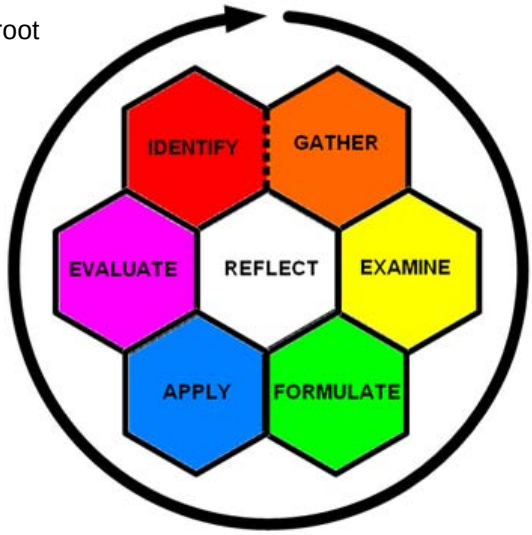

Figure #3: Disciplines for a Strategic Endstate[24]

[21] Richard Paul and Linda Elder, Critical Thinking, Tools for Taking Charge of Your Learning and Your Life (Upper Saddle River, NJ: Prentice Hall, 2001), 98.
[22] Ibid., 70.
[23] Ibid.
[24] Ibid.

Elder's model illustrates progressive aspects of critical thinking. First, a clearly defined problem set must be identified. Next, steps must be taken to amass the necessary information to address the issue at hand. Once this information is accumulated, it must be examined so that a plan can be formulated and applied to a course of action that fulfills the objectives. Finally, a means to evaluate the results will reveal whether the objectives were met. Hence the use of a reflective approach toward assessing its effectiveness, relative to accomplishing the task at hand, will enable the process to adapt to changing requirements.

By following Elder's disciplines for a strategic end state, it is necessary to develop a well-defined and scientific approach toward how such potential problems can be resolved. The manner in which the problem is framed and considered, in view of the information available, directly influences how information is processed in order to achieve a given level of understanding. Ultimately the central issues, as well as the purpose to be achieved, must be clearly understood in order to approach and apply the necessary methods to effectively solve the problem.[25] Therefore, consideration should be given as to how the U.S. should develop its capabilities to confront current and future threats despite the potential of limited capacity. Once the necessity for a well defined and scientific approach toward confronting problems is understood, it then becomes imperative that the information necessary to frame the problem is adequately assembled and assessed.

[25] Ibid.

The means necessary to drive effectiveness and efficiency requires a clear understanding of their surroundings. To preclude biases or becoming distracted by irrelevant injects, critical thinkers must master not only the process but also the art of thinking. Therefore, it becomes imperative that the information is presented in a timely and useful manner to develop an accurate awareness infused with a corresponding FOR. It is this understanding and the implications associated with the current environment that enables an awareness of how current conditions unfold from past actions.

REASONING

Boal and Hooijberg identify precisely the value of a strategic leader when they observe that "Critical thinking is the use of reasoning to develop sound strategies that increase the probability of a desirable outcome. Critical thinking is thus the description of how to thinking in a manner that is purposeful, reasoned and goal directed."[26] Through the process of reasoning, a conceptual synthesis of information formulated through observed experiences defines the purpose, assumptions, implications, points of view, inferences and consequences. By utilizing reliable empirical evidence, one can apply sound reasoning to assimilate a relational affect. Hence the mental model is derived from conclusive assumptions based on a reliable FOR. This mental model affords one the opportunity to apply past performance and reasoning in a rational manner against predeterministic outcomes within a closed system or environment.

[26] Foundation for Critical Thought, 2007, http://www.criticalthinking.org/CTmodel/CTModel1.cfm#, (Accessed April 3, 2009).

One must remain aware that the process is susceptible to biased perspectives, or distortion. It is through this cognitive bias which allows two people to arrive at different conclusions despite having the same information. Thus the following questions should be considered when applying the elements of reasoning to assess the effects of these variables within the open system.

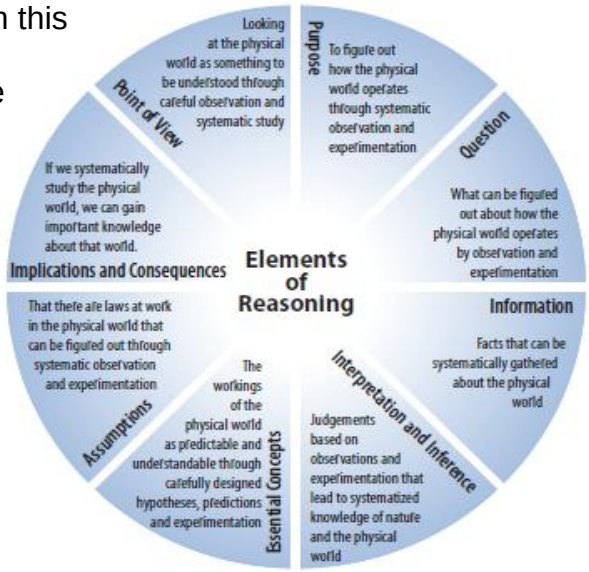

Figure #4: Elements of Reasoning[27]

"Question: All reasoning is an attempt to figure something out, to settle some QUESTION, to solve some problem

- State the question at hand clearly and precisely
- Express the question in several ways to clarify its meaning
- Break the question into sub-questions
- Distinguish questions that have definitive answers from those that are opinionated or that require multiple viewpoints

Concepts: All reasoning is expressed through and shaped by, CONCEPTS and IDEAS

- Identify key concepts and explain them clearly
- Consider alternative concepts or alternative definitions of concepts
- Make sure you are using concepts with precision

Interpretation and Inference: All reasoning contains INFERENCES or INTERPRETATIONS by which the CONCLUSIONS drawn give meaning to data

- Infer only what the evidence implies
- Check inferences for their consistency with each other
- Identify assumptions that underlie your inferences

Assumptions: All reasoning is based on ASSUMPTIONS

- Clearly identify your assumptions and determine whether they are justifiable
- Consider how your assumptions shape your point of view

Implications: All reasoning leads somewhere or has IMPLICATIONS or CONSEQUENCES

- Trace the implications and consequences that follow from your reasoning
- Search for negative as well as positive implications
- Consider all possible consequences

Point Of View: All reasoning is done from some POINT OF VIEW.

- Identify your point of view
- Seek other points of view and identify their strengths and weaknesses
- Strive to be fair-minded in evaluating all points of view" [28]

[27] Foundation for Critical Thought, 2007, http://www.criticalthinking.org/CTmodel/CTModel1.cfm#, (Accessed April 3, 2009).
[28] Foundation for Critical Thought, 2007, http://www.criticalthinking.org/CTmodel/CTModel1.cfm#, (Accessed April 3, 2009).

UNDERSTANDING

Opening one's mind to identifying how to mitigate risk and knowing what is important and what is not is critical to developing awareness. This presents an interesting dilemma, since one does not know what he or she did not know until it is eventually learned. Therefore, it is incumbent upon them to be conscious of their ignorance and the effect it has on their ability to make informed decisions. Ultimately, the area of conscious incompetence allows one to mitigate liability and examine the opportunity to think strategically. Once individuals are aware of what they know and do not know, their knowledge and associated reliance on pertinent information impacts their ability to make effective and informed decisions. Research conducted by Justin Kruger and David Dunning, from Cornell University, illustrates that incompetent individuals tend to overestimate their own level of skill.[29]

1. Incompetent individuals fail to recognize genuine skills in others.[30]
2. Incompetent individuals fail to recognize the extremity of their adequacy. [31]
3. If they can be trained to improve their own skill level substantially, these individuals can recognize and acknowledge their own previous lack of skill. [32]

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[29] Justin Kruger and David Dunning, "Unskilled and Unaware of it: How Difficulties in Recognizing One's Own Incompetence Lead to Inflated Self-Assessments," (*Journal of Personality and Social Psychology* 1999), 1121-34.
[30] David Dunning, Kerri Johnson, Joyce Ehrlinger and Justin Kruger, "Why People Fail to Recognize Their Own Incompetence," (*Current Directions in Psychological Science* 2003) 83 – 87.
[31] Ibid.
[32] Katherine A. Burson, Richard P. Larrick and Joshua Klayman, "Skilled or Unskilled, but Still Unaware of It: How Perceptions of Difficulty Drive Miscalibration in Relative Comparison," (*Journal of Personality and Social Psychology 2006),* 60 – 77.

CONSCIOUS COMPETENCE

Through examining the conscious competence learning model, we begin to understand how to assess the level at which we are operating and the inherent risk found at that level. Understanding that one does not always understand, affords the opportunity to be receptive to exploring the art of the possible. By adopting an open-minded approach toward issues as they present themselves, the opportunity exists to increase one's awareness and heighten their SA.

