



# DEDUCTIVE SENSEMAKING PRINCIPLES USING PERSONAL CONSTRUCTS OF THE FIELD COMMANDERS

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# Presentation Outline

1. INTRODUCTION
2. RELATED DEFINITIONS OF SENSEMAKING
3. RELATING WAR PRICIPLES TO THE SENSEMAKING PROCESS
4. TWO PSYCHOLOGICAL THEORIES SUPPORTING SENSEMAKING DEDI+UCTIVE PRINCIPLES
5. A STUDY OF THE SENSEMAKING PRINCIPLES OF THE FIELD COMMANDER
6. SUMMARY & CONCLUSIONS



## INTRODUCTION

It is by the eyes of the mind,  
By reasoning over the whole,  
By a species of inspiration that the general sees,  
Knows and judges  
(Napoleon Bonaparte)

One who employs strategic power (shih)  
Commands men in battle as if he were rolling logs and stone ( Sun-Tzu)

A number of assumptions or suppositions must be made about a variety of things which do not actually appear,  
But which in all probability did take place,  
And therefore cannot possibly be left out of consideration,  
By my experience, I see these things (Carl Von Clausewitz)

Fighting is one thing  
Intelligence is another.  
Each requires different qualities, not often found in the same person  
(John Keegan: Intelligence in War).



## Common ideas about knowledge and deductive principles

**Inductivism:** Science proceeds by performing experiments repeatedly, and accumulating observations.

Then it makes inductive generalizations from the accumulated facts. These are the laws of science. (Francis Bacon)

**Hypothetico-Deductivism:** Science proceeds by devising hypothetical models for how nature might really be organized. Then it deduces the consequences of these models, and compares them with observation.

Deductive and Inductive logic are two examples of several logics we use to “make sense” of the world around us.





