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The Four-Element Framework: An Integrated Test and Evaluation Strategy



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14 June 2007*



Our Army . . . Our Soldiers . . . Our Equipment

ARMY TEST AND EVALUATION COMMAND



Agenda



- Background
- Introduction
- Overview
- Element/Interface Development
- Application
- Strengths
- Concept Development & CH-47F Case Study
- Summary



Background

DoD
5000.1

DOD 5000.1 – “The primary objective of Defense acquisition is to acquire quality products that **satisfy user needs with measurable improvements to mission capability...**”

JCIDS

Joint Capabilities Integration and Development System

- War Fighting Capability Gaps
- Material/Non-material Solutions

Materiel System

Performance Attributes
Key Performance Parameters

Capabilities
Development
Document

Capabilities
Production
Document

DoD Architecture Framework Products

OV

Operational View – mission tasks, activities, operational elements and information required to accomplish warfighting mission.

SV

System View – system elements and capabilities necessary to support warfighting functions.

TV

Technical View – set of rules and standards to ensure that a system satisfies a set of operational requirements.

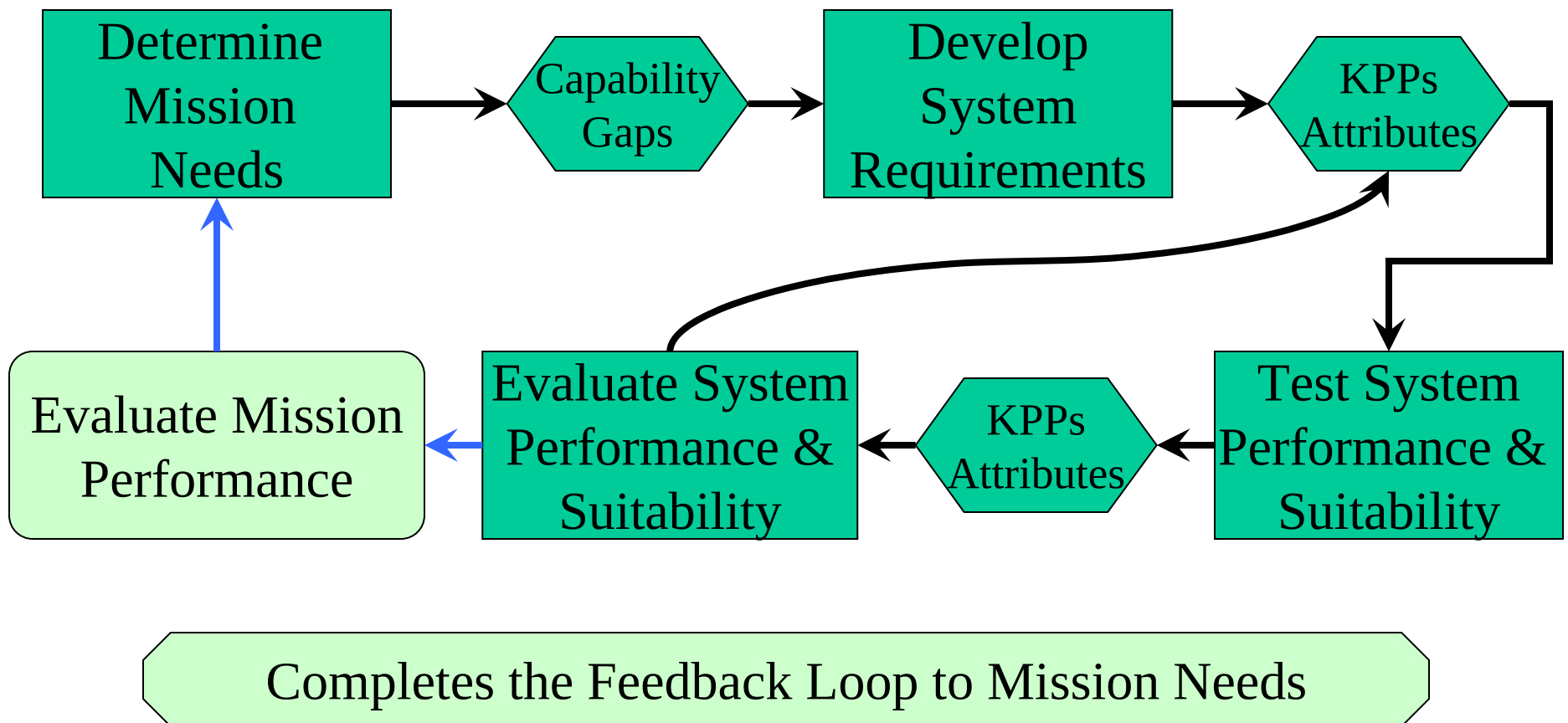
AV

All View – overarching architecture that supports the OV, SV and TV.



Introduction

T&E Process Paradigms:  Traditional;  Proposed





Mission
Perspective

Purpose
(What)

Means
(How)

Overview

The Four Elements



T&E
Perspective

Purpose
(What)

Means
(How)

MISSION ELEMENT

Mission Tasks and Sub-tasks

SYSTEM ELEMENT

System and Sub-system Functions

EVALUATION ELEMENT

Mission Ability and System Capability Measures

TEST ELEMENT

Data Products and Data Sources



Overview

Elements, Interfaces and Traces



Elements

- Mission, System, Evaluation, and Test

Interfaces

- Mission to System
- Mission to Evaluation
- System to Evaluation
- Evaluation to Test