To help visualize the conscious competence model, the author presents the following four level quadrant table in Figure #5 to illustrate this concept:

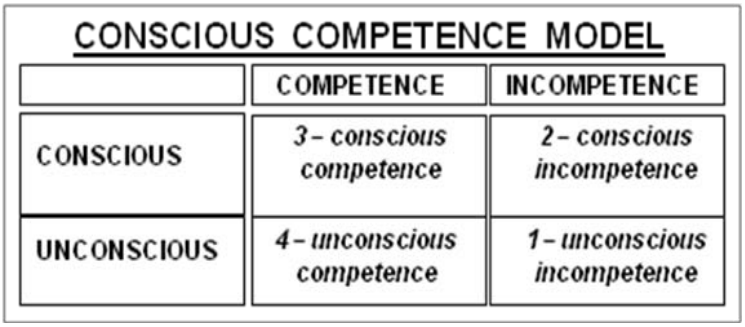

Figure #5: Conscious Competence Model

"1 – Unconscious incompetence

- person is not aware of the existence or relevance of the skill area
- person is not aware that they have a particular deficiency in the area concerned
- person might deny the relevance or usefulness of the new skill
- person must become conscious of their incompetence before development of the new skill or learning can begin

2 – Conscious incompetence

- person becomes aware of the existence and relevance of their skill
- person is therefore aware of their deficiency in this area, ideally by attempting or trying to use the skill
- the person realizes that by improving their skill or ability in this area, their effectiveness will improve
- Ideally, the person has a measure of the extent of their deficiency in the relevant skill as well as a measure of what level of skill is required to achieve their own competence

3 – Conscious competence

- the person achieves "conscious competence" in a skill when they can perform it reliably at will
- the person must concentrate and think to perform the skill
- the person performs the skill without assistance
- the person will not reliably perform the skill unless thinking about it—the skill is not yet "second nature" or "automatic"
- the person should be able to demonstrate the skill to another, but is unlikely to be able to teach it well to another person
- the person should ideally continue to practice the new skill and if appropriate, commit to becoming "unconsciously competent" in it

4 – Unconscious competence

- the skill becomes so practiced that it enters the unconscious parts of the mind—it becomes "second nature"
- common examples are driving, sports activities, typing, manual dexterity tasks, listening and communicating
- it becomes possible for certain skills to be performed while doing something else; for example, knitting while watching television
- the person might now be able to teach others the skill concerned, although after sometime of being unconsciously competent, the person might actually have difficulty explaining exactly how they do the skill which is now largely instinctual" [33]

Unconscious incompetence can stem from a physical obstruction or the unavailability or inaccuracy of information. Therefore if the individual is unaware that they are uninformed, the potential to gain such awareness is highly unlikely. Clearly, the greatest threat can be found at this level for overconfidence inhibits decision makers and infuses restlessness as they throw caution to the winds and convince others that they have all of the information necessary to make an informed decision. This condition of ignorance, which stems from a lack of awareness not only creates liability but also precludes the individual from ever becoming aware. For while at Level 1, within the cognitive model, the decision maker is ineffective and a risk to the organization.

Level 2 cognitive model addresses those individual that are consciously unaware due to an inability to comprehend the meaning of a situation as outlined in Bloom's Taxonomy. It is at level 2 cognition that individuals must use extensive resources to mature and apply knowledge in order to develop understanding. The individual's limited FOR precludes effective synthesis of information into a

[33] Roger Kane, *Conscious competence learning model, stages of learning - unconscious incompetence to unconscious competence - and other theories and models for learning and change*, Roger Kane, *Conscious competence learning model, stages of learning - unconscious incompetence to unconscious competence - and other theories and models for learning and change*, http://www.businessballs.com/consciouscompetencelearningmodel.htm#will_taylor_5th_ level_conscious_competence, November 2005: (accessed 16 Nov 08).

comprehensive and complete picture. Moreover their lack of a clear relationship between variables within the environment preclude the opportunity to make effective and informed decisions. However, since the individual is aware of their condition, they recognize the opportunity to become enlightened through education and experience. Hence, individuals at this level make the best students due to their awareness of their predicament of being uninformed. These decision makers can typically be expected to take concerted action to elevate their understanding and thus potentially mitigate risk. Ultimately, their conscious awareness prevents them from being ineffective or becoming a liability.

At level 3 of the cognitive model, the individual is consciously aware but experiences difficulty in correlating the relationships and thus finds difficulty fusing the facts and synthesizing the knowledge into understanding. Thus, it is difficult for them to formulate the implication of information and in-turn they are unable to estimate its effects upon the environment. The results of these limitations make it increasingly more challenging for them to determine or even forecast future dynamics without a well-defined mental model. At this level, the individual is predisposed to eschew a strategic and deterministic approach that fosters an enlightened expectation of future impacts. Here, the decision maker's inability to fuse a multitude of problem sets into a unified approach toward cohesive resolution hinders their ability to act strategically. Thus, the lack of mature cognition and heightened SA prevents these individuals from becoming fully informed which precludes autonomously linked enlightened decision.

Notably, level 3 is the stage at which teaching, adapting and error detection activities are performed. At this level, the individual is receptive to acknowledging when new information does not fit properly into the model based on their FOR, perceptions, or expectations. Of course, ignoring or forcing the new information to fit could place the entire premise and course of action at risk and send the individual back to sector 1 and quadrant 1 of the SA and cognitive models. Further, it is at these stages that imparting knowledge to others is most beneficial for both students and teachers become aware of their deficiencies in knowledge.

It is through this symbiotic relationship of those at level 2 and 3 of the cognitive model which shared experiences and collaborative understanding open their perspective to the realm of options and the art of possibilities. Moreover, it is through this exchange that teachers and their students will derive mutually beneficial opportunities to explain and explore answers to previously unexplored questions. Individuals in stage 3 should be chosen to teach those in stage 2 as they expand their knowledge and broaden their FOR in preparation to ascend to stage 4. It is from this symbiotic mutually beneficial relationship between student and teacher that provokes a reflective reassessment of perceptions and is necessary to elevate both individuals to their next level of cognition. [34]

Many have remarked that intuition or military genius exposed by Clausewitz as *coup d'oeil* is depicted in a heightened level of fully conscious competence or Level 4 of our model. Roger Kane spoke of a fifth level at which the individual

[34] Ibid.

responded with optimal, instantaneous and instinctive reaction. Some refer to this as being in the "zone."[35] At this level, an individual becomes able to achieve self-awareness and make accurate assessments of their abilities based upon an understanding of current conditions. By leveraging opportunities in this adaptive approach, threats can be mitigated and weaknesses overcome.[36] Having an awareness of one's limitations enables an individual to approach the true capacity of their ability. Indeed, it is not what one knows that makes them an asset but the awareness of what they do not know, which precludes them being a liability. Moreover, it is through this awareness that they are able to establish their overall realized value to an organization.

To preclude diversionary qualifiers, astute leaders reflect on the perceptions and expectations of others throughout the conscious competence assessment. Further, through a thoughtful, reflective, open-minded and empathetic approach towards issues, the propensity to achieve self-awareness and circumvent egocentric tendencies begins to reveal itself. Indeed, such biases, preconceived notions and paradigms distort or sometimes blind leaders and thus prevent effective critical thought as depicted by the reflective competence model shown if figure 6 below.[37]

