

Chapter 10-6 – AF2T2EA: AN ILLUSTRATIVE EXAMPLE

SUBJECT

This chapter presents the results of an illustrative example of the AF2T2EA “Kill Chain.”

APPROACH

Using the cognitive pyramid approach as shown in Figure 10-6.1, the Conceptual Model variables were binned into five areas. They were: Environment, Information, Awareness, Understanding, and Action (or decision).

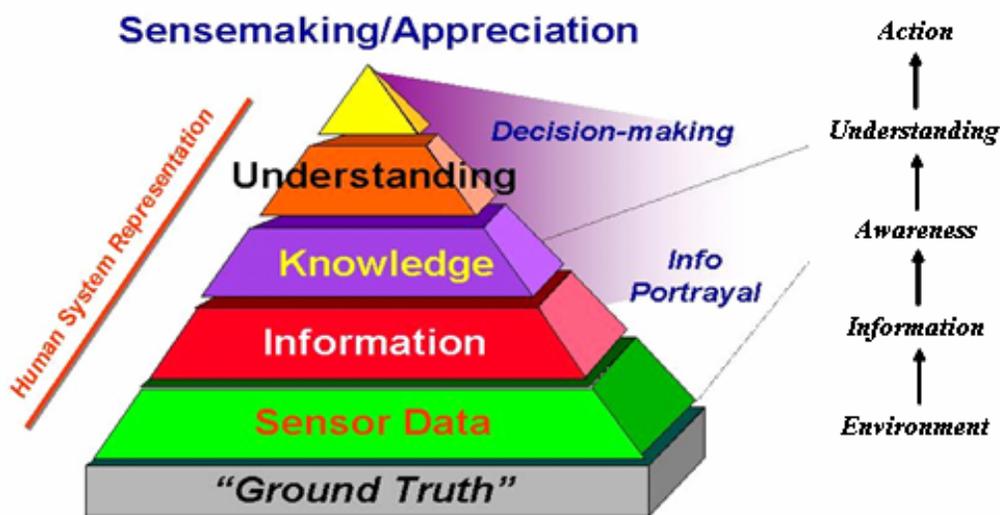


Figure 10-6.1: Cognitive Pyramid.

The execution of today’s Air Force’s “Kill Chain” is a lengthy process that is subdivided into seven “events”, namely: (1) Anticipate, (2) Find, (3) Fix, (4) Track, (5) Target, (6) Engage, and (7) Assess.

The desired attributes to accomplish this process can be summarised as:

- Focussed, persistent C2ISR for all target categories, to achieve desired effects.
- C2 of ISR assets to persistently track target entities to predict the adversary’s courses of action in the battlespace.
- Full-spectrum, networked ISR focussed by anticipation in order to re-detect potential targets.
- C2 of ISR to cross-cue assets to precisely geo-locate targets.
- Networked, multi-sensor inputs to characterise a target’s operational, physical, functional capabilities, and tactical employment patterns.
- Share information across entire operational network (i.e., collaborate).
- C2 of ISR assets to persistently track target entities to lead to other target entities.

AF2T2EA: AN ILLUSTRATIVE EXAMPLE

- Dynamic C2ISR network to enable target engagement at time and place of choosing.
- NRT automated C2 of forces to provide consistent ROE and with human-in-the-loop.
- Automated, machine-to-machine dialogue passing precise decision quality data/information across network to coalition assets.
- NRT and dynamic C2 of ISR assets and collection planning and tasking to execute battle damage assessment of operational effects.
- Deliver information in NRT across network of sensors, decisionmakers, and strikers to shorten AF2T2EA cycle.

An illustrative example to apply the Conceptual Model (May 2005 version) was to take a subset of capabilities for each of the seven areas and then apply the Conceptual Model's variables to each of the sub-events.

The selected capabilities were:

1) Anticipate:

- Ability to model, predict and display possible effects and threats.
- Anticipate adversary's actions in order to streamline and shorten AF2T2EA cycle.
- Ability to model and predict CBRNE and TIM threats and events.
- Predict how (Red, Blue, Gray) actions will cascade into direct/indirect effects in support EBO.
- Require correct, current, consistent and shared information.

2) Find:

- Fully merge and integrate sensor/information to support battlespace SA.
- Accurate/real-time battlespace SA, enabling decisionmakers to correctly react to changes.
- Rapidly and accurately update situational understanding as a result of changes in SA awareness.

3) Fix:

- Accurate and timely positive combat identification of surface, air, and space objects.

4) Track:

- Integration/display and availability of operations information in a common operational picture.
- Improve, automate, and streamline monitoring of friendly surface, air and space force location.

5) Target:

- Improve commander's COA selection and dissemination process.