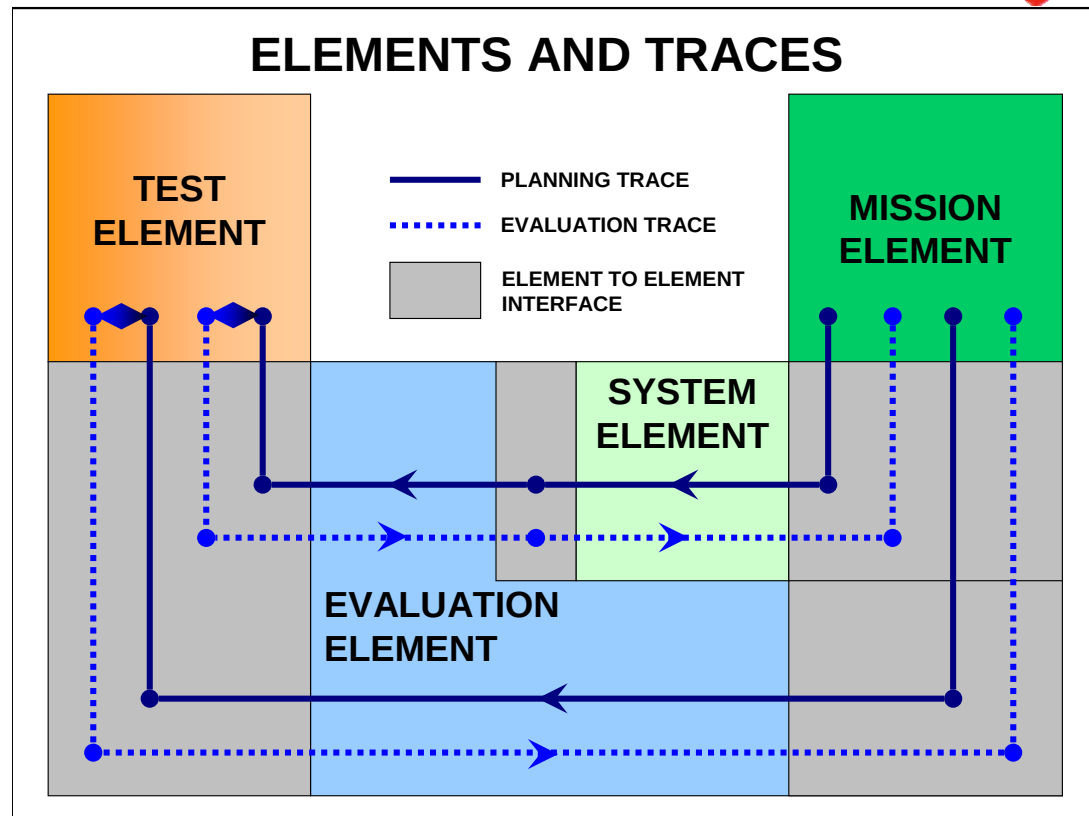
Traces

Planning = Mission to Test

Evaluation = Test to Mission

Two Types:

- Type 1 links Mission, System, Evaluation and Test Elements.
 - ◆ Plans and evaluates mission task ability through system function capability.
- Type 2 links Mission, Evaluation and Test Elements.
 - ◆ Plans and evaluates mission task ability directly.





Element/Interface Development

Mission Element

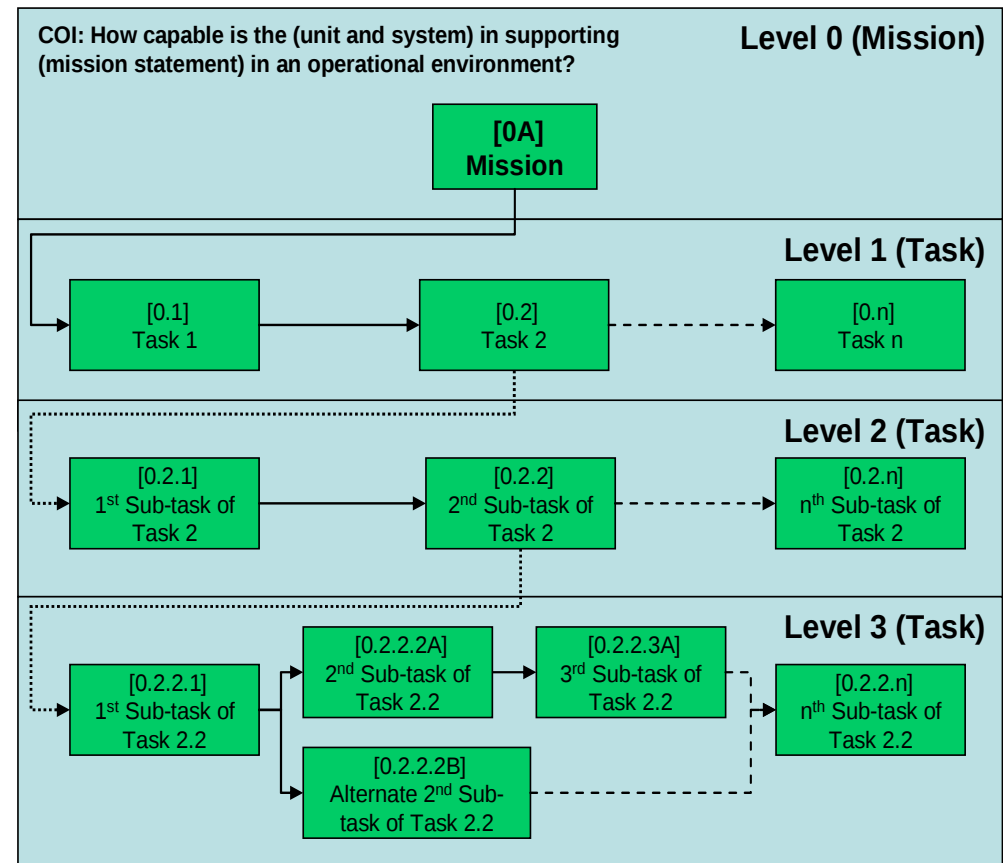


Purpose

- To describe unit mission and tasks.
-- A task is defined as a discrete action that the unit (system and its operators) must perform in order to accomplish its mission.

Components

- Critical Operational Objective: Mission based – “How capable is the (unit and system) in supporting (mission statement) in an operational environment.”
- Task Levels: Orderly breakdown of the mission into tasks and sub-tasks.
- Alternate Mission Tasks: Optional mission tasks used to accomplish part(s) of the mission. Alternate task options define different “mission threads.”