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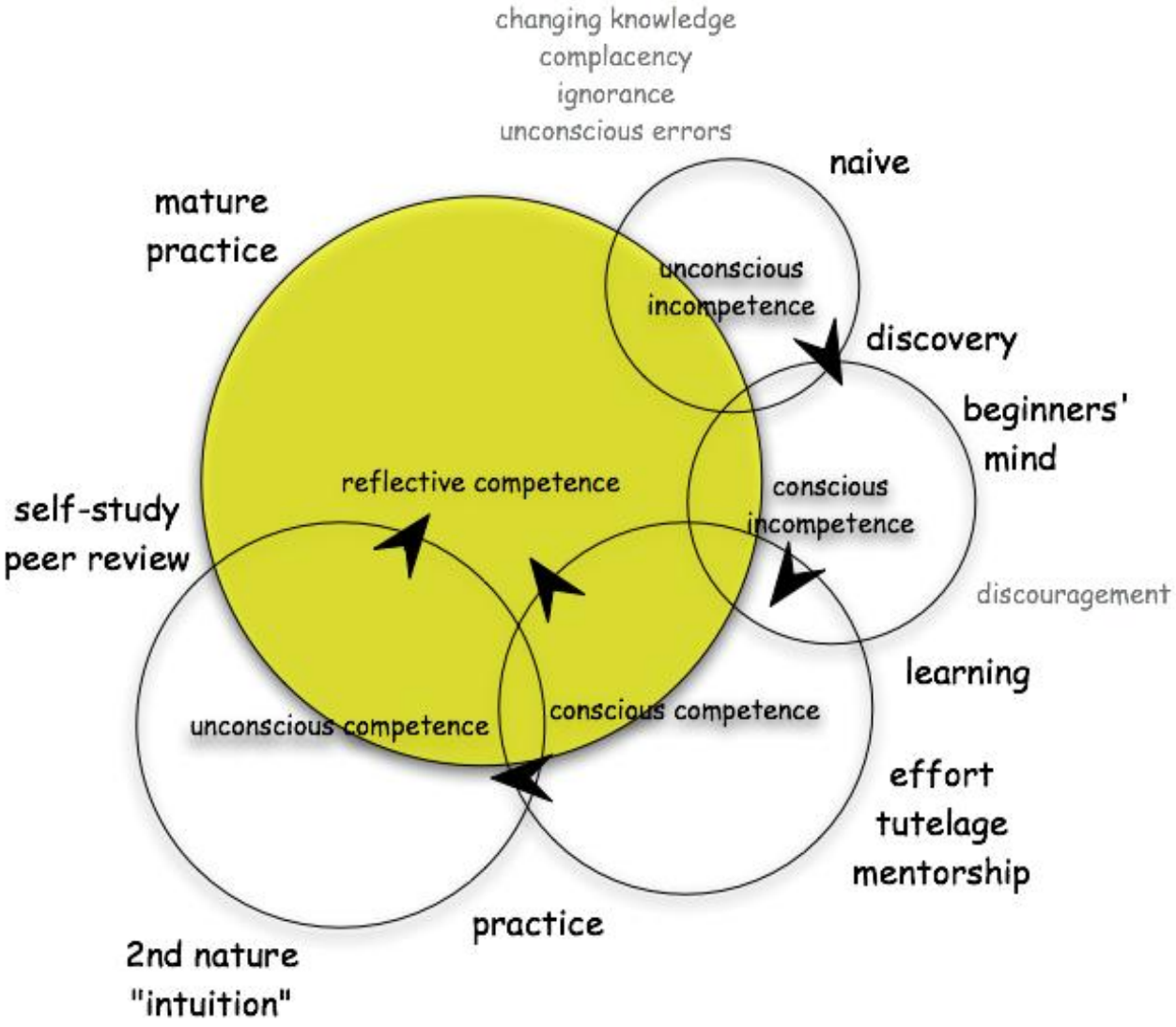
[35] Roger Kane, *Conscious competence learning model, stages of learning - unconscious incompetence to unconscious competence - and other theories and models for learning and change*, http://www.businessballs.com/consciouscompetencelearningmodel.htm#will_taylor_5th_level_conscious_competence, November 2005: (accessed 16 Nov 08).

[36] Headquarters, Department of the Army, *The Army Training and Leader Development Panel Officer Study Report to the Army*, *http://www.army.mil/atld*, 2001, OS-3.

[37] Richard Paul and Linda Elder, Critical *Thinking, Tools for Taking Charge of Your Learning and Your Life*, 234.



(Courtesy of Will Taylor, Chair, Department of Homeopathic Medicine, National College of Natural Medicine, Portland, Oregon, USA, March 2007.)

Figure #6: Reflective Competence[38]

COMPETENCY

It is essential to develop the competencies that will enable efficiency and effectiveness thereby increasing proficiency. Through the application of a well defined and collaborative process, the opportunity exists to achieve collective intellectual cognizance. By examining the elements that drive these

[38] Ibid.

competencies, the characteristics of skill, experience and knowledge can identify the need for strategic leadership. James F. Bolt observes that leadership can be taught which he asserts is rooted in a strong foundation of an enlightened decisionary process. He believes that less focus should be placed on reacting to the environment and more given to leaders who, through self reflection, derive the benefits as described in Thales “know thy self” in order to effect their environment.[39] Bolt postulates that through self efficacy, the strategic leader can indeed shape the environment to their desired endstate.[40]

Absent any cognitive or correlated biases, assumptions predicated upon perceptions require that inferences be made. The inherent risk is that an ill-defined scope and the resulting variables are not properly correlated. In this case, the deterministic actions taken based on the reliance of skewed information are what Herbert Simon calls "bounded rationality." The results of actions taken amidst ambiguous information causes strategic leaders to arrive at irrational or suboptimal decisions. Within this volatile, uncertain, complex and ambiguous (VUCA) environment, reliance must be placed on strategies that drive a heuristic endeavor to explore the art of the possible. Thus consideration must be given to myriad of plausible solutions in an effort to determine the best fit from a reflective FOR in order to implement appropriate actions from previous successes.

[39] James F. Bolt, Frances Hesselbein, Marshall Goldsmith and Richard Beckhard, “New Skills for New Leadership Roles,” *The Leader of the Future: New Visions, Strategies and Practices for the Next Era*, (San Francisco: Jossey-Bass, 1996), 161 – 173.
[40] Marshall Sashkin, Robert Phillips and James Hunt, “Strategic Leader Competencies,” *Strategic Leadership: A Multiorganizational-Level Perspective* (Westport, CT: Quorum Books, 1992), 139 – 160.

Placing too much reliance on empirical statistics or allowing undue influence from social attribution leaves one susceptible to cognitive bias.[41] Hence, the scope of how information is collected, interpreted and filtered determines the development of perceptions. Therefore the impact of how information is processed affects the formulation of understanding. Elder and Paul have established the following considerations upon which to insure critical thought precludes the pitfalls of close mindedness:

> [42] ***"Elder presents the following considerations to determine whether you are being closed-minded:***
>
> - Are you unwilling to listen to someone's reasons?
> - Are you irritated by the reasons people give you?
> - Do you become defensive during a discussion?
>
> ***Analyze what is going on in your mind to understand the cause of close-mindedness:***
>
> - I realize I was being close-minded in this situation because...
> - The thinking I was trying to hold onto is . . .
> - Thinking that is potentially better is . . .
> - This thinking is better because . . ." [43]

Within the context of the decision-making process, one can easily become quick to jump at the first available solution without having explored the art of the possible. This commonly accompanies the failure to explore all viable options and thus making it impossible to derive the best solution available. As problems are defined and solutions developed, the risk of logical fallacy can cause

[41] Max H. Bazerman, *Judgment in Managerial Decision Making* (Hoboken, NJ: John Wiley & Sons, 2002), 23.
[42] Ibid.
[43] Richard Paul and Linda Elder, *Critical Thinking: Tools for Taking Charge of Your Learning & Your Life*.

unrelated facts to convince one to accept a premise that is not supported. The implications of accepting information that may not be all-inclusive and may even include incorrect assumptions, can serve as the basis for a flawed perspective. The reliance on this perspective is at the heart of the consequences that stem from a lack of awareness.

To preclude biases and prevent distraction, by non-relative injects, critical thinkers must master not only the process but also the art of thinking. Therefore, it becomes imperative that the information is presented in a timely and useful manner in order to leverage a FOR with awareness that develops accurate understanding. The implications associated with the current environment drives an awareness of current conditions which proceeds from past actions. Each occurrence that requires critical thought is stimulated by ambiguity within the environment. Therefore, if the world was indeed only black and white, one's inherent ability to make an immediate decision would preclude the necessity for any form of critical thought. However, given the unpredictability of the human dimension and its affect on the environment, the need to clarify objectives and evaluate relevant circumstances that filters our perceptions becomes evident. Thus the current environment is plagued with ambiguity, which drives assumptions that are made in accordance with the paradigms and inferences obtained through a FOR. Therefore, the critical thinker must remain aware of these distracters and take steps to overcome them.

CHAPTER 3 – AWARENESS

If I always appear prepared, it is because before entering upon an undertaking, I have meditated long and have foreseen what may occur. It is not genius that reveals to me suddenly and secretly what I should do in circumstances unexpected by others; it is thought and preparation.[44]

Napoleon Bonaparte
French Emperor and General

Situational awareness is defined by Endsley, the author of *Human Capabilities and Limitations in Situation Awareness*, as "the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning and the projection of their status in the near future."[45] The focus of SA, although still in its infancy, has been employed extensively in the aeronautical, space and intelligence communities. Yet there is no single mutually acceptable definition of SA among the multitude of different variables upon which it is measured.[46] However, it is generally accepted that within the context of awareness lies the ability to develop and maintain a perspective of the big picture. Indeed, this defines the "operational space" within which the environmental factors influence the ability to move, act and fulfill objectives.

[44] Quotes by Author, http://www.quotesandpoem.com/quotes/listquotes/author/napoleon-bonaparte, (Accessed 03 May 2009)
[45] Endsley, M. R. and Bostad, C. A. (1993). *Human Capabilities and Limitations in Situation Awareness,* 19/1 – 19/10.
[46] Dennehy, Kathryn and Deighton, Carole D. B., 1997, "Engineering Psychology and Cognitive Ergonomics, no. 1," Transportation Systems; Proceedings of the International Conference, Stratford upon Avon, United Kingdom; 23 – 25 Oct. 1996. 283-290.