## Principles:

A basic truth, law, or assumption  
e.g: Principles of democracy

A rule or standard  
e.g., Military decision making process

A fixed or predetermined policy or model of action  
e.g., Army doctrines



# WHAT IS SENSEMAKING ?

**Sensemaking:** A process, design, or techniques of fusing information in context to derive understanding.

**Making Sense:** The art or science of making meaning and/ or interpreting information in context for decision making.





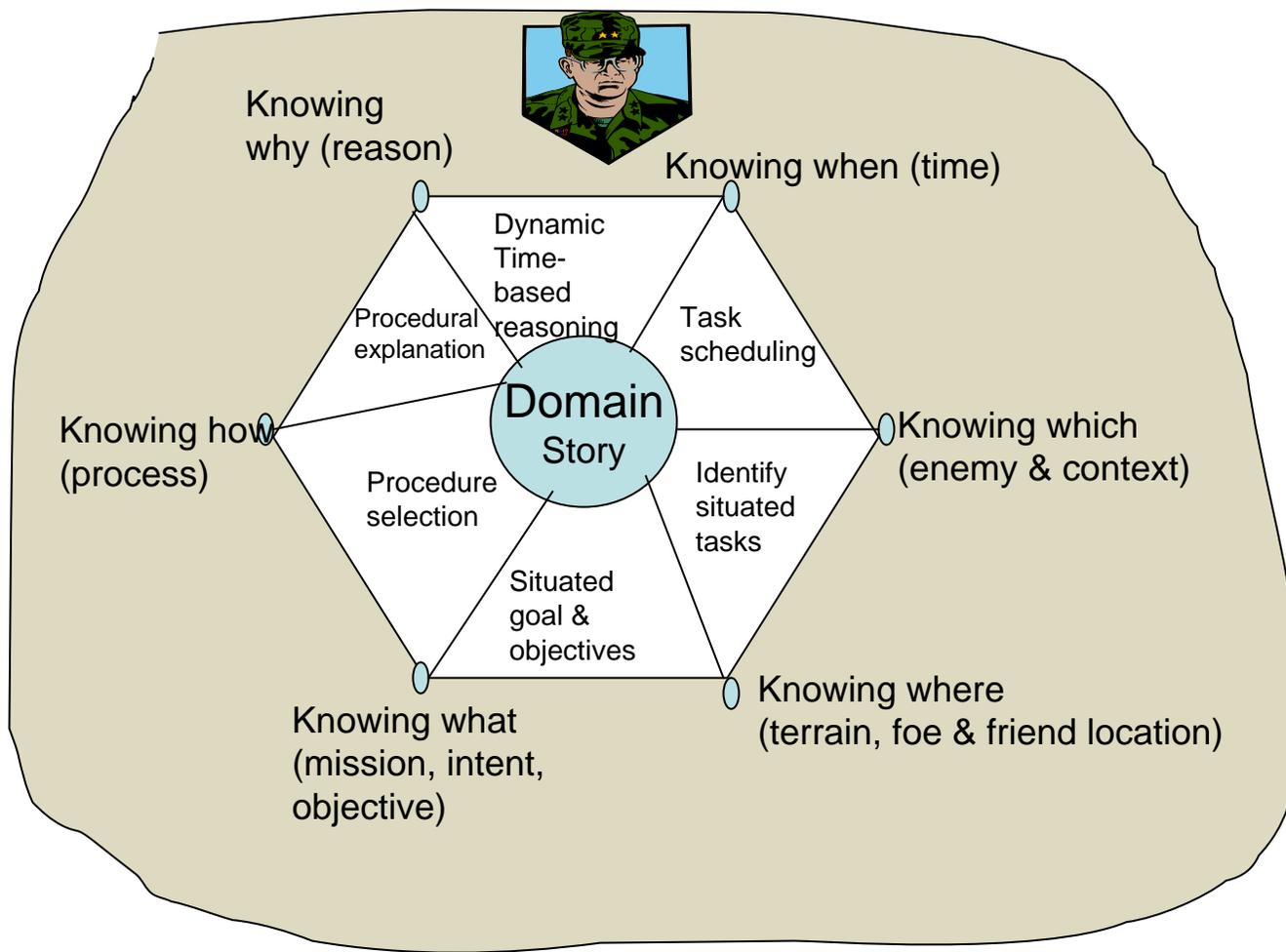
# WHAT IS SENSEMAKING ?

Among the several definitions, two are Selected

HOW MEANING IS CONSTRUCTED AT BOTH THE INDIVIDUAL & THE GROUP LEVELS – (Weick, 1995).

DERIVING MEANING FROM FRAGMENTARY CUES–

(DARPA'S Information Awareness Project



## Our Sensemaking Inquiry System Research Architecture



# THE COMMANDER'S SENSEMAKING KNOWLEDGE COMPONENTS

## Hindsight:

The commander relies in hindsight—elements of experiential knowledge; lessons-learned data; “I have seen this before syndrome”

## Insight:

The commander relies on tacit knowledge—“knowing more than he can tell;” the “aha” experience

## Outsight:

The commander looks for outside information to confirm his beliefs—HUMINT, SIGMINT, etc. “What is happening out there syndrome”

## Foresight:

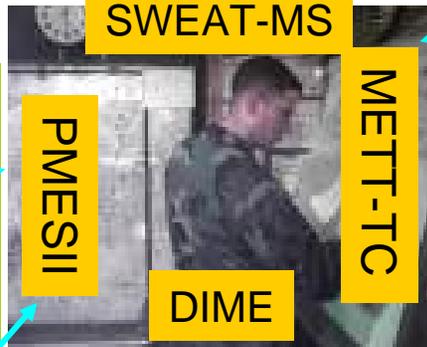
The commander attempts to project his knowledge into the future through envisioning, anticipated (expected goals). A product of mental simulation

## Short-sight:

The commander relies on short-term goals; Lacks discernment or long-range planning perspective.

## Oversight:

The commander overestimates/ Underestimates situation—unintentional omission or mistake.