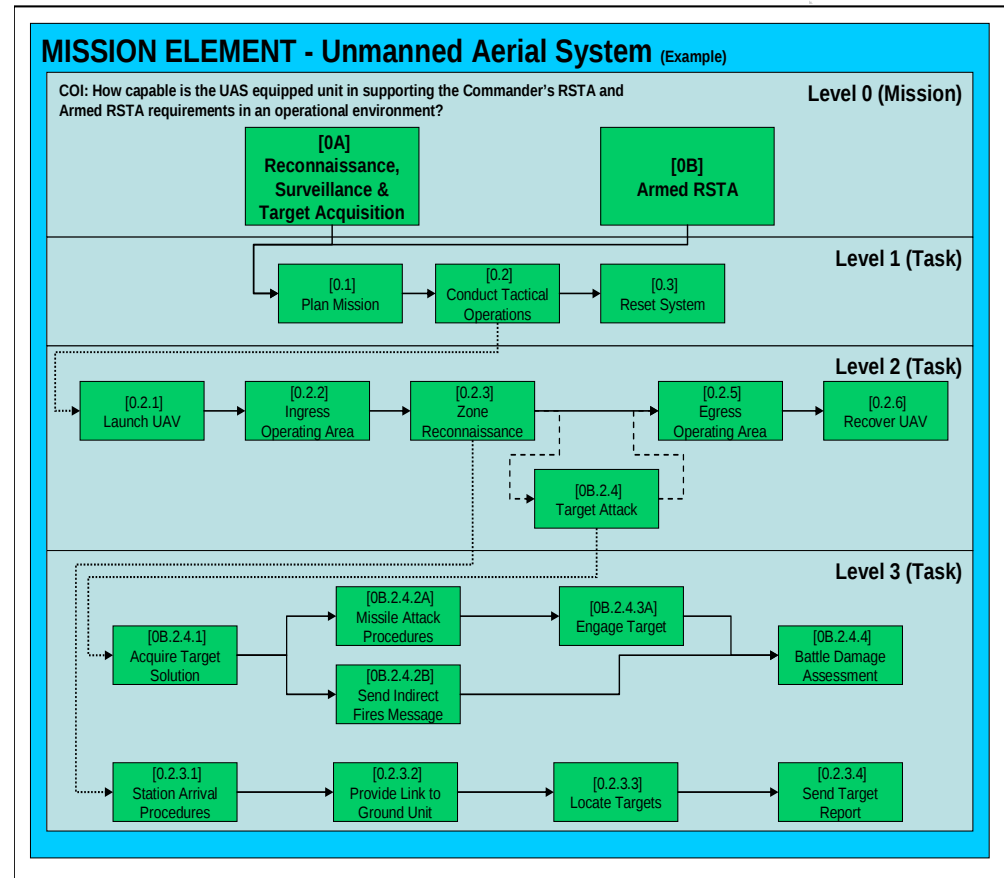
Element/Interface Development

Mission Element – Example



Development Keys

- Temporal Format.
 - ◆ Temporal format provides a block diagram of mission to mission tasks in order of their occurrence.
 - ◆ Supports development of mission threads.
- Lowest Level of Mission Tasks.
 - ◆ Lowest level mission tasks must be measurable.
 - ◆ Evaluated directly or indirectly via evaluation of system function capability.
- Support Documents.
 - ◆ Mission Need Statement, Initial Capabilities Document, Operational and Organizational Plan, Universal Task Lists, Capabilities Development/Production Documents (CDD/CPD).
 - ◆ Integrated architecture products in CDD/CPD uniquely support mission element.
 - OV-1: Who, How, Where, When, Why of the system and its mission.
 - OV-5: Operational activities (mission tasks).
 - OV-6c: Association of capabilities with sequences of operational activities (mission tasks).





Element/Interface Development System Element

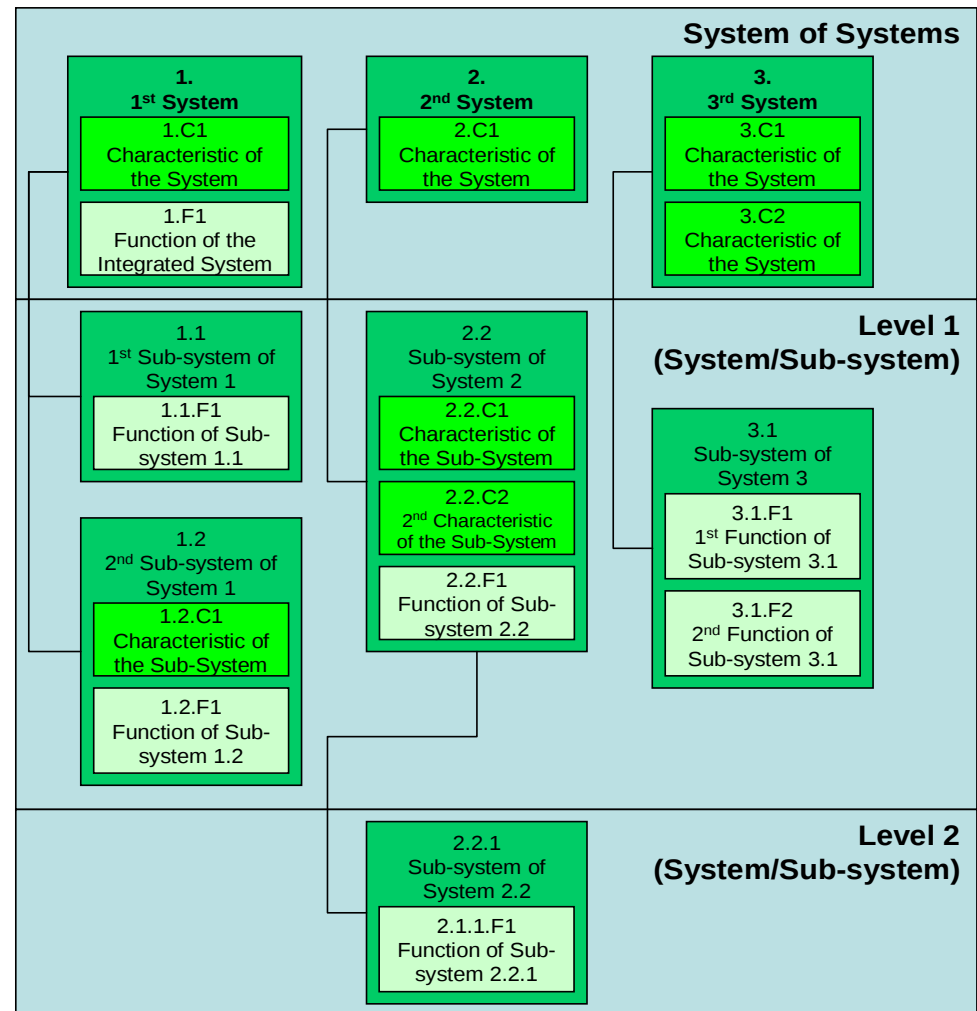


Purpose

- To describe the system and the system functions and characteristics.

Components

- System Items: Makeup of the system and sub-systems.
- System Functions: Description of the function an item must perform in support of the mission.
- System Characteristics: Description of a particular quality of the system that effects whether the item can perform a function.
- System Level: Level of systems, sub-system, and components from the system-of-systems perspective.