INTELLECTUAL COGNITION

SA is generally accepted as the state of intellectual cognition is correlated within the dynamic environment where one operates. Hence, SA results directly from an internalized mental perspective filtered by one's perceptions and FOR. It is the correlation of this cognitive knowledge which feeds SA and validates the resulting outcome of expectations. As illustrated in Joint Publication 6 the use of information is to "help create situational awareness as the basis for a decision."[47] Hence maintaining heightened SA has become increasingly essential in today's competitive world. In "Situation Awareness Analysis and Measure," authors Kaempf, Wokf and Miller observe that to be successful, a strategist must "recognize the situation provided by the challenge to the decision maker."[48]

SA informs and elevates knowledge to a level at which it facilitates and predicates understanding. Upon consideration and assessment of the open system, SA provides an enlightened understanding of the variables within the environment so that sound decisions are made based upon analysis garnered throughout the cognitive process. Hence, elevated understanding facilitates informed decisions while allowing for the potential to forecast deterministic second and third order affects. Therefore, the criticality of actions taken as a result of the information presented requires due diligence to engage with careful analysis and assessments in order to adequately portrays the battle space. Hence by using a well developed mental model along with the benefit of a strong

[47] U.S. Joint Chiefs of Staff, *Joint Publication 6-0, Joint Communications System* (March 20, 2006), I-2.
[48] Daryl G. Croft, Simon P. Babury, Laurie T. Butler and Dianne C. Berry, *The Role of Awareness in Situational Awareness*, 1993, 82.

FOR and coupled with acute cognitive skills, the opportunity to develop adaptive plans that are reflective of the current environment can insure the fulfillment U.S. objectives.

Clearly, individuals have varying levels of understanding and SA. Generally, however, cognitive skills are applied equally across the spectrum to address events as they occur within the environment. Additionally today's SA builds tomorrows FOR such that flaws in current SA are compounded by the resulting derailment of the ability to build sound understanding. Thus the quality of what SA and a sound FOR has upon providing clarity within the cognitive process are directly proportionate to the individual's ability to make effective decisions. Since SA considers all variables which represent the unpredictability found within the environment, the need to assess and ascertain the reliability of one's SA is underscored by the volatility of the environment.

The variances found within SA include spatial abilities, attention sharing, memory and perceptual skills (perceptual speed, encoding speed, vigilance and pattern matching skills) which align strategic endeavors to higher order cognitive skills (including analytic skills, cognitive complexity, field independence and locus of control).[49] Therefore, SA is linked directly to the changing variables within a dynamic environment. Moreover, it is the culmination of one's state of knowledge, fused and correlated to all aspects of the dynamic environment that are applied to their conceptual ability to grasp, adapt and correlate the cascading second and third order affects of the variables within that environment. It is these

[49] Ibid.

cognitive skills which allow them to directly enable the opportunity to influences, predict, shape and adapt to this dynamic environment.

LEVEL OF SITUATIONAL AWARENESS

The relationship between SA and cognition are directly interlinked. For the individual must be conscious of their competence or even aware of their incompetence in order to elevate through the levels of cognition in order to mature their SA. Considering that while an individual is at SA level 1 they are afforded the opportunity to perceive their environment. At level 2 of SA they establish understanding and at level 3 they can forecast and even predict future actions. Thus those individuals who are unconsciously unaware fail to perceive information and are unable to possess SA.

Elevating consciousness to an autonomous, effortless and largely unconscious state is at the height of SA. It is the ascension to level 5 cognition which results in the autonomous action Clausewitz's associated with the military genius discussed in chapter one. The skills found at this level enable quick, predeterministic action to be taken without conscious consideration of current circumstances. In short, if the environment replicates itself, then good decisions are made. However, if variances are apparent, then the likelihood of success is reduced. It is through the individual's unconscious awareness of their surroundings which preclude the cognitive capacity relative to their actions which prevents them from being able to explain their actions to others. Thus operating

at this level fosters circular decision making based on previous variables that are devoid of potential subliminal stimuli. Under these circumstances, the highly aware individual is no longer able to explain their actions and must rely instead on logic to justify them. Thus, their lack of awareness precludes collaboration and limits the individual's overall effectiveness.[50]

A good example of this premise is the repetitive act of driving home from work. In time, the act becomes so familiar that the driver invests little mental effort into it. Often, one arrives home unable to explain the conditions experienced during the journey. Worse yet, when asked for directions from work to home, one is frequently unable to provide them. This demonstrates that they are operating without the benefit of conscious awareness. Thus, level 5 cognition limits the determinist's ability to assess accurately the results of their action and may also result in a lack of awareness and responsiveness to new stimuli.

FUSED SA

From the clear understanding derived at level 1 SA (Perceiving) to correlating those objectives at Level 2 (Understanding), a user definable operational picture becomes critical in order to focus exclusively on the aspects that are germane to the specific decision to be made. This clarity of focus, coupled with the ability to leverage predictive analysis into the decisionary processes, enables informed decisions to be made. The efficiencies gained by timely and effective decisions enable the adaptive processes to outpace

[50] Ibid

competitors within the decision making cycle. Given the immense amount of information available today, it is indeed critical to assess only the information that is relevant. Thus the means to establish a user definable picture therefore becomes necessary. Richard Paul and Linda Elder have established parameters to assist in achieving the focus that determines the relevancy of the information obtained with the following checklist:

"Ask These Questions to Make Sure Thinking Is Focused on What Is Relevant

- Am I focused on the main problem or task?
- How is this connected? How is that?
- Does my information directly relate to the problem or task?
- Where do I need to focus my attention?
- Are we being diverted to unrelated matters?
- Am I failing to consider relevant viewpoints?
- How is your point relevant to the issue we are addressing?
- What facts are actually going to help us answer the question?
- What considerations should be set aside?
- Does this truly bear on the question? How does it connect?" ***[51]***

The manner in which one characterizes a situation has a direct influence on the effectiveness of their decision making process. Because one's FOR molds the formulation of perceptions, it in-turn filters the way one views the world and thus impacts how decisions are made. The manner in which one sees and considers the problem, coupled with their level of cognitive ability, affects the individual's situational comprehension. According to Manktelow and Jones, deductive problem solving directly informs the context. Therefore, situational information (Level 1 SA-Perceiving) and the manner in which it is fused (Level 2 SA-Understanding) will directly affect the way strategy is developed to overcome current and potential threats within their environment.

[51] Richard Paul and Linda Elder, *Critical Thinking: Tools for Taking Charge of Your Learning & Your Life* (2nd Edition), (Prentice Hall, 2001), 428.

There is also reason to believe that performance is tied directly to SA. Research shows that the more complete and accurate the SA, the greater the likelihood will be of attaining a higher degree of performance.[52] Because SA helps paint a complete picture, the realm of operational art provides a means to extensively examine the realm of possibilities and the causality of their options. Hence, understanding these perspectives and associated perceptions will help illustrate the potential implications linked to a given cultural viewpoint. As unscientific as they may appear, these predictors provide a useful approach with which to assess and forecast the predisposition of expectations and their related risks within an open system.

OPERATIONALIIZING SA

Consideration must be given to when to leverage SA from both an offensive and defensive posture. While the information acted upon produces a benefit, it also reveals vulnerabilities of and to your adversary. Thus, consideration should be given to the value of withholding information either about enemy vulnerability or friendly capability. A simple cost benefit analysis will disclose when sharing SA becomes more beneficial than withholding it. However, be advised that as the U.S. contributes to the fog and resulting friction of war by their actions, the adversary will likewise endeavor to derive strategic advantage through their awareness of and use of this knowledge in their application of the operational art of war. Hence, the decision to share or withhold information becomes difficult given the elusive nature of the causality of action associated with the resulting predisposition of this information. Joint Publication 3-0

[52] Endsley, 1990

enlightens critical strategic thinkers that, “decision-making is both art and science. Information management, awareness of the operational environment, a sound battle rhythm and the establishment of commander’s critical information requirements (CCIRs) facilitate decision-making.” [53]

VALUE OF SA

The complexities of warfare continue to grow well beyond the rules typically associated with conventional confrontations. Only by understanding the science of the closed system, aided by the unpredictability of the open system, will planners be fully capable to focus the operational art necessary to meet and overcome current and future threats. Once operationalized, SA becomes a remarkably valuable and powerful tool at the strategic, operational and tactical level. Notably, however, its greatest benefit can be derived at the strategic level. By incorporating the benefits of good SA into operational design, strategic planners thus become empowered to develop adaptive plans that are fully informed in order fulfill military objectives. Joint Publication 5-0 observes that the “JIPOE is a process that enables JFCs and their staffs to visualize adversary capabilities and potential COAs across all dimensions of the operational environment….This process, combined with the COP, offer information and intelligence products provides the JFC with the tools necessary to achieve situational awareness.” [54]

[53] U.S. Joint Chiefs of Staff, *Joint Publication 3-0, Joint Operations* (DATE?), III-3.
[54] U.S. Joint Chiefs of Staff, *Joint Publication 5-0, Joint Operation Planning* (DATE?), I-28

CHAPTER 4

"Global dominance will be achieved by those that most clearly understand the role of information and the power of knowledge that flows from it."[55]

Admiral David B. Jeremiah, USN (Ret.)