6) Engage:

- Better optimized use of the battlespace environment.
- Conduct real-time effects-based mission execution.

- Real-time collaboration among all C2 entities.
- Capability to achieve self-synchronization of forces.

7) Assess:

- Real-time Red, Blue Gray force status assessment.
- Rapid assessment and selection of targets to maximize desired effects.
- Ability to accurately assess surface/air/space impacts of physical environmental conditions.
- Improve COA evaluation and requirements process.

This illustrative example was subdivided into two parts:

- Part 1: For each of the events (AF2T2EA), the Conceptual Model’s variables were mapped into environment, information, awareness, understanding, and decision (or action).
- Part 2: The Conceptual Model’s variables were mapped into each of the capabilities listed under the AF2T2EA process. For each of the capabilities listed above, the Conceptual Model variables were evaluated as to having high, medium or low correlation to the stated AF2T2EA capabilities. Table 10-6.1 below provides a summary of the top 5 variables for each of the seven events within the AF2T2EA “Kill Chain” process.

Table 10-6.1: Top Five Variables for Value View of AF2T2EA Process

Event within AF2T2EA “Kill Chain” Process	Conceptual Model Variables
Anticipate	1) Understanding about Environment, Intentions.
	2) Uncertainty.
	3) Information about Forces, Environment, Intentions, Uncertainty.
	4) Awareness about Forces, Environment, Intentions, Mission.
	5) Correctness of Information, Individual Information, Shared Information.
Find	1) Sensor Persistence, Coverage.
	2) Correctness of Information, Individual Information, Shared Information.
	3) Timeliness of Information, Individual Information, Shared Information.
	4) Awareness about Forces, Environment, Intentions, Mission.
	5) Speed of Command, Decisions, Planning, Task.
Fix	1) Correctness of Information, Shared Information.
	2) Precision of Information, Individual Information, Shared Information.
	3) Timeliness of Information, Individual Information, Shared Information.
	4) Accuracy of Individual Awareness, Individual Understanding, Collective Understanding.
	5) Level of Confidence.

AF2T2EA: AN ILLUSTRATIVE EXAMPLE

Event within AF2T2EA “Kill Chain” Process	Conceptual Model Variables
Track	1) Correctness of Individual information, Shared Information, Individual Awareness Collective Awareness, Partial Awareness, Individual Understanding, Partial Understanding, Collective Understanding.
	2) Accuracy of Shared Information, Individual Awareness, Collective Awareness, Partial Awareness, Intersection Awareness, Individual Understanding, Partial Understanding, Collective Understanding, Intersection Understanding.
	3) Understanding about Forces, Environment, Mission, Intentions.
	4) Sensor Persistence, Coverage.
	5) Timeliness of Information, Individual Information, Shared Information, Individual Awareness, Collective Awareness, Individual Understanding, Collective Understanding.
Target	1) Accuracy of Collective Awareness, Intersection Awareness.
	2) Currency of Information, Individual Information, Shared Information.
	3) Effectors: Lethal, Non-lethal.
	4) Situation: Political, Social.
	5) Awareness about Forces, Environment, Intentions, Mission.
Engage	1) Awareness about Capabilities, Forces, Environment, Intentions, Mission.
	2) Speed of: Command, Decision.
	3) Task: Competence, Efficiency, Knowledge, Speed.
	4) Mission Effectiveness.
	5) Effectors: Lethal, Non-lethal.
Assess	1) Understanding about Capabilities, Forces, Environment, Mission, Intentions.
	2) Awareness about Capabilities, Forces, Environment, Intentions, Mission.
	3) Correctness of Information, Individual Information, Shared Information, Individual Awareness, Collective Awareness, Partial Awareness, Intersection Awareness, Individual Understanding, Collective Understanding, Partial Understanding, Intersection Understanding.
	4) Task: Competence, Efficiency, Knowledge, Speed.
	5) Mission Effectiveness.

WHAT WE LEARNED

- There was an excellent mapping of the variables to the seven events of the AF2T2EA “Kill Chain” process. In May 2005, the variable listing comprised 337 variables. An outcome of this mapping was to see if variables were missing. This was not the case.
- The correlation of Conceptual Model variables to each of the seven events of the AF2T2EA “Kill Chain” process was strikingly appropriate and consistent. Table 10-6.1 above summarizes the findings.

REFERENCES

- [1] Material taken from an unpublished HQ USAF briefing dealing with desired capabilities of the F2T2EA “Kill Chain,” author unknown, December 2004.
- [2] Phister, Paul. “AF2T2EA – An Illustrative Example.” Presented at the Peer-to-Peer Workshop. Virginia Beach, VA, USA. 4-6 October 2005.