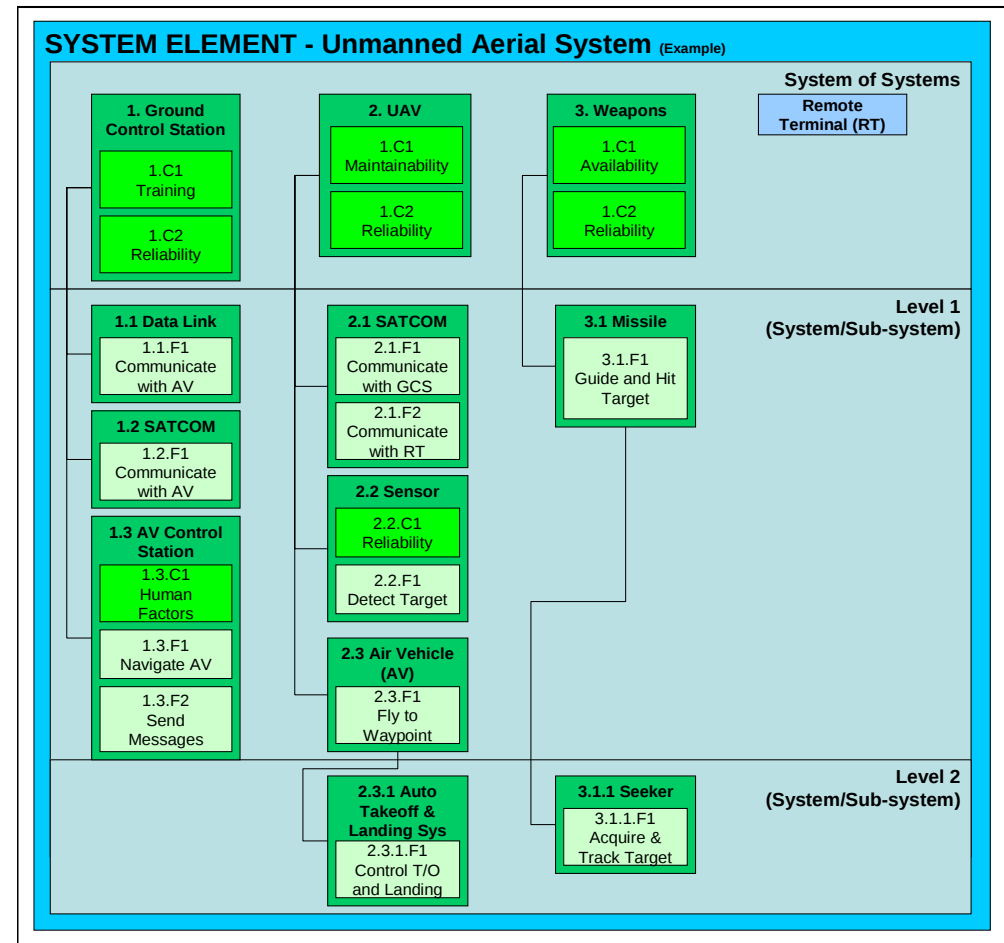
Element/Interface Development

System Element – Example



Development Keys

- Item to Function Link.
 - ◆ Objective is to define the system functions.
 - ◆ System item is the sub-system responsible for providing the function.
- System-of-Systems.
 - ◆ Include systems that are not part of the system being developed and evaluated if they are required to support the mission.
- Lowest Level of System Function.
 - ◆ Should be associated with the accomplishment of a mission task.
 - ◆ Measurable by T&E.
- Risk Areas
 - ◆ Items and functions can be based on a specific area of developmental risk.
- Support Documents.
 - ◆ System Work Breakdown Structure
 - ◆ Integrated architecture products in CDD/CPD uniquely support mission element.
 - SV-1: Systems required to support the mission and the interfaces between them.
 - SV-4: System functions required to support the operational activities (mission tasks).





Element/Interface Development

Mission to System Interface



Purpose

- To describe how the mission tasks relate to the system functions.

Components

- Mission Tasks: Taken from the mission element.
- System Functions and Characteristics: Taken from the system element.
- Input Rule: Description of how the system items relate to the mission task. Uses logical input rules, such as AND and OR to describe links to more than one system or function.
- Conditions: Description of the physical, military, and civil variations that effect performance of a task. For example; weather conditions, countermeasures, urban environment, etc.

	[0.1] Task 1	[0.2.1] 1 st Sub-task of Task 2	[0.2.2.1] 1 st Sub-task of Task 2.2	[0.n] Task n
System 1				
1.C1 Characteristic of System 1	Input Rule (AND/OR)	Input Rule (AND/OR)	Input Rule (AND/OR)	
1.1.F1 Function of Sub- system 1.1	Input Rule (AND/OR)		Input Rule (AND/OR)	
	Conditions		Conditions	
1.2.F1 Function of Sub- system 1.2		Input Rule (AND/OR)		
		Conditions		
System 2				
2.2.C1 Characteristic of Sub- system 2.2		Input Rule (AND/OR)	Input Rule (AND/OR)	
2.2.F1 Function of Sub- system 2.2		Input Rule (AND/OR)		
		Conditions		
2.2.F1 Function of Sub- system 2.2			Input Rule (AND/OR)	
			Conditions	
System 3				
3.C1 Characteristic of System 3				Input Rule (AND/OR)
3.1.F1 1 st Function of Sub- system 3.1				Input Rule (AND/OR)
				Conditions



Element/Interface Development

Mission to System – Example



Development Keys

- Input Rule.
 - ♦ Link every function required to support the mission task.
 - ♦ Link alternate system functions that support the mission task.
 - ♦ Top row for every system defines if the system supports the mission task with a function. (Used later to link system suitability to the task.)
 - ♦ Linkages are important since they will be used to evaluate mission tasks based on the evaluation of system functions/suitability.
- Conditions.
 - ♦ Consider the conditions based on the ability to support the mission task, but...
 - ♦ The specific function may drive the choice of applicable conditions. For example; terrain may effect the communication functions of line-of-sight systems but not effect satellite systems.
- Support Documents.
 - ♦ Initial Capabilities Document and System Threat Assessment Report to determine conditions.
 - ♦ Factors of METT-TC to determine conditions.
 - ♦ Integrated architecture products in CDD/CPD uniquely support mission element.

= SV-5: Maps operational activities (mission tasks) from the OV-5 to the system functions from the SV-4. 13

MISSION TO SYSTEM LINKS - Unmanned Aerial System (Example)									
KEY			MISSION TASK	0.2 Conduct Tactical Operations	0.2.1 Launch UAV	0.2.2 Ingress OA	0.2.5 Egress OA	0.2.6 Recover UAV	0.2.4.3A Engage Target
SYSTEM and SYSTEM FUNCTION			LINKS	CONDITIONS					
1.0 Ground Control Station	1.C1 Training			All Functions	All Functions	All Functions	All Func.	All Func.	All Functions
	1.1 Data Link	1.1.F1 Communicate with AV	OR 1.2.F1 1. Terrain 2. AV Altitude 3. EW Jamming	OR 1.2.F1 AND 2.3.1.F1	OR 1.2.F1 AND 1.3.F1, 2.3.F1	OR 1.2.F1 AND 1.3.F1, 2.3.F1	0.2.2	0.2.1	OR 1.2.F1 AND 3.1.F1
	1.2 SATCOM	1.2.F1 Communicate with AV	OR 1.1.F1 1. EW Jamming	OR 1.1.F1 AND 2.3.1.F1	OR 1.1.F1 AND 1.3.F1, 2.3.F1	OR 1.1.F1 AND 1.3.F1, 2.3.F1	0.2.2	0.2.1	OR 1.1.F1 AND 3.1.F1
	1.3 AV Control Station	1.3.C1 HFE		All Functions	All Functions	All Functions	All Func.	All Func.	All Functions
2.0 UAV	2.C1 Reliability				All Functions	All Functions	All Func.	All Func.	
	2.3 Air Vehicle	2.3.F1 Fly to Waypoint			AND 1.3, (1.1 OR 1.2)	AND 1.3, (1.1 OR 1.2)	0.2.2		
	2.3.1 ATLS	2.3.1.F1 Control Takeoff and Landing			AND (1.1 OR 1.2) 1. Winds 2. Runway Length 3. Density Altitude		0.2.2	0.2.1	
3.0 Weapon	3.1 Missile	3.1.F1 Guide and Hit Target							All Functions AND(1.1OR1.2) 1. Target Type 2. Weather 3. Slant Range



Element/Interface Development Evaluation Element



Purpose

- To describe the evaluation measures and how they relate to mission tasks, system functions, and system suitability.