COMPLEXITY THEORY

The complexity theory provides useful insight into the interrelationships between the cognitive models presented in Chapter 1, the value of Awareness in Chapter 2 and their collective impact on military operations. The study of this theory outlines the convergence of how to interpret the results of open and closed systems to reveal the underlying order within a chaotic system. It is the inexplicable presence of this order that is critical to establishing valid models upon which strategic planners can develop reliable options for military operations. Thus, deterministic actions can be taken to minimize the fog and friction of war brought on by the unpredictability of human influence within the open system.

Today's dynamic environment is constantly changing and adapting. Fortunately, the complexity theory provides the means with which to derive order from apparent chaos. By the application of the cognitive process, one becomes able to leverage SA and their FOR in order to develop understanding so that they can provide some assemblelance of order to this chaotic environment. As a

[55] Felker, Ed, *Information Warfare: View of the Future, A Common Perspective* (September 1995), 18.

result, the ability to become knowledgeable and understand the implications and causality of action facilitates the potentiality of deterministic analysis which can yield useful predictive action.

OODA LOOP

Because of the development of understanding the complexities of the continuum loop found in the decision making process, Colonel John Boyd developed a model to provide balance and relevancy to both time and effect. By reducing this loop to its constituent elements of observe, orient, decide and act, Col Boyd developed a useful model for the decessionary process known as the OODA Loop. An early pioneer with a great respect for what would soon be known as information strategy; Col Boyd recognized that one must first observe and become aware of their environment before it can be understood. As awareness of the given situation becomes apparent, it is important to understand the interrelationships between these diverse and complex environments. By examining their corresponding interconnectivity, the individual can develop a course of action that aligns variables within the environment toward those objectives that fulfill the desired endstate.

- ***"OBSERVATION***: the collection of data by means of the senses
- ***ORIENTATION***: the analysis and synthesis of data to form one's current mental perspective
- ***DECISION***: the determination of a course of action based on one's current mental perspective
- ***ACT***: the physical playing-out of decisions" [56]

[56] Coram, Robert, Boyd: *The Fighter Pilot Who Changed the Art of War* (New York: Backbay Books, 2002), 327.

Col Boyd observes that humans operate using a divisionary process that is shaped by an awareness which is predicated by observation. Hence, he asserts that observation is the first and most important step in the process. Clearly, building on false or flawed perceptions means that the results of those actions will also be flawed. Therefore, to derive strategic advantage over one's adversaries, it is critical to develop more accurate and timely information, since this will allow the individual to make opportunistic and informed decisions inside their enemy's OODA Loop.

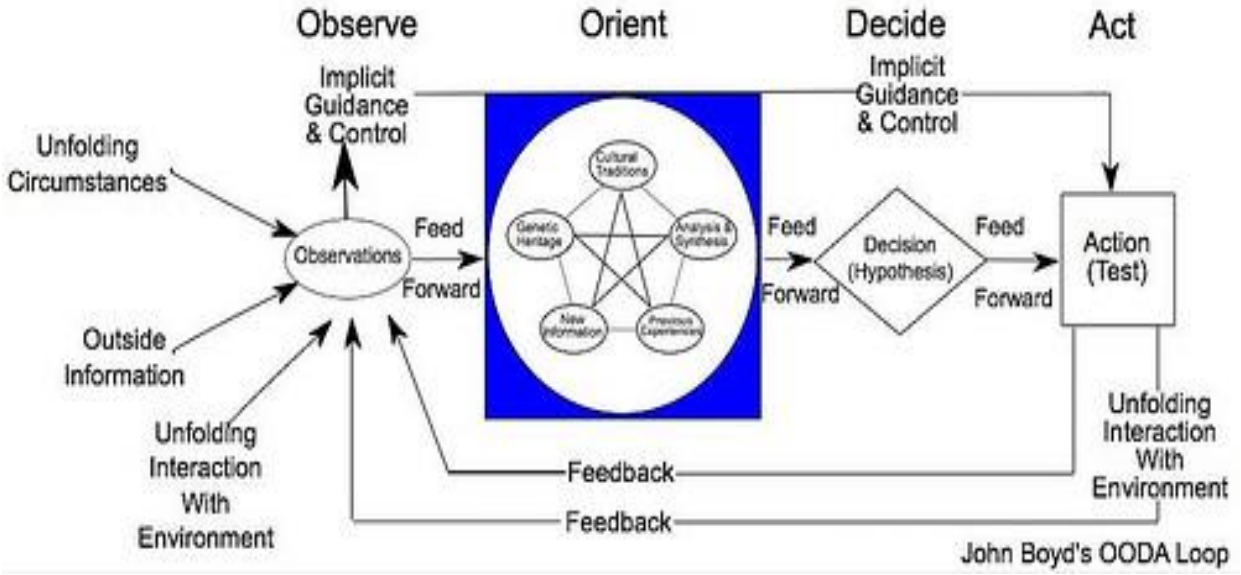


Figure #7: Col John Boyd's OODA Loop[57]

Col Boyd frames how the understanding and application of knowledge serves to drive the interrelationship of collected information in figure 7 above in order to achieve enlightened awareness. After careful analysis and deduction, one can achieve an understanding of specific relationships that result from

[57] Ibid., 344,

induction and synthesis of thought. As these concepts become increasingly clear, so does the causality of the constituent elements relative to how to see and understand the environment. By achieving clear cognition, derived from carefully consideration of the domain, one begins to understand the effects their actions exert upon the environment. When these relationships are understood, informed actions can be taken to effectively impact the environment, thus enabling the potentiality of their influence to shape the current surroundings in the manner intended.

By correlating SA to the OODA Loop, we can align Endsley's mental model of perception, comprehension and projection directly with Bloom's Taxonomy. When considering the factors discussed previously, relative to the cognitive model, we can easily fold the output of the OODA Loop to mature knowledge in an evolutionary manner. As SA is established, refined and maintained throughout this process, ongoing efforts to track and assess both the timeliness and validity of the information must be developed. Thus heightened SA derived throughout this process will directly elevate the level of understanding. [58] Through understanding the cognitive process of inductive and deductive thought, the strategic thinker can fuse seemingly disparate information into actionable knowledge. The OODA Loop allows the correlation of this information into small, easily digestible pieces in order to synthesize and elevate it into awareness that drives understanding.

[58] Rohini K. Srihari, Wei Li, Cheng Niu and Corne, Thomas. InfoXtract: A Customizable Intermediate Level Information Extraction Engine. *Workshop on the Software Engineering and Architecture of Language Technology Systems (SEALTS), North American Chapter of the Association of Computational Linguistics-Human Language Technology Conference 2003*

Observation either assist with the formulation toward understanding of the environment, or the environment imparts understanding through those observations. Clearly, the relationships and their resulting causality are among the key determinants of how awareness is developed. Indeed, a thorough understanding of the synthesis of these relationships provides significant insight into the effects that each has on the other as well as on the environment. Through a deterministic process of focusing awareness upon the second and third order effects, action is taken to elicit the desired results. Therefore, heightened awareness enables a greater appreciation of how the environment is affected and influence by external stimuli. It is by identifying recurring situations and providing the opportunity, according to McGuinness and Foy, to drive toward resolution of the desired objectives through ongoing efforts to meta tag and fuse data that information remains accessible for future analysis.[59] The net effects of this process reveals the answer to the following questions:

- ***"Perception*** – attempts to answer what is actually going on
- ***Comprehension*** – asks what is actually going on
- ***Projection*** – attempts to identify what is most likely to happen
- ***Resolutions*** – provides consideration as to what should be done"[60]

Once these questions are addressed and answered, it becomes clear that SA matures one's operational FOR to a level necessary to provide the foundation upon which predictive analysis is based. From this, modeling will allow for the

[59] McGuinness, Barry and Foy, Louise, "A subjective measure of SA: The Crew Awareness Rating Scale (CARS)," in *Proc of the First Human Performance, Situation Awareness and Automation Conference* (Savannah, GA, October 2000).
[60] Ibid.

identification of patterns from past events and enable forecasting for predictive future actions so critical to applying understanding in the decisionary process.[61]

Given the dynamic nature of the world environment, it is critically important to remain adaptive to mitigate emerging threats. For as Gödel, Heisenberg and the Second Law of Thermodynamics points out, disorder injected into the environment, increases exponentially throughout the continuum. [62] Thus, through this dialectic approach, the opportunity to validate assertions via continual reassessment is facilitated by informed decisions in order fulfill prescribed objectives.[63] Hence, consideration must be given to the opponents decisionary process for it holds the propensity to preclude reactionary action within your operational environment. Thus by validating the FOR and assess current SA, the opportunity exit to preclude falling prey to unintended consequences.