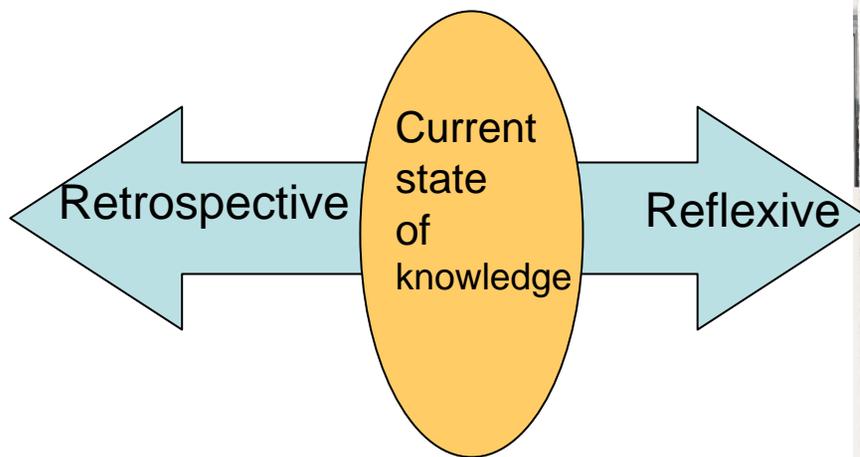


The Adversary

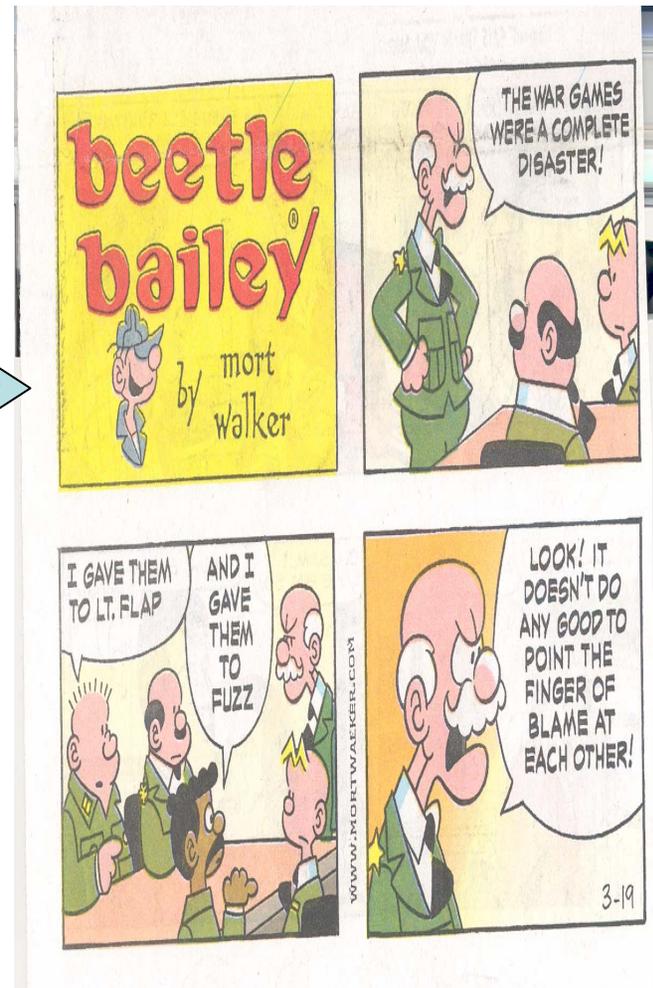


## Relating War Principles to the Sensemaking Process

### 1. Cognitive Level:



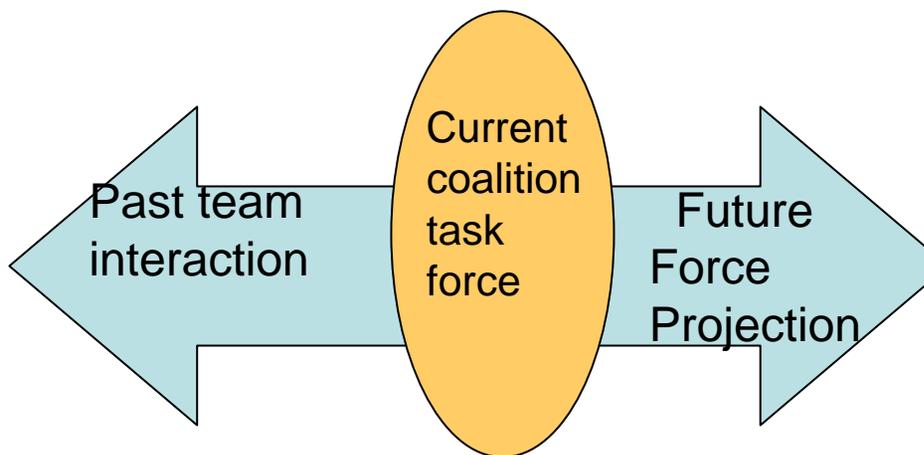
- Use past experience, mental model to establish meanings to situations
- Forms a chain of mental map, link concepts, and gain situation awareness