Components

- Conditions:** Conditions are assigned to tasks that are linked directly to a MOE in the evaluation element.
- Measure of Effectiveness (MOE):** Parameter used to evaluate the system function or mission task.
- Measure of Suitability (MOS):** Parameter used to evaluate the suitability of a system.
- Standard:** Acceptable performance of the system function or mission task in terms of the MOE or MOS.
- System-focused COI:** COI focused on system or sub-system performance. Typically stated, “Does the (system) perform (a specific required capability)?”
- Link to System-focused COI:** Column in the evaluation element that identifies which MOE/Ss are used to evaluate the system-focused COI.
- Measure of Performance (MOP):** Quantitative or qualitative measure of system performance under specified conditions.

COI: Does the (system) perform (system capability)?				[0.1] Task 1	[0.2.1] 1 st Sub-task of Task 2	[0.2.2.1] 1 st Sub-task of Task 2.2
1.C1.S1.P1 MOP for MOS 1.C1.S1	X	Standard for MOS 1.C1.S1	1.C1.S1 MOS for System 1	1.C1 Characteristic of System 1	Input Rule (AND/OR)	Input Rule (AND/OR)
1.1.F1.E1.P1 MOP for MOE 1.1.F1.E1		Standard for MOE 1.1.F1.E1	1.1.F1.E1 1 st MOE for Function 1.1.F1	1.1.F1 Function of Sub- system 1.1	Input Rule (AND/OR)	Input Rule (AND/OR)
1.1.F1.E2.P1 MOP for MOE 1.1.F1.E2		Standard for MOE 1.1.F1.E2	1.1.F1.E2 2 nd MOE for Function 1.1.F1	1.2.F1 Function of Sub- system 1.2	Conditions	Conditions
2.2.C1.S1.P1 MOP for MOS 2.2.C1.S1	X	Standard for MOS 2.2.C1.S1	2.2.C1.S1 MOS for Sub- system 2.2	2.2.C1 Characteristic of Sub-system 2.2	Input Rule (AND/OR)	Input Rule (AND/OR)
2.2.F1.E1.P1 MOP for MOE 2.2.F1.E1		Standard for MOE 2.2.F1.E1	2.2.F1.E1 MOE for Function 2.2.F1	2.2.F1 Function of Sub- system 2.2	Input Rule (AND/OR)	Input Rule (AND/OR)
2.2.F2.E1.P1 1 st MOP for MOE 2.2.F1.E1		Standard for MOE 2.2.F2.E1	2.2.F2.E1 MOE for Function 2.2.F2	2.2.F2 Function of Sub- system 2.2	Conditions	Conditions
0.2.1.E1.P1 MOP for MOE 0.2.1.E1		Standard for MOE 0.2.1.E1	0.2.1.E1 MOE for Task 0.2.1		Conditions	Conditions
0.2.2.1.E1.P1 MOP for MOE 0.2.2.1.E1		Standard for MOE 0.2.2.1.E1	0.2.2.1.E1 MOE for Task 0.2.2.1		Conditions	Conditions



Element/Interface Development Evaluation Element – Example



Development Keys

- Mission and System Elements.
 - ◆ All system functions must have at least one MOE.
 - ◆ Mission tasks linked directly to a MOE usually indicate a need for evaluation during OT&E.
- MOEs, MOSs and MOPs.
 - ◆ System functions and mission tasks may have more than one MOE.
 - ◆ MOEs may have more than one MOP.
 - ◆ Both systems and sub-systems may have one or more MOSs.
 - ◆ “Dry run” evaluation from MOP to mission task to ensure evaluation is sound.
- Standards.

EVALUATION ELEMENT - Unmanned Aerial System (Example)									
COI: Does the missile guide, fly to and impact the target in its intended operating environment?			KEY SYSTEM TASK ITEMS LINKS EVALUATION CONDITIONS CONDITIONS		COI: How capable is the UAS equipped unit in supporting the Commander's RSTA and Armed RSTA requirements in an operational environment?				
Measures of Performance			Standards		MOE/MOS		0.1 Plan Mission		
1.C1.S1.P1 MTBMEF			> 100 hrs (KPP)		1.C1.S1 Mission Rel		0.2 Conduct Tactical Ops		
1.1.F1.E1.P1 % of accurate sent messages.			> 90.0% (KPP)		1.1.F1.E1 Data Accuracy		0.2.1 Launch UAV		
1.1.F1.E2.P1 % of complete messages.			< 5.0%, < 30 seconds (Attribute)		1.1.F1.E2 Drop Out Rate		0.2.2 Ingress OA		
1.1.F1.E2.P3 Time of drop out.							0.2.3 Locate Targets		
1.3.F1.E1.P1 % via direct route.			Military Judgment		1.3.F1.E1 % of Successful Course Changes		0.2.3A Engage Target		
1.3.F1.E1.P2 % via waypoints.									
2.C1.S1.P1 # MTTR			< 4 hrs (KPP)		2.C1.S1 Repairability				
2.2.F1.E1.P1 Stationary Targets			> xx.x % at XX km (KPP)		2.2.F1.E1 % of Targets Detected				
2.3.F1.E1.P1 Difference between estimated and actual time of arrival.			< 10 sec from estimated time of arrival (AA)		2.3.F1.E1 Waypoint Arrival On-Time %				
2.3.1.F1.E1.P1 % of Successful T/O			Must Control YES/NO (AA)		2.3.1.F1.E1 % of Successful T/O				
2.3.1.F1.E2.P1 % of Successful Landings			Must Control YES/NO (AA)		2.3.1.F1.E2 % of Successful Landings				
3.C1.S1.P1 MTBSF			>50 hrs (KPP)		3.C1.S1 In-flight Rel				
3.1.F1.E1.P1 % targets hit.			Performance similar to AGM-xxx		3.1.F1.E1 Probability of Single Shot Hit				
0.1.E1.P1 Time to plan.			Military Judgment		0.1.E1 % of Successful Mission Planning Sessions				
0.1.E1.P2 % successful loads.									
0.2.3.3.E1.P1 % operational targets detected.			> xx.x % at XX km (KPP)		0.2.3.3.E1 % of Targets Detected				

- ◆ Assign a standard to each MOE to assist in resolution of the MOE. Typically four types of standards:
 - Direct Measurement: Compare demonstrated performance to standard. For example; maximum range.
 - Pass/Fail: Demonstration of a particular feature. For example; required number of hard points.
 - Comparison: Compare performance of two systems. For example; “performance equal to or greater than...”
 - Military Judgment: No specific standard. Military utility will be determined after the evaluation.