APPLICATION OF STRATEGY

In his book, "Strategic Theory for the 21st Century," Yarger examines how strategic decisions are assessed against the ends, ways and means. Through an exploration of the art of the possible, he ascertains how strategy is developed and implemented in order to derive a better understanding of how best to apply it. He further encourages examining the complexity of the chaotic system to gain a greater appreciation of those variables that influence it. By endeavoring to focus upon requirements and not become distracted by cognitive dissonances, the

[61] Rohini K. Srihari, InfoXtract: *A Customizable Intermediate Level Information Extraction Engine*.
[62] Boyd, John, *Destruction and Creation*, http://74.125.93.104/search?q=cache:wMD01_p7708J:www.goalsys.com/books/documents/DESTRUCTION_AND_CREATION.pdf+G%C3%B6del,+Heisenberg,+and+the+Second+Law+of+Thermodynamics&cd=5&hl=en&ct=clnk&gl=us (accessed March 19, 2009), 7.
[63] Ibid.

ability to actualize opportune benefits while precluding the impact of opportune cost exists. For in full awareness, a cost benefit analysis will ultimately reveal the benefit to be derived from long-term return on intellectually invested capital. In this vain, Yarger suggest the following questions be examined and assessed.[64]

- "What assumptions were made in this strategy and what is the effect if any of them is wrong?
- What internal or external factors were considered in the development of the strategy?
- What change in regard to these factors would influence positively or negatively the success or effectiveness of the strategy?
- What flexibility or adaptability is inherent in the components of the strategy?
- How can the strategy be modified and at what cost?
- How will other actors react to what has been attempted or achieved?
- How will they react to the way in which the strategy was pursued?
- What is the balance between intended and unintended consequences?
- How will chance or friction play in this strategy?"[65]

After examining the causality of past events in relation to current circumstances, and with the addition of a sustained drive for the pursuit of knowledge, the strategist can continually refine and achieve a better perspective upon which to develop enlightened understanding. As Yarger observes, strategy teaches one how to think rather than what to think. Therefore, by taking a proactive approach toward understanding the realm of possibilities tempered by constraints in time, resources and intellectual capital the strategist is confronted with and must take ownership of the consequences of the plan. [66]

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[64] Harry R. Yarger, *Strategic Theory for the 21 Century: The Little Book on Big Strategy* (February 2006), 73 – 75.
[65] Ibid., 71.
[66] Ibid., 73-75.

HISTORIC EXAMPLE

Strategic opportunities and operational benefits of the UM can be seen in the events that unfolded during the Cuban missile crisis. The Cold War epilogue remains fresh in our collective memory as a result of the most recent nuclear arms race between the Soviet Union and the United States. Due to the inability to collect data regarding the nuclear strength of both nations, a series of incorrect assumptions were made. An obscure FOR resulted in a fallacy to knowledge thus causing the U.S. to develop a faulty understanding that they lagged behind the USSR in nuclear capacity. However, despite the clear nuclear superiority in both numbers and strategic geographic alignment, the U.S. leveraged its flawed FOR to make decisions that contributed toward and perpetuated the growing confrontational relationship with the USSR to the brink of WWIII.

The Soviets had developed an equally dubious paradigm based on what they perceived as an aggressive stance by the U.S. to continue to perpetuate its lead in the arms race. Thus, significant mistrust stemmed from the USSR's perception, based on flawed paradigms and fueled by fear perpetuated uninformed decisions. Hence a misinformed FOR established inaccurate SA by both countries regarding strategic nuclear capacity which drove them to the flashpoint that became the Cuban Missile Crisis.

Leading up to this event, the U.S. mitigated what it perceived as a threat posed by Khrushchev, by positioning missiles only 90 miles from the USSR's borders in Turkey. In response, Russia endeavored to in their view rebalance the

nuclear chessboard by situating missiles in Cuba. Both nations now threatened by medium range missiles, that if launched did not allow adequate time to respond with retaliatory recourse, were justifiably concern. The USSR feeling that balance had simply been restored to the nuclear equation by their actions in Cuba was at a loss to understand the alarm within the U.S. administration. The U.S. observing an increase threat to their sovereignty and national security felt obligated to take action to mitigate this new threat.

Ultimately, President Kennedy's administration demonstrated a lack of awareness about why the Soviet Union was so motivated to place missiles in Cuba and triggered alarms of impending attack. Upon reflective consideration and utilizing Yarger's approach to exploring the art of possibilities, the ability to discern the causality of the USSR's actions, Kennedy was presented with the following three options:

- "Engage Castro and Khrushchev on the world stage in an effort to resolve the crisis through diplomacy
- Engage in open surveillance coupled with a blockade to monitor and preclude employment of additional weapons
- Conduct a military offensive to include air attacks and a ground invasion"[67]

Fortunately, President Kennedy understood the ramifications and chose to proceed with caution using an iterative approach that provided maximum flexibility of successive options to provide the means to adapt to the situation as it unfolded. It was this spiral approach, similar to John Boyd's OODA Loop, which

[67] Library Think Quest, Cuban Missile Crisis 14 days in October, http://library.thinkquest.org/11046/days/index.html (accessed May 12 2009).

enabled the U.S. to achieve a better understanding based on matured knowledge it gained while working through the situation. President Kennedy's rational approach, which Allison and Zelikow points out in their book, "Essence of Decision" that "the attempt to explain international events by recounting the aims and calculations of nations or governments is the trademark of the Rational Actor Model."[68] Ultimately, it was President Kennedy's careful, surefootedness and action as a rational actor which allowed rational heads prevail and redeem the day—and quite possibly the world.

CAUSALITY OF ACTION

It is through the iterative approach conceived by Boyd which provided the opportunity to assess and identify actions taken during the Cuban Missile Crisis as "nation A's best choice depends on nation B's choice," since "recognition of this fact highlights the significance of A of communication, signaling, commitment and bargaining aimed at manipulating B's information and choices."[69] Clearly, it is imperative to take an interative approach toward understanding the causality of one's actions since the "explicit statements and actions of nations constitute strategic signals. Adversaries watch and interpret each other's behavior, each aware that his own actions are being interpreted, each acting with a consciousness of the expectations he creates. Thus the paradoxical regression in which I know that he knows that I know, etc." exist.[70]

[68] Allison, Graham and Zelikow, Philp, *Essence of Decision: Explaining the Cuban Missile Crisis*, (Addison-Wesley 1999), 15.
[69] Ibid., 23.
[70] Ibid., 41.

RECOMMENDATION

> *"If he had one hour to save the world he would spend fifty-five minutes defining the problem and only five minutes finding the solution.* [71]"
>
> - Albert Einstein

Ultimately, all things in life, war and politics are only as difficult and complex as we make them. By considering history and correlating it with current conditions based on enlightened understanding, the answer often becomes self evident. It thus is incumbent upon our military leaders to determine the path that will most efficiently and expeditiously fulfill objectives while expending the least resources and incurring minimal risk. Therefore by working smarter, the opportunity to reduce the complexity, the fog and the resulting friction of war, strategic leaders can simplify actions taken through informed decisions.

INTELLECTUAL INVESTMENT

At the strategic level, the investment made to develop future leaders at universities and military academies will indeed represent a short-term cost that will ultimately provide long-term benefits. The need for continuing education to layer learning, inspire intellectual rigor and exercise cognition is absolutely critical. The military has certainly developed such programs through professional military education (PME). Accordingly, the knowledge imparted through the means of education must be based on a strong foundation of theory, process and application. Therefore, this paper has presented an UM that defines how we

[71] Einstein's Secrets to Amazing Problem Solving, http://litemind.com/problem-definition/ (accessed May 11, 2009)

think, establish what to think about and shows how to collectively leverage intellectual capital to overcome current and future challenges.

It is thus the recommendation of the author that all aspects of military education, from the academies to ongoing PME, establish a substantial foundation of reflective thought steeped in a strong FOR that fully matures SA in order to develop and shape the current environment to coincide with U.S. objectives. By reviewing both successes and failures of past actions in relation to current events, threats can be mitigated through a common architecture leveraged upon the cognitive capability of prudent knowledge. Thus the maturation of shared awareness through the collaborative capacity of interlinked synergistic endeavors will reveal the way forward that serves U.S. national interest.

At the operational level, leaders must take an active approach to mentoring their subordinates in order to continually invest in their intellectual capacity. Additionally they must endeavor to nurture their FOR with the benefit of experience to enable them to progress through the cognitive process in order to stimulate their awareness and elevate their understanding. Notably, this collaborative endeavor is mutually beneficial, for the questions received during the efforts to provide mentorship will validate and open perspectives to the art of the possible. Thereby this symbiotic relationship between student and teacher elevates the student from stage 1 (Unconscious Incompetence) through stages 2 (conscious incompetence) to stage 3 (conscious competence) of the cognitive

process. Hence, the means by which teachers can be grounded academically and remain receptive to exploring the art of the possible through the eyes of their students will enable them to realize the benefits of stage 3 (conscious competence) without encountering the obsolescence found in stage 4 (unconscious competence) of the cognitive model. By using this collaborative approach to exploring the application and operationalization of theories, concepts and notions, continual learning ensues along with the means to effectively apply the facts to resolve pressing problems. Ultimately the benefits derived from this symbiotic relationship will allow the benefactor to reap substantial intellectual return on their academic and experiential investment.