## Relating War Principles to the Sensemaking Process

### 2. Social Level

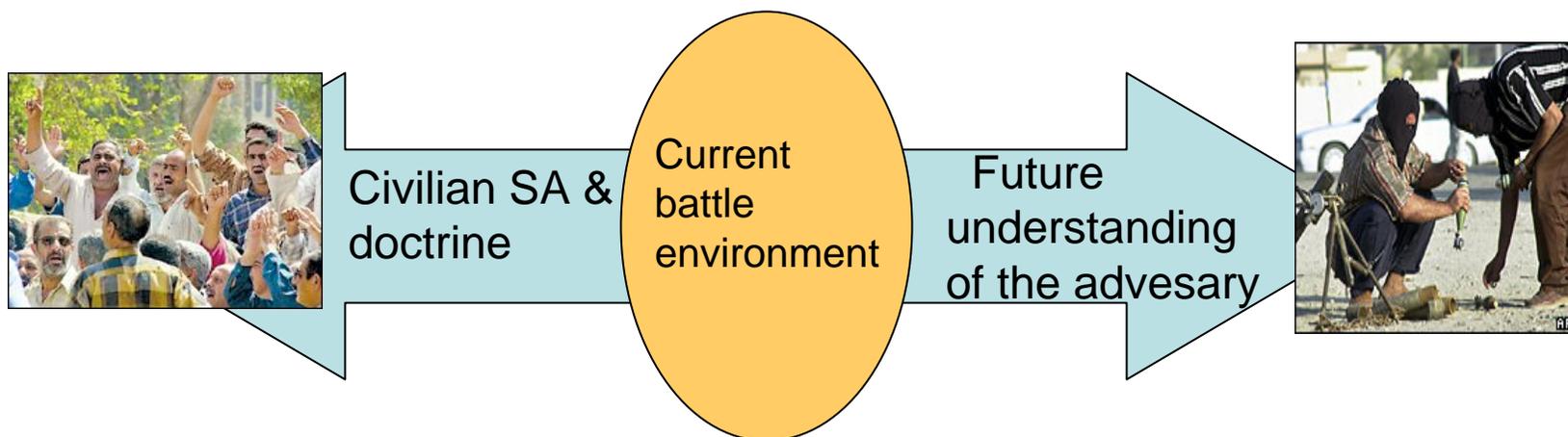


- Information exchange
- Establish a common language
- Negotiate meaning and common understanding
- Organize future events based on roles and common operating picture



