Mission Based T&E Progress

Christopher Wilcox
Deputy/Technical Director
Fires Evaluation Directorate, US AEC
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Purpose and Agenda

• **Purpose:** To review the status of the MBT&E methodology in the following areas:
  - Implementation,
  - Lessons Learned, and
  - Current Development Focus Areas.

• **Agenda**
  - Background (Why and What)
  - Implementation (How)
  - Lessons Learned (Items to Sustain and Improve)
  - Current Development Focus Areas
  - Conclusions
Why? - Acquisition Initiatives
Common Focus on Mission Capability

**DoD**

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

**JCS**

Joint Capabilities Integration and Development System – The primary objective of the JCIDS process is to ensure the capabilities required by the joint warfighter are identified … *in order to successfully execute the missions assigned.*

**DOT&E**

Director, Operational Test and Evaluation – “The evaluation of operational effectiveness is linked to mission accomplishment.”

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**Goal: T&E Focused on Mission Capability**

2. Office of the Joint Chiefs of Staff, Chairman of the Joint Chiefs of Staff Instruction 3170.01G, 1 Mar 09.
Capability\(^1\) – The ability to achieve a desired effect [or result, outcome, or consequence of a task\(^2\)] …

- under specified standards and conditions
- through a combination of means and ways
- to perform a set of tasks.

1. CJCSI 3170.01F, May 2007
2. Taken from JP 1-02, Mar 2007, definition of effect.
What? - MBT&E Framework

MISSION AND SYSTEM

Mission Capabilities
(Higher Commander’s mission and tasks)

- Task ➔ Desired Effect

SoS Task Capabilities
(Mission and tasks of unit employing the system)

- Task ➔ Desired Effect

MISSION PLANNING

ENABLES

SYSTEMS ENGINEERING

ENABLES

Materiel SoS Performance

Attribute ➔ Desired Effect

EVALUATED BY

Measures Of Effectiveness

TESTED BY

Contractor Testing

Developmental Testing

Live Fire Testing

Operational Testing

Models & Simulations

Demonstrated Certifications
### Tasks, Attributes, MOEs & MOPs

<table>
<thead>
<tr>
<th>Task</th>
<th>Operational Measure</th>
<th>Materiel System</th>
<th>Technical Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Close Air Support</td>
<td>% missions enemy is observed</td>
<td>% missions COA is completed</td>
<td>Time to first target observation</td>
</tr>
<tr>
<td>Support in AO</td>
<td>Employ RAS</td>
<td>Engage with RAS</td>
<td></td>
</tr>
<tr>
<td>A/C TDL</td>
<td>Average maximum positive control range</td>
<td>RAS position, speed and attitude info accuracy</td>
<td></td>
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<tr>
<td>RAS Munition</td>
<td>In-flight Reliability</td>
<td>Maximum loiter time</td>
<td></td>
</tr>
<tr>
<td>Seeker</td>
<td>Guidance and Control</td>
<td>G&amp;C S/W</td>
<td>Warhead</td>
</tr>
</tbody>
</table>

### Data Sources

- Tower Tests
- Captive Flight P1
- Motor Static Runs
- Motor Wind Tunnel Runs
- MS B
- Arena Tests
- HWIL (seeker)
- Armor Penetration P2 (seeker)
- DT Flight Tests
- DT Ground Firings
- M&S (Lethality)
- IFS
- LUT/OT-B
- Certifications
- MS C
- Logistics Demonstration
- Full-up System Live Fire
- Analysis
- IOT
- Full-rate Production decision

### Army Proven

**Battle Ready**
How? – Strategy Development

The T&E Strategy…

- Initial strategy development using MBT&E derived template;

- Links the attributes of the system to mission context; and

- Addresses Critical Operational Issues, Key Performance Parameters in the mission context.