COLLABORATION

Through organizing information and correlating it to the objectives at hand, the strategic leader becomes empowered with the means to assimilate essential and relevant information to properly apply it to current situations and resulting circumstances. During the assessment stage, it is therefore essential that a user's definable operational picture (UDOP) be developed to ensure decision makers are not inundated with unrelated information. The results of these endeavors will act as a catalyst to provide commonality of SA to facilitate collaborative actions. A recent RAND study concluded that the lack of a COP creates challenges to the ability to vertically and horizontally depict the

battlefield.[72] Therefore by establishing a COP, SA is elevated through the collaborative endeavors that synchronize actions within a netcentric environment.[73] Joint Publication 1-02 observes that the "common operational picture facilitates collaborative planning and assists all echelons to achieve situational awareness."[74]Therefore it is through this Common Operational Picture (COP) that synergistic endeavors become aligned to produce clarity of focus to enable unity of purpose.

ASSESSMENT

A cost-benefit analyses must be conducted to insure that the most important issues are addressed first and that scarce resources are prioritized and applied precisely to meet the problems that pose the greatest potential threat. Throughout this process, full consideration must also be given to opportune cost and potential benefits associated with action taken and results achieved. Thus the implications of enlightenment builds knowledge which establishes the understanding necessary for transformation essential for success on the field of battle. Therefore by elevating awareness and maximizing the value gained by reviewing our lessons learned through a broad FOR, understanding can be developed and matured to overcome the complexities of the VUCA environment.

[72] Stewart Jr., John F. BG (P), *Operation Desert Storm, The Military Intelligence Story: A View from the G-2, 3d U.S. Army* (Riyadh, Saudi Arabia, April 1991), 28
[73] U.S. Joint Chiefs of Staff, *Joint Publication 6-0, Joint Communications Systems* (Washington, DC: Department Defense, March 20, 2006), IV-3.
[74] U.S. Joint Chiefs of Staff, *Joint Publication 1-02, Department of Defense Dictionary of Military and Associated Terms* (Washington, DC: Department Defense, April 12, 2001).

To ensure that decisions can be made in full awareness of the causality of the associated second and third order of effects, predictive analysis modeling offers the potential to assess options and establish the best course of action. Thus by coordinating, synchronizing, modeling and managing information through technological tools, an organization can efficiently correlate resource allocation in order to empower leaders to effectively fulfill their objectives. Therefore, technological capabilities must be developed that facilitate capturing, correlating, fusing and disseminating current and historical information. Once the means to continually update a shared FOR and validate current SA is achieved, actionable knowledge can be fused to produce the propensity for enlightened understanding which is necessary to shape the environment to the desired endstate.

The need to apply an adaptive approach during the planning process will imbue strategic leaders with the necessary flexibility to develop branch and sequel plans essential to effectively confront a dynamic changing world environment. Adopting the mind-set that prior planning prevents poor performance; the need for accurate, timely and reliable information becomes critical to achieving the level of awareness essential for producing informed plans. Thus those processes set forth within operational planning provides the mechanism necessary to elevate information through the cognitive process, which enables planners to devise approaches that are steeped in strategic forethought.

MANAGING INFORMATION

The continual acquisition of data to generate actionable information is critical to mature the depth and breadth of knowledge. The impact and implications associated with gaining and maintaining information superiority are just becoming evident. Thus, the benefits derived from heightened awareness provide the ability to decrease the uncertainty and reduce the fog and friction surrounding the field of conflict. Hence the cost of being unaware and the benefit of the strategic advantages gained by being aware bring to light the criticality of mitigating threats to enable operational capabilities in order to drive predictive analysis that maximizes tactical capacity. Therefore, ongoing efforts must be made to elevate awareness to ensure that the data previously organized into information is accessible on demand. It is through the asymmetric advantage derived from the knowledge that builds understanding that the U.S. will be able to maintain and leverage their strategic capacity.

To provide the commander with reliable information in a UDOP, information must be instantly accessible. Joint Publication 6 identifies the necessary capabilities within Information Management (IM) to allow the joint community to "dynamically tailor and prioritize their information requirements to support the mission and environment. IM is facilitated by a variety of common information sharing services such as messaging, discovery and delivery of information and collaboration as depicted in the IM figure 7 below.[75] Thus by

[75] U.S. Joint Chiefs of Staff, Joint Publication 6-0, Joint Communications Systems, A-3.

establishing a sound IM construct, the means exist to make available the right information to the right person at the right time and place necessary for effective decisions.

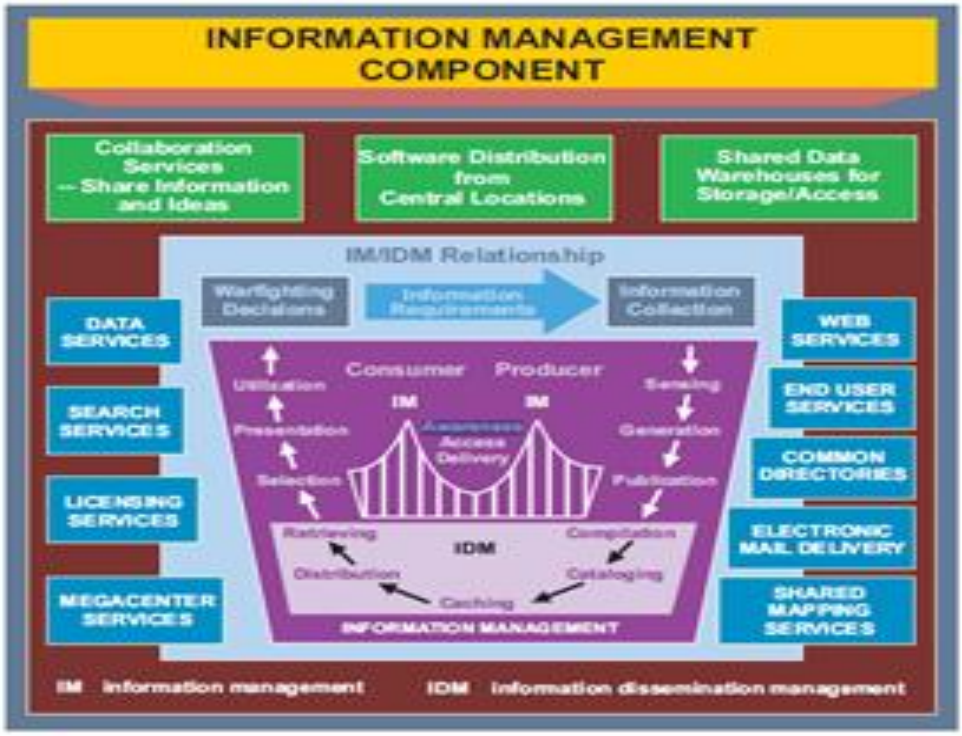

Figure #8: Information Management Component[76]

The complexities and the manner in which information is amassed, organized, fused and disseminated is compounded by the number of agencies involved in this process. Given the breadth and depth of scope, it becomes apparent that there is a definitive need to coordinate, share, correlate and validate the information acquired to preclude redundancy. In view of the legal requirements for information collection, coupled with the historical means and

[76] Ibid.

current focus, each of these agencies plays a justifiable role in information accumulation. Hence, a central organization capable of focusing and guiding the collaborative effort would prove beneficial in developing synergy.

The requirement to oversee, manage, protect and provide accessibility along with the capacity to effectively and efficiently distribute information is absolutely essential. Given the increasing demands and growing reliance upon this information, the establishment of an agency to oversee and mitigate the risk to U.S. information superiority is paramount. As U.S. reliance and dependency on information increases, we must be cognizant of the inherent vulnerability found in cyberspace. In view of increased mission demands, the criticality of expediting these efforts to provide oversight by such an organization in order to protect and insure the viability of the domain of cyberspace is critical. Given the ease of entry of this vast unregulated space and the inherent risk, the need to maintain information superiority has never been greater. Compounded by the potential of consequences associated with losing dominance within this vital domain, the U.S. can ill afford to risk losing the strategic advantage essential to acquiring, managing and fusing information.

Unfortunately, today's fusion centers are under-resourced in equipment and human intellectual capital. This prevents them from accommodating the growing need for information that will paint today's operational picture. Hence the loss of yesterday's information will substantially inhibit our ability to achieve a reliable predictive analysis. Thus a lack of attention and support in today's

centers directly and negatively affects the scope and quality of their efforts which are critical to the maturation of U.S. SA. Ultimately, it is through reliable and accurate awareness coupled with a strong FOR that the potential to capitalize upon lessons learned from historical actions exist.