Element/Interface Development Test Element



Purpose

- To describe the data products, the sources of the data products, and how they relate to the evaluation element's MOPs.

Components

- Link to MOPs: Description of which data products support which MOPs.
- Data Products: Specific data packet obtained through a data source satisfying a MOP data requirement.
- Data Sources: The specific source of a data product.

Operational Test Event #2		Operational Test Event #1			Modeling and Simulation	Developmental Test			Contractor Test		DATA SOURCE
Data Product #1	Data Product #2	Data Product #1	Data Product #2	Data Product #3	Data Product	Data Product #1	Data Product #2	Data Product #3	Data Product #1	Data Product #2	MOPs
											MOP 1.C1.S1.P1
											MOP 1.1.F1.E1.P1
											MOP 1.2.F1.E1.P1
											MOP 2.2.C1.S1.P1
											MOP 2.2.F1.E1.P2
											MOP 0.2.1.E1.P1
											MOP 0.n.E1.P1



Element/Interface Development Test & Evaluation Plan



- Documents the four elements and the interfaces between them.
- Two main body chapters: mission evaluation and data sources.

MISSION EVALUATION CHAPTER

Mission

Description of the overall mission.

- Mission Task

Description of the mission task.

System functions input rule.

Conditions.

- Measure of Effectiveness

Description of the MOE.

Evaluation Design and Procedure.

Standard.

- Measure of Performance

Description of the MOP.

Method of Analysis.

- Data Product (s)

Listing of required data product (s).

- System

- MOS; MOP; Data Product (s).

- System Function

- MOE; MOP; Data Product (s).

DATA SOURCES CHAPTER

Data Sources

Summary description of all data sources.

Summary data product schedule for all data sources.

- Data Source

Purpose and description of the data source.

Scope and schedule of the data source.

- Data Products

Description of the data product.

Listing of the MOPs requiring the data product.



Application Test and Evaluation Elements



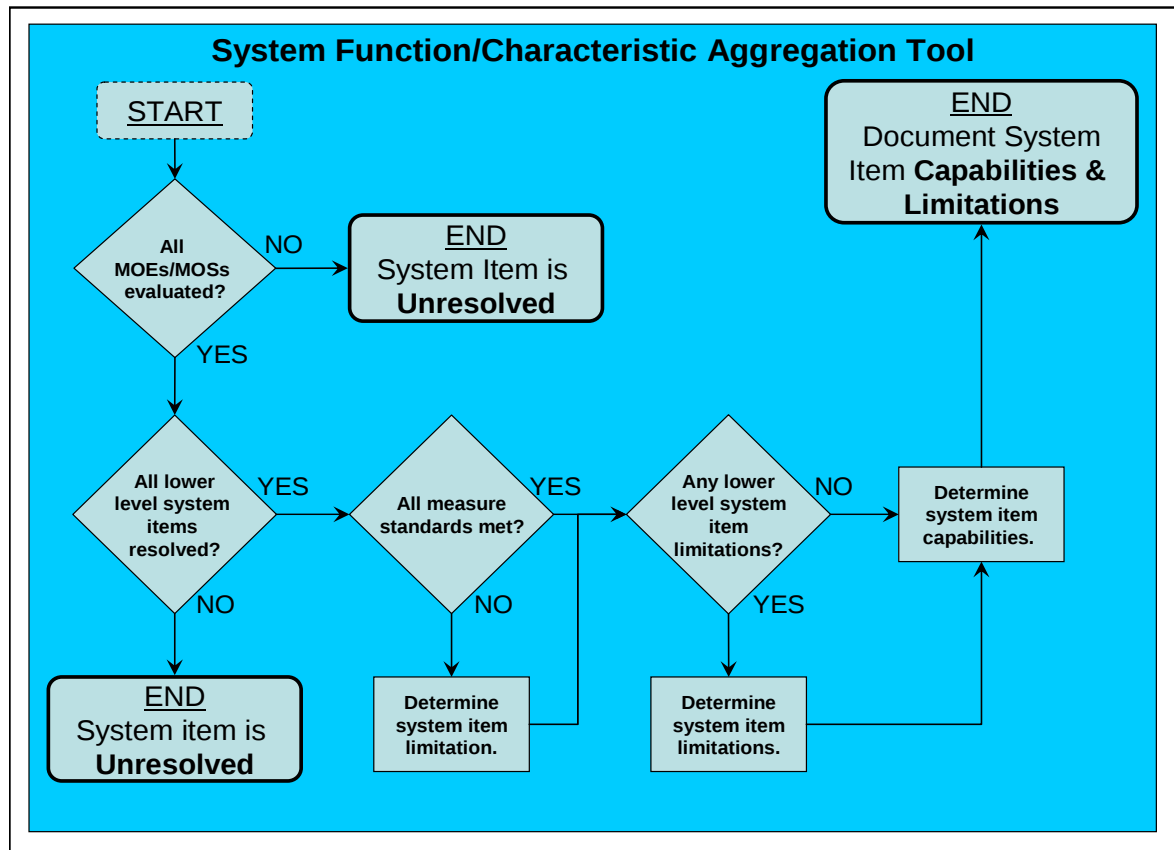
- Test Element:
 - ◆ Data is collected from the data sources.
 - ◆ Data is then authenticated in terms of quantity, quality and applicability.
 - ◆ Authentication body (Data Authentication Group) includes representatives from the test events, other data sources, the evaluator and materiel developer.
- Evaluation Element:
 - ◆ Data is then organized and analyzed.
 - ◆ Each MOE/S is rated as **met** or **not met** based on the standard.
 - ◆ The ratings are used to determine system capabilities and limitations and mission abilities and restrictions.



Application System Element



- System item **capabilities and limitations** are determined at the System Element.
 - Capability: “The (system) has the capability to (function capability with reference to standard).”
 - Limitation: “The (system) is limited to (function capability) which is (shortcoming with reference to the standard).”
- MOE/MOS ratings are applied to the system functions to determine the system capabilities and limitations.
- Capabilities and limitations of lower level system functions are also used to evaluate higher system functions.
- Tool developed to resolve the system functions.

