AN APPROACH TO COLLABORATIVE SENSEMAKING PROCESS

Professor Celestine A. Ntuen, Ph.D
Distinguished University Professor
The Army Center for Human-Centric C2 Decision Making
ntuen@ncat.edu
http://gandalf.ncat.edu/ihms
+1-336-334-7780 (X531): phone
+1-336-334-7729: fax
Presentation Outline

1. INTRODUCTION: Define Sensemaking/Occasions for SM
2. THE INDIVIDUAL SENSEMAKING STRUCTURE
3. COLLABORATIVE SENSEMAKING (CS)
4. PRINCIPLES SUPPORTING CS
5. CS FRAMEWORK
6. CHALLENGES
7. SUMMARY/ CONCLUSIONS/ EXAMPLE CS SYSTEM

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.
Some Sensemaking Definitions


2. A SYSTEM OF ACTIONS, SYMBOLS AND PROCESSES THAT ENABLES AN ORGANIZATION TO TRANSFORM INFORMATION INTO VALUED KNOWLEDGE WHICH IN TURN INCREASES ITS LONG-RUN ADAPTIVE CAPACITY – (Schandt, 1997; pp. 8)
Some Sensemaking Definitions

3. A THEORY AND A PROCESS OF HOW PEOPLE REDUCE UNCERTAINTY OR AMBIGUITY;SOCIALLY NEGOTIATE MEANING DURING DECISION MAKING  
----(Weick, 1985)

Some Sensemaking Definitions

5. COLLECTING “DOTS” and BRIDGING MEANING TO HUGE VOLUME OF DATA---INQ-Tel (Arlington-based company).

6. DERIVING MEANING FROM FRAGMENTARY CUES--(DARPA’S Information Awareness Project).
Why Sensemaking? Situation Understanding

Iraqi Problems
- Insurgency
- Terrorism
- Civil Unrest
- Ethnic Rivalry
- Weapon of Mass Destruction
- Despotic Leadership

Solution Approach
- Political
- Economic
- Military
- Social
- Information
- Infrastructure

Adversary Characteristics
- Dynamic, Uncertain, Chaos, Complex, Novel, Ambiguous, Asymmetric

Spatial dimensions of the Sensemaking Environment: the Cynfin framework (a la Leedom, 2004)

Sensemaking: An End-to-End Approach

Understanding

Awareness

Battlespace Monitoring

Sensemaking

Command Intent

Battlespace Management

Synchronization

Operating Environment

Adapted from “Understanding Information Age Warfare” (CCRP, 2001)
Sensemaking Challenge

To create a systematic, widespread and persistent Cognitive Edge for the warfighter
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 believes—HUMINT, SIGMINT, etc. “What is happening out there syndrome”

Oversight:
The commander overestimates/underestimates situation—unintentional omission or mistake.

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.

The Adversary

METT-TC

SWEAT-MS

DIME

PMESII

INDIVIDUAL SENSEMAKING
STRUCTURE

TACIT KNOWLEDGE
INDIVIDUAL MENTAL MODEL
SELF AWARENESS
PERSONAL EXPERIENCE
CRITICAL THINKING ABILITY
INTUITION / COGNITIVE DEVELOPMENT
TRAINING
LEVEL OF EXPERTISE

INTERACTION WITH OTHERS
LEARNING STYLES
LEADERSHIP STYLES
PERSONALITY STYLES
OTHER TRAITS

KLEIN (1988):
Power of Intuition
Mental Simulation
Metaphor
Story Telling

Theory of Expertise (Chi, Simon; 1981; Adelson, 1984; many others):
Product of experience
Training
Skill, ability, knowledge
Competency, Proficiency

Situated Acts (Suchman, 1987)
Situational factors
Task complexity
Uncertainties
Cognitive codes in the mind

Schema Theories (Hintzeman, 1976)
Cognitive codes in the mind
Storehouse of experience
Daily coping (Functional)
Atypical beliefs (Cognitive)
Meta-cognitive codes (Contextual)

Pirolli & Card Model:
INFORMATION → SCHEMA → INSIGHT
COLLABORATIVE SENSEMAKING
COLLABORATIVE SENSEMAKING

Panic
Confusion
Inconsistency
Lack of Cohesion
Snafus
Lack of Consensus
Break down in sensemaking
ORGANIZATIONAL (DRIVING) FACTORS IN THE SENSEMAKING PROCESS

Levels of Organizational Sensemaking Analysis

- Ecological Level (Environmental Interactions)
- Organizational Level (Collaborative Work Communities)
- Individual Level (Cognitive Core)

Individual & Group Training
Complexity & Interdependence of multiple cultures
Availability of Aiding Tools
Framing Shared Understanding
Team Situation Awareness
Team Mental Model
Shared Purpose
Common Language for communication
Synchronizing Efforts: Time & place

Bleach training in Iraq
Who is there?

Principle 1: Collaboration requires a shared vision and goal

Principle 2: Collaboration takes place in the same information space
   (a) Common operating picture
   (b) Common situation awareness

Principle 3: Collaboration results from shared communication

Principle 4: Time and space is invariant during collaboration

Principle 5: Collaboration involves organizational (group) knowledge process
COLLABORATIVE SENSEMAKING

Principle 1: Collaboration requires a shared vision and goal
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Principle 5: Collaboration involves organizational (group) knowledge process
THE FRAMEWORK

1. Identify contextual information
2. Identify a common process in assigning meanings to context
3. Identify the process for interpreting information
4. Identify process for understanding information
5. Define a common framework for sharing individual tacit knowledge.
Actionable Knowledge
Understanding Analysis
Interpretation Domain
Meaning Analysis
Contextualization/ Situated Information
Tacit dimension
Focal Knowledge
Model-Based
Relevant Paradigms:
Data/Frame Model
Multi-Thread/Multi-Trace Model

Leedom, 2005
Relevant Paradigms:
Knowledge Marketplace Model
Social Network Theory

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Concept is that of a social construction of knowledge. Social construction denotes the structure or the epistemology of team semantic knowledge, and, the process or the ontology of team syntactic knowledge.

Multicultural Collaboration

Barriers

• Lack of training
• Warfighting Mindset
• Lack of technologies to support full spectrum operations
• Culturally-based differences in:
  – Cognitive Processes
  – Organizational Procedures

Challenges

• Little information exchange
• Limited understanding of team member roles and responsibilities
• Poor team coordination
• Little giving or receiving of assistance
• Little motivation to work with others on the team

• Inaccurate team situation awareness
• Increased conflict
• Limited trust
• Low psychological safety
• Lack of commitment to the team
• Little innovation or risk taking
• Poor team performance

The ability to interoperate is necessary but not sufficient to insure effective collaboration.
1. COLLABORATIVE SENSEMAKING IS PERVERSIVE IN EVERYDAY TEAM PROBLEM SOLVING

2. MANY FACTORS AFFECT COLLABORATIVE SENSEMAKING PROCESS:

1. Group Dynamics
2. Dynamic Tasks
3. Availability of Technology
4. Expertise and Experience of the Stakeholders
5. Cultural Mix of the Sensemakers
6. Communication / Language
SUMMARY / CONCLUSIONS

3. REQUIRES MODELLING METHODS THAT CAPTURES THE SENSEMAKING PROCESS AT DIFFERENT LEVELS OF ABSTRACTION
Abstraction Decomposition Ladder (Rasmussen, 1986)
Sample SM System to Support Collaboration
Analytical Model to help in information management
QUESTION?