## Relating War Principles to the Sensemaking Process

### 3. Ecological Level

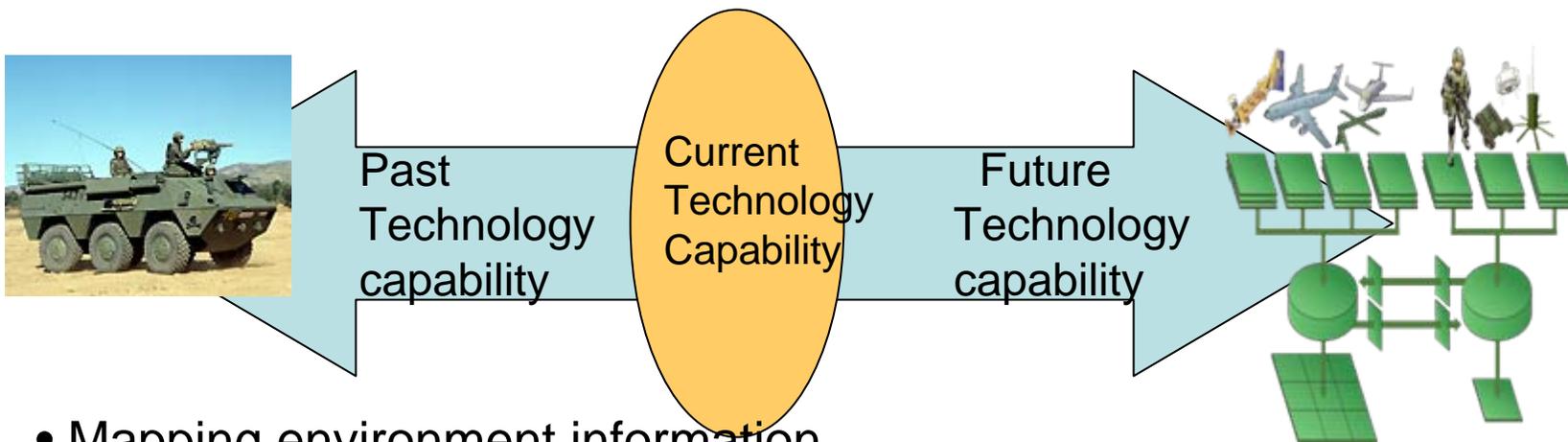


- Mapping environment information to beliefs of the sensemakers
- Revising beliefs to discover new trends and behaviors.
- Adjust beliefs to fit the “requisite variety” of the environment



Relating War Principles to the Sensemaking Process

4. Technology Level



- Mapping environment information to beliefs of the sensemakers
- Revising beliefs to discover new trends and behaviors.
- Adjust beliefs to fit the “requisite variety” of the environment





TWO PSYCHOLOGICAL THEORIES SUPPORTING  
SENSEMAKING DEDUCTIVE PRINCIPLES

Field Theory (Lewin, 1935, 1936)

1. In every experience, we acquire knowledge.
2. The social environment is a dynamic field
  1. A field is the totality of coexisting facts which are conceived of as mutually independent
3. The psychological field consists of a totality of human experience or life space.
4. The geometry of the life space can be constructed using mental map: how one experience influence another—over time and space.



## TWO PSYCHOLOGICAL THEORIES SUPPORTING SENSEMAKING DEDUCTIVE PRINCIPLES

### Field Theory (Lewin, 1935, 1936)

5. A life space is subject to change in states (Hesse, 1970; pp. 181).

e.g., the commander's judgment and decision is time and context dependent.

6. The objects in the life space interact with social space to create or enable new experience

e.g., the new civil affairs doctrine for the military is a result of experience in Iraq war—bringing cultural and civil experience to stability operations

PEMSII (Political, economic, Military, Social, Infrastructure, Military)

DIME (Diplomatic, Infrastructure, Military, & Economic)



TWO PSYCHOLOGICAL THEORIES SUPPORTING  
SENSEMAKING DEDUCTIVE PRINCIPLES

Field Theory (Lewin, 1935, 1936)

7. Every judgment and decision is subject to constraints created by field forces (e.g., magnetic polarities, yin-yan interactions).

e.g., effect-based operations are occasioned by the level of expectations and directions of risk factor.

8. The force field is organized and differentiated.

e.g., battlefield sectorization with different control factors.



## Personal Construct Theory (Kelly, 1955)

1. The experienced commander develops a repertoire of constructs, algorithms, and principles to explain every situations that may arise.
2. Construct is similar to our common use of concepts  
“Man as a scientist” uses concepts to build and refine theories of the situated worlds, and give explanantion based on experience.
3. Personal Construct Theory (PCT) –the world is perceived by a person in terms of whatever meaning that person applies to a situation (through the sensemaking process): variations occur at different levels of information abstraction and levels of tasks