Joint Publication 3-0 highlights the criticality of providing commanders the "critical support in communications, navigation, intelligence, reconnaissance, surveillance, targeting, ballistic missile warning and environmental sensing that greatly facilitate command. The precision with which these systems operate significantly improves the speed and accuracy of the information that commanders at all levels exchange vertically and laterally, thereby enhancing their awareness of the operational environment."[77] Given that knowledge is power and to actualize it, a nation must first elevate its level of awareness to facilitate enlightened understanding.

The disparity that absorbs the shift of intellectual consciousness will undoubtedly be the source of the shift of power. In the future, our adversaries are likely to utilize the benefits of cyberspace in order to gain a strategic advantage in their efforts to wage information warfare. Given the relative ease of entry and inexpensive means to operate within this domain, U.S. adversaries could easily garner an asymmetric advantage to the detriment of U.S. interest. Thus the loss of information superiority could have devastating consequences to U.S. citizens, servicemen and even our way of life.

[77] U.S. Joint Chiefs of Staff, Joint Publication 3-0, Joint Operations, III-9.

CONCLUSION

History is replete with examples of the consequences of uninformed decisions. The need to make informed decisions and work intelligently has never been more critical than it is today. More than ever before, the opportune cost of doing something wrong or doing nothing at all is far outweighed by a rash and reactionary approach that precludes considering the art of the possible. Therefore the prediction of future consequences lie within the FOR established by yesterdays SA. Today's leaders must be open and receptive to reviewing past actions in order to be able to adapt to and overcome current threats so that they can achieve the objectives that will ensure future U.S. viability.

History enlightens those with relative competence that they do not always understand that they do not understand. Therefore, it is incumbent upon strategic thinkers to evaluate critically the reliability of information and the value of heightened awareness, since this will drive actions that serve to facilitate the fulfillment of long-term objectives. Thus, the UM establishes the framework that enables the achievement of stated objectives while exploring the art of the possible.

When considering available data and taking the time to organize it and fuse it into information, the resulting knowledge will open one's eyes and mind to the realm of possibilities. It is within this realm that the exploration of knowledge as it relates to one's FOR correlates current circumstances to past experiences in order to enable the strategic leader to elevate their cognition through critical

thought. Predicated upon a good FOR, the decision maker can leverage their knowledge, infused with heightened SA, to develop the understanding essential for enlightened decisions critical in today's VUCA environment. Thus by utilizing the UM as outlined below in figure 8, the strategic leader is armed with the means to make informed decisions that support U.S. national interest.

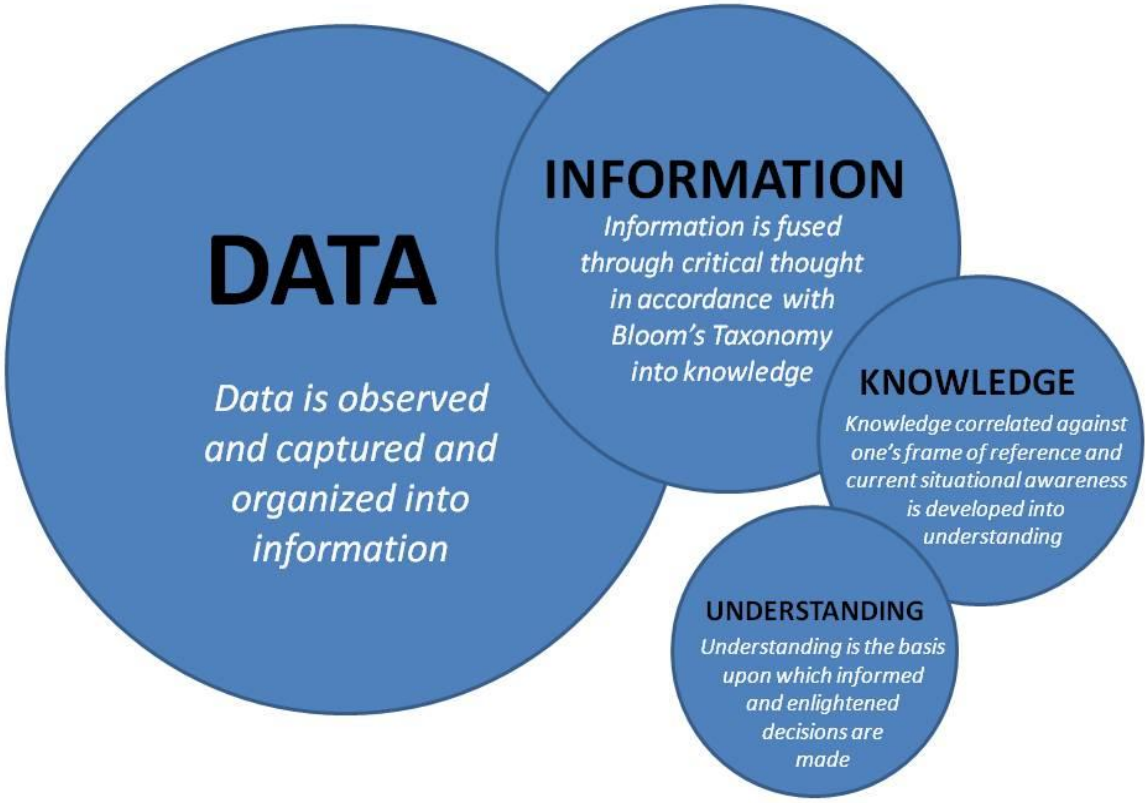

Figure #9 (Author's Representation of an Understanding Model - UM)

1. *Data is observed, captured and organized into information*
2. *Information is fused in accordance with Bloom's Taxonomy through critical thinking into knowledge*
3. *Knowledge correlated against one's FOR and current SA is developed into understanding which is the basis upon which informed and enlightened decisions are made*

The necessity to review the art of war across all lines of operation and apply its myriad of tools—including information—at the operational level of war is critical to success in warfare. Therefore victory at the tactical level is predicated upon sound SA at the strategic and operational levels. Thus strategic planners must remain cognitively aware that the scientific application of the systems of war within a closed system may not adequately recognize the variables presented by an adversary within an open system. Hence, those in level 1, who are blinded by overzealous aspirations and unaware of what they do not know, refuse to appreciate the complexities of this open system. Thereby it is their inability to understand that their view of the environment is myopic and bounded by the confines of a closed system which makes such individuals a liability.

Ultimately, those who have made progress and rely on past actions to achieve future success, find themselves at level 4 (unconscious competence) of cognition and situational awareness. However, they are unaware and thus oblivious to the changing conditions and implications found in the variables in an open and dynamic system. This lack of awareness and unwillingness to understand the implications resulting in the persistent misapplication of yesterday's tools against today's problems also become a liability. Thus those in stages 1 (unconscious incompetence) and 4 (unconscious competence) of the cognitive model have developed an overconfidence or even egotistical close-mindedness. However, those in stages 2 (conscious incompetence) and 3 (conscious competence) of the cognitive model are aware of and understand their limitations, thus making them amenable to utilizing a humble open-minded

approach. It is this perspective which provides them the means to drive toward awareness in an effort to elevate their understanding and learn to overcome the challenges and threats presented in this adaptive and open environment.

As a competency, SA minimizes the resulting chaos by employing knowledge throughout the cognitive process conscious of the implications as prescribed within the complexity theory. Thus, the means to organize past information into a FOR and apply it to current situations ensure the ability to leverage the necessary resources to meet future objectives. Therefore, SA can reveal how best to properly apply scarce resources and leverage the right capability at the right time and place, so that U.S. can successfully meet its prescribed objectives. The application of operational art presents unique opportunities to examine the nature and implications as well as the cause and effect of a problem. It is this consideration which enables the assessment of the second and third order affects related to actions taken compared to results achieved. Thus the effective use of adaptive planning through the operational design process, can establish a strategy that serves to fulfill these U.S. national objectives. Technology serves to integrate the means to facilitate a strategic advantage derived by a netcentric force in order to facilitate awareness at all levels of operation. Hence by leveraging forethought of adaptive planning and the advantage offered by the application technological means to unify and enable a self-synchronized force, the resulting synergy from their collaborative efforts drives an asymmetric strategic advantage.

By utilizing the benefits of SA as a competency, the opportunity exists to overcome the challenges resulting from the complexities of the world environment through enlightened understanding. The causality of one's actions upon those variables presented will reveal the enemy's motivation to act and determine the impacts of their intentions and objectives. Therefore, by striving to continually elevate, refine and appreciate the implications of SA, and the resulting complexities associated with its maturation, the pathway to understanding, as outlined by the UM, becomes clearly apparent. Therefore, SA is the critical competency necessary to mature knowledge into enlightened understanding which enables the alignment of U.S. means in such a way as to leverage all instruments of national power to fulfill those interest which serve U.S. national ends.

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