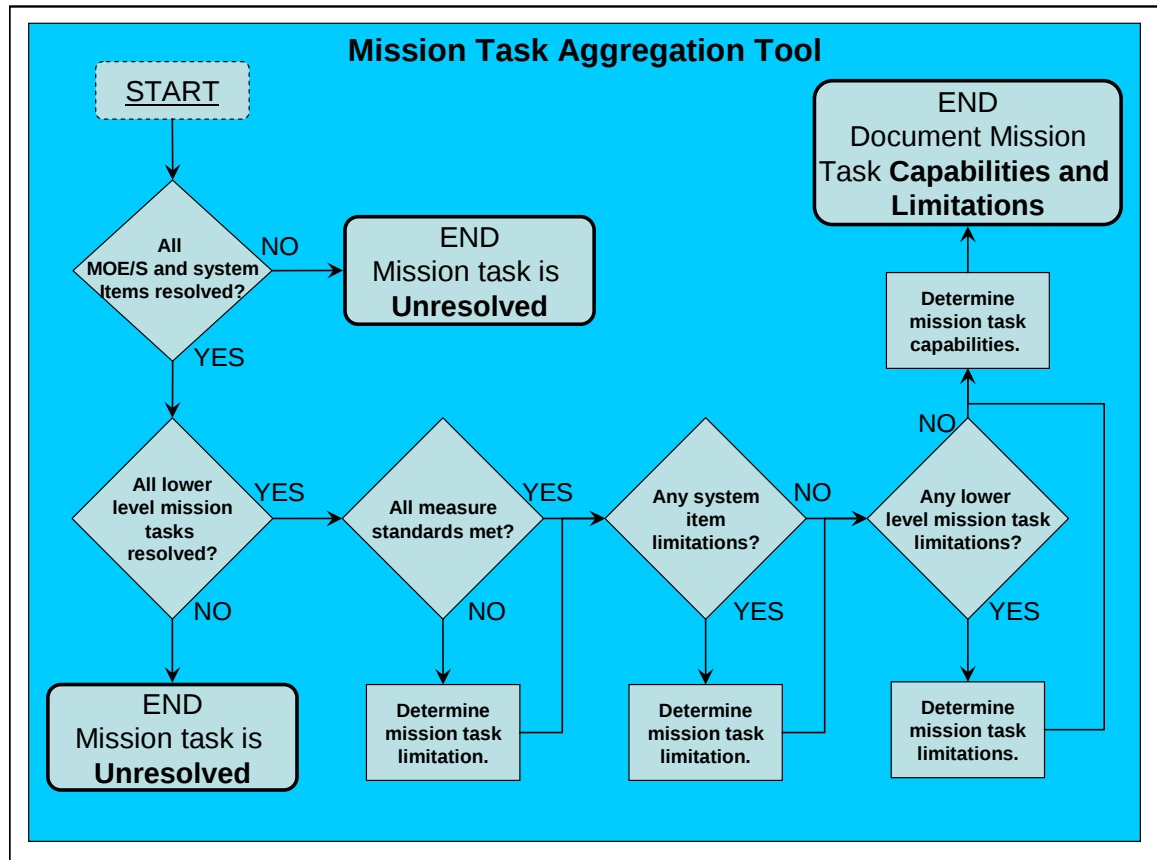




Application Mission Element



- Mission task **capabilities and limitations** are determined at the Mission Element.
 - ◆ Capability: “The (unit) has the capability to (task ability) while (task).”
 - ◆ Limitation: “The (unit) is limited to (task ability) while (task) which is (shortcoming to mission task requirement if available).”
- MOE/MOS ratings are applied to the mission tasks to determine the mission capabilities and limitations.
- System item capabilities and limitations are used to determine mission capabilities and limitations.
- Capabilities and limitations of lower level mission tasks are also used to evaluate higher mission tasks.
- Tool developed to resolve the mission tasks.





Application Evaluation Report



- The evaluation report provides the documented results of the evaluation.
 - ◆ Mission Evaluation Results.
 - Mission performance in terms of mission threads.
 - Overall mission capabilities and limitations.
 - Individual mission task capabilities and limitations.
 - ◆ System Evaluation Results.
 - System performance in terms of attributes and KPPs.
 - System effectiveness and suitability.
 - Overall system capabilities and limitations.

Provides the decision maker with...

a clear picture of the system capabilities and limitations allowing acquisition decisions based on the military utility gained.

Provides the warfighter with...

a clear picture of the unit's capabilities and limitations within the context of the mission.



Strengths



- Provides a mission-based form of evaluation.
 - ◆ Military utility of the system immediately apparent to the user.
 - ◆ System suitability directly linked to mission capability.
- Outlines a fully integrated test and evaluation program.
 - ◆ Promotes synergistic use of data gathered from all sources: contractor test, developmental test, operational test, and modeling and simulation.
 - ◆ Promotes early identification of T&E strategy risks.
- Provides continuous evaluation of the mission throughout all system development phases.
 - ◆ Impact of development risks on the mission visible in early development.
 - ◆ Monitors progress of system development and demonstration within the context of mission capabilities provided.
 - ◆ Incremental development strategies are supported by evaluating each increment's capabilities in the context of the overall mission.



Concept Development



Path Forward

- Joint Cargo Aircraft Case Study: Program Currently in T&E Planning.
 - ◆ GOAL: Produce an executable System Evaluation Plan.
 - ◆ GOAL: Further develop the end-product (completed mission-based evaluation).
- Case Study: TBD Program Currently in T&E Concept Stage.
 - ◆ GOAL: Demonstrate a Fully Integrated T&E Concept from MS B to Full-rate Production Decision.
- Tool Development: Develop tools to support development of elements and interfaces and execution of the T&E.

CH-47F Case Study – Results & Lessons Learned

- All four elements and the interfaces successfully developed in a spreadsheet.
- Verified that the concept can be applied to build a mission-based T&E strategy.
- Some system functions/characteristics may require more than one sub-system to execute.
 - ◆ Define an “integrated system/sub-system” level in system element to support these functions/characteristics.
- Information Exchange Requirements/Net Ready not defined at the system level.
 - ◆ Two options:
 - Define which system or sub-system provides the interoperability capability and link the evaluation requirement to that system’s function or characteristic;
 - or link the evaluation requirement to the function or characteristic of an integrated system.
- Need more applicable standards.
 - ◆ By Observation: No defined standard. Capabilities and limitations reported as observed.
 - ◆ Descriptive: No defined standard. Data taken to support determination of capabilities/limitations.
 - ◆ Defined Standard: Standard given IAW military specification, regulation, etc.