## Personal Construct Theory (Kelly, 1955)

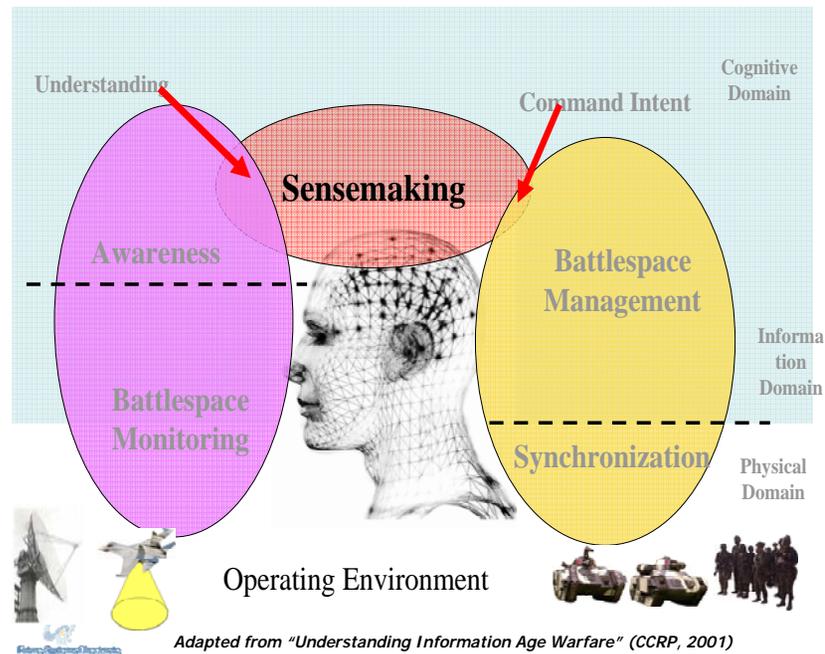
4. PCT is a phenomenological in that an individual's personal identity help us recreate the personal worlds:
  - (a) The individual creates his or her own ways of seeing the world;
  - (b) The individual uses his or experience to cope with evolving circumstances;
  - (c) The individual attempts to use his or experience as a a theory construction for new situations;
  - (d) The individual belief system influences the use of experience in making decisions.





## Personal Construct Theory (Kelly, 1955)

5. A person's construction system is composed of a finite number of dichotomous constructs (pp. 59):  
 Attack/do not attack,  
 Defense/offense, etc.



6. Constructs are used for predictions, to anticipate events, and for Testing theories of what we think we know about new situations



## SENSEMAKING PRINCIPLES OF THE FIELD COMMANDERS

Subjects: 6 military commanders from the rank of major to full colonel. They are (have) participated on an on-going conflicts in Iraq and Afaghistan; and have command experience at brigade level or below.

Sample Scenarios:

Humanitarian Mission for some Kurds located at a predominantly Sunni area. During the mission, the unit came understand some important cultural differences between the Kurds, Sunnis, and Shia. The village has been previously under the UN forces who have since evacuated the area. The commanders were asked to give an assessment of urban civil population, describe the relationships between their background of the war situation, cultural intelligence, and integrate models of terrain, cultural/civil, and cognitive states of the operation.



# SENSEMAKING PRINCIPLES OF THE FIELD COMMANDERS

Data Collections.

Interview using media style

Open-ended questionnaires with write in, self explanation

Using and constructing personal mental maps with  
significant links

## Issues that impact sensemaking:

1. Poor information sharing between TOC (Tactical operation Center) and field commanders.
2. Poor transition between status quo doctrines and the new civil / cultural doctrines.



## SENSEMAKING PRINCIPLES OF THE FIELD COMMANDERS

### Issues that impact sensemaking:

3. Poorly coordinated center of gravity (CoG) to response to unpredicted attacks by insurgents or Sunni-Kurdish “unfriendly” elements.
4. Maintaining control and developing understanding of likely combat situations.
5. Maintaining stability along the humanitarian zone.





# EMERGING SENSEMAKING PRINCIPLES FROM THE FIELD COMMANDERS

Principles attributed to internal factors (Personal construct)	Principles attributed to external factors (field theoretic)	Personal construct and field theory
<p>Principle 1: Commanders organize information by creating their own heuristics to suit the context they are dealing with, including referent to doctrines and rules of operation</p>	<p>Principle 2: Commanders deal with a situation at a time, leading to synchronic concept of operations—dealing with the incumbent adversary one at a time—alternations and continuation of actions over time represents new and evolving event</p>	<p>Principle 3. Commanders combine many cognitive ‘sights’ in dealing with the sensemaking process. Foresight, insight, hindsight, oversight, Table 2 (Ntuen, 2006) illustrates the use of this principle.</p>



## EMERGING SENSEMAKING PRINCIPLES FROM THE FIELD COMMANDERS

Principles attributed to internal factors (Personal construct)	Principles attributed to external factors (field theoretic)	Personal construct and field theory
<p>Principle 4: Commanders are experts. According Ericsson &amp; Lehmann (1966), <i>“Experts don’t just automatically extract patterns and retrieve their response directly from memory. Instead, they select the relevant information and encode it in special representations....that allow planning, evaluation and reasoning about alternative courses of actions.”</i></p>	<p>Principle 5. Commanders think of actions and consequences of the actions with respect to end state. They think of delivering force to achieve the maximum effect. Proportionality is something of neutrality—just enough to neutralize the enemy actions.</p>	<p>Principle 6: The commander’s sensemaking of a specific battle situation is bounded by reflective knowledge of history, situational information, and beliefs that sustain operational actions and their involvement in those actions. <i>The commander adapts the relevant past knowledge to current situations and design new ones in novel situations</i> (Truer, et., 1999).</p>



# EMERGING SENSEMAKING PRINCIPLES FROM THE FIELD COMMANDERS

Principles attributed to internal factors (Personal construct)	Principles attributed to external factors (field theoretic)	Personal construct and field theory
<p>Principle 7: Commanders are intuitive statisticians (Peterson, 1967). They represent a notional understanding of adversary by constructing sensemaking patterns and statistical footprints of events through the use of analogy, concept mappings, and link analysis</p>	<p>Principle 8: The commander's perception of risk consequences to own troops play a vital role in commitment of troops and resources to fight war. Minimum risk means troop safety first</p>	<p>Principle 9: Uncertainty is an inseparable part of battlefield sensemaking and decision making. Commanders tend to see uncertainty in two lenses—one that sees threats and another that sees opportunities. Threats are near-term, while opportunities are long-term tensions. Under uncertain dimensions, judgment and decisions rarely achieve finality.</p>



# EMERGING SENSEMAKING PRINCIPLES FROM THE FIELD COMMANDERS

Principles attributed to internal factors (Personal construct)	Principles attributed to external factors (field theoretic)	Personal construct and field theory
<p>Principle 10: The commander constructs a model of performance based on execution capability of his troops and the relevance of the mission. Such effort includes the ability of battlestaff to interpret the commander's intent, knowledge to understand the mission and decision, concrete and abstract knowledge of how to implement actions with less guidance, and the ability to deploy the available resources optimally while achieving maximum battle effect</p>	<p>Principle 11: Organizational artifacts of various kinds—such as rules, culture, doctrines, and authority structure, and so on—play a central role on how commanders make sense of the battlefield.</p>	<p>Principle 12: Sensemaking, decision-making, and action co-exist during periods of battle—you can not do one without the other—and their cycle of interaction is continuous during the execution of the battle.</p>



# EMERGING SENSEMAKING PRINCIPLES FROM THE FIELD COMMANDERS

Principles attributed to internal factors (Personal construct)	Principles attributed to external factors (field theoretic)	Personal construct and field theory
<p>Principle 19: Commanders use self knowledge to cope with evolving battlefield situations. They often develop situation handling heuristics to deal with ensuing problems</p>	<p>Principle 20: Commanders sensemaking is through the doctrinal filters and regulations</p>	<p>Principle 21: Commanders are ambidextrous leaders. The ambidextrous individuals are multi-taskers with the capability to response to uneventful conditions taking place at various locations of the organization—including external noise</p>



## EMERGING SENSEMAKING PRINCIPLES FROM THE FIELD COMMANDERS

Principles attributed to internal factors (Personal construct)	Principles attributed to external factors (field theoretic)	Personal construct and field theory
Principle 22: The commander is an information processing sensor who consumes and uses multivariate information in the sensemaking process		Principle 23: Commanders often seek a balance between theory (doctrines, standard operating procedures, etc) generated from organizational constructs and the reality of the battlefield; the latter overrides the former during stressful tasks.