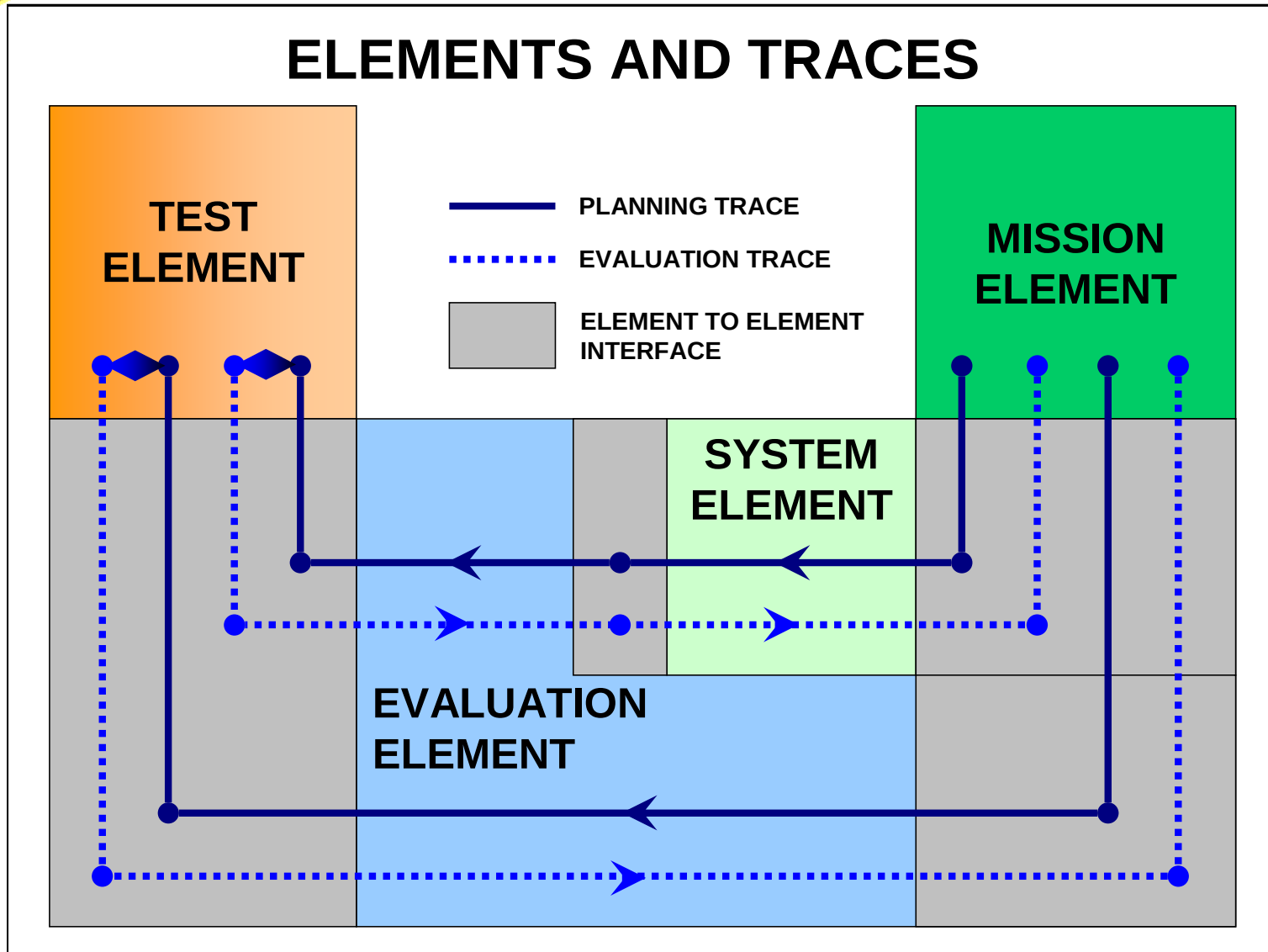
Summary



- Mission-based evaluation process has been developed to support T&E planning and execution. Process is comprised of:
 - ◆ Four elements.
 - Mission Element — Mission Tasks and Sub-tasks.
 - System Element — System Items and Functions.
 - Evaluation Element — Evaluation MOEs and MOPs.
 - Test Element — Data Sources and Products.
 - ◆ Interfaces.
 - Links between each element have been developed to facilitate T&E planning and execution.
- Execution of the T&E effort provides:
 - ◆ the decision maker with a clear picture of the system capabilities and limitations allowing acquisition decisions based on the military utility gained.
 - ◆ the warfighter with a clear picture of the unit's capabilities and limitations within the context of the mission.



Element, Links & Traces





Acronym Chart



AA	Additional Attribute	MOS	Measure of Suitability
AV	All View (slide 4)	OA	Operational Area
AV	Air Vehicle (slides 11, 13, and 15)	OT	Operational Test
CDD	Capabilities Development Document	OT&E	Operational Test and Evaluation
COI	Critical Operational Issue	OV	Operational View
CPD	Capabilities Production Document	RSTA	Reconnaissance, Surveillance & Target Acquisition
DAG	Data Authentication Group	RT	Remote Terminal
DoD	Department of Defense	SATCOM	Satellite Communications
DT	Developmental Test	SV	Systems View
GCS	Ground Control Station	T&E	Test and Evaluation
JCIDS	Joint Capabilities Integration and Development System	T/O	Takeoff
KPP	Key Performance Parameter	TM	Telemetry
MER	Mission Evaluation Report	TV	Technical View
METT-TC	Mission, Enemy, Terrain, Troops, Time and Civil	UAS	Unmanned Aerial System
MOE	Measure of Effectiveness	UAV	Unmanned Aerial Vehicle
MOP	Measure of Performance		



Bibliography

1. Commander Operational Test and Evaluation Force, Policy and Information Notice 05-1A Enclosure 1, 2 February 2006.
2. Dr. Paul H. Deitz, et al., A General Framework and Methodology for Analyzing Weapon System Effectiveness, 27 March 2001.
3. The Defense Acquisition University Press, Test and Evaluation Management Guide 5th E., January 2005.
4. DoD Architecture Framework Working Group, DoD Architecture Framework Version 1.0 Volume I: Definitions and Guideline, 15 August 2003.
5. DoD Architecture Framework Working Group, DoD Architecture Framework Version 1.0 Volume II: Product Definitions, 15 August 2003.
6. DoD Architecture Framework Working Group, DoD Architecture Framework Version 1.0 Deskbook, 15 August 2003.
7. Department of the Army, The Army Universal Task List, Field Manual Number 7-15, 31 August 2003.
8. Department of the Army, Mission Command: Command and Control of Army Forces FM-6-0, October 2002.
9. Department of the Army, Army Regulation 73-1 Test and Evaluation Policy, 7 January 2002.
10. Jack H. Sheehan, et al., The Nexus of Military Missions and Means, June 2004.
11. Jack H. Sheehan, et al., The Military Missions and Means Framework, U.S. Army Materiel Systems Analysis Activity, October 2004.
12. U.S. Army Test and Evaluation Command, ATEC Pamphlet 73-1, 19 April 2004.
13. Memorandum, U.S. Army Test and Evaluation Command, CSTE-TC-PD, 1 March 2005, subject: U.S. Army Test and Evaluation Command Interim Policy Guidance 05-02, Policy and Procedures for Conducting Accelerated Test and Evaluation of Rapid Acquisition Initiatives.
14. U.S. Army Test and Evaluation Command; Research, Development and Acquisition System Evaluation Techniques, TECOM Pamphlet 70-5, 18 September 1980.
15. Office of the Under Secretary of Defense, Acquisition, Technology and Logistics, Department of Defense Directive Number 5000.1, 12 May 2003.
16. Office of the Joint Chiefs of Staff, Chairman of the Joint Chiefs of Staff Instruction 3170.01E, 11 May 2005.