# EMERGING SENSEMAKING PRINCIPLES FROM THE FIELD COMMANDERS

Principles attributed to internal factors (Personal construct)	Principles attributed to external factors (field theoretic)	Personal construct and field theory
<p>Principle 24: The commander's interpretation of the battle situation is an ongoing process—dynamically changes at discrete time intervals to cope with the adversary strategies and tactics. <i>At any moment, situation interpretation and meaning assignment evolves around three-tier abstract dimensions of physical, informational, and cognitive levels of processing (FM1 5-0.1 ).The cognitive dominates everything else.</i></p>		<p>Principle 25: The commander updates his/her belief according to the current situation awareness and seeks information to support the belief updating strategy.</p>



# EMERGING SENSEMAKING PRINCIPLES FROM THE FIELD COMMANDERS

## Personal construct and field theory

Principle 26: The commander views the sensemaking process as an ongoing execution monitoring loop. This loop is a culmination of all the components of battlespace visualization elements—Visualize, Decide, Design, Act. During different phases of the battle life cycle, the commander sensemaking is translated into a situation-handling process of monitoring the battle information dynamics, analyzing the information, providing guidance for decisions and actions and recommended corrective adjustments when required



# EMERGING SENSEMAKING PRINCIPLES FROM THE FIELD COMMANDERS

## Personal construct and field theory

Principle 27: Commanders visualize the battlespace as a continuous close-loop of goal-action links anchored primarily on the mission statements.

Principle 28: Commanders develop different situation understanding and situation handling mechanisms relative to the task assigned



# THE COMMANDER'S SIGHT OF THE BATTLE COMMAND AS EXPLAINED BY THE PRINCIPLES

Sighted (cognition)	Knowledge Type	Explanations/ Applications
Foresight	Fore knowledge	Envisioning and predicting mental causal maps for situations and/or events. Applied to planning during contingencies, alleviating constraints/bottlenecks, and perceiving dimensions of system failure at the conceptual stage. Useful in constructing simulation models.
Outsight	Focal knowledge	Thinking outside of the box. Imagining the impossible scenarios, events, and their consequences.





# THE COMMANDER'S SIGHT OF THE BATTLE COMMAND AS EXPLAINED BY THE PRINCIPLES

Sighted (cognition)	Knowledge Type	Explanations/ Applications
Hindsight	Introspective knowledge	Heavily bounded on intuitive-behavioral continuum. The "light bulb" is on by instant discovery.
Oversight	Diagnostic knowledge	There is an overshoot caused by the gap in knowledge between the reality and model-based situation assessment. The interest is to diagnose causes and consequences of error during the sensemaking process.
Outsight	Focal knowledge	Thinking outside of the box. Imagining the impossible scenarios, events, and their consequences.





## SUMMARY / CONCLUSIONS

1. The commander, as an individual, depends on his or her tacit knowledge to cope with battlefield dynamics
2. These dynamics are further influenced by “social forces) and “field forces”.
3. It is surmized that the commander, then, develops some guiding rules or principles based on experience to cope with the dynamics of the battlefield.





## SUMMARY / CONCLUSIONS

4. Lewin field theory and Kelly's personal construct theory provide the basis for understanding the commander's personal view of the battlefield.
5. Understanding the commander's construct is useful to many C2 situations:
  - Design of decision systems that reflect the mental models of the commanders in different situations—a sort of expert system for the decision maker.
  - Understand how the commander make sense of situations (from simple, complex, and wicked)



## SUMMARY / CONCLUSIONS

- Develop training programs for the battlestaff to quickly recognize situations and commander's intent.
- Develop sensemaking tools that can connect to different expert perspectives while allowing for efficient search for common mental models available for a situation.