Mission context driven from evaluation strategy through DT and OT.
How? - Use of Authoritative Task List

MBT&E Process: 1. Develop mission tasks. 2. Link to ATL

Army Universal Task List

T&E Plan

EFFECTIVENESS

ART 1.4.1: DIRECT LETHAL FIRES
End State: Target is destroyed

- MOE: % Correct Weapon Settings
- MOE: Time to Attack
- MOE: Probability of kill
- MOE: % Targets Engaged
- MOE: % Collateral Damage
The T&E Plan…

• Focuses on Soldier missions and tasks;

• Links the attributes of the system to mission context; and

• Addresses Critical Operational Issues, Key Performance Parameters in the mission context.

Mission and task capabilities are the highest level of the T&E dendritic.
• OTA Evaluation Report

• Conclusions focused on Soldier tasks and how the system supports the mission.

• COIs, Criteria and KPPs addressed, but conclusions are put in the context of the Soldier’s mission and tasks.

**2.1.1.1 ART 1.6.1.1 Conduct Breaching Operations**

- End State: “creation of lanes through or over an obstacle to allow an attacking force to pass.”

- Result: “The SYSTEM supports this task by detecting the threat obstacle, marking the threats (for interrogation) and towing the clearing set to ‘proof’ the lane. The SYSTEM … is a significant improvement over dismounted IED detection, marking and proofing.”

All T&E results are related to the mission.
Items to Sustain - Planning

• MBT&E strategies being developed.
  – Linking all T&E requirements to missions / tasks.
  – Leveling of expectations in T&E IPT.

• Mission context enhancing T&E design.
  – Mission context (desired results, conditions, standards) leads to integrated T&E.
  – Evaluation measure design focused on operational capability.
  – DT designed using operational techniques and procedures.

• SoS description aligned with PM’s Work Breakdown Structure.
  – Facilitates sharing of T&E data during contractor testing.
  – Aligns Warfighter tasks with contractor requirements.
Items to Sustain - Reporting

• Mission Task to System Attribute Linkages.
  – Understanding how system technical performance impacted desired capabilities.
  – “Accumulated” evaluation of effectiveness, suitability and survivability.

• Conclusions more than a restatement of test results.
  – MBT&E Capabilities = task + desired result.
  – Conclusions telling “what the data means” in terms of capabilities.

Answering the “so what” question in the Warfighter’s terms
Items Being Improved - Planning

• Linkages between tasks and system attributes are being developed.
  – Impact: Additional time to develop and coordinate linkages.
  – Mitigation: T&E IPT developing during project execution.
  – Path ahead: Develop linkages as capabilities based analysis is being conducted.

• Reference missions and tasks are being developed.
  – Impact: Additional time to develop, coordinate and “validate” reference missions.
  – Mitigation: Direct coordination with TRADOC School Houses.
Items Being Improved - Reporting

- Mission/task standards (threshold/objective requirements) are being developed.
  - Impact: Qualitative results solely based on military judgment.
  - Mitigation: T&E IPT developing “expected” mission/task performance.
  - Path Ahead: Develop task, conditions and standards in requirements.

- Roll-up of system and operational performance into overall assessment of ESS is being developed.
  - Impact: ESS still based on met/not met technical requirements. Impact of sustainability/survivability on effectiveness not determined.
  - Mitigation: Providing capabilities and limitations as rationale for ESS assessment. Continue to use links to COIs and KPPs in parallel.
Current MBT&E Development Focus

• Developing better understanding of the mission context.
  – How will the Warfighter execute the mission?
  – What is needed to execute the mission?
  – Under what operational conditions are the capabilities needed?

• Incorporating mission analysis into the requirements development process.
  – What are the key Warfighter capabilities (task + desired result) needed for the mission?
  – How do you know that the capabilities are supporting mission accomplishment?
  – How do the attributers, KPPs, and COIs support assessment of capabilities?

• Incorporating relationship between Systems Engineering and war fighter Task.
  – How do the SoS components support the tasks?
  – What level of technical performance is necessary to support task accomplishment?

Collaboration between Combat Developer, Materiel Developer and Independent T&E.
Conclusions

• **Implementation of MBT&E is showing:**
  – Mission and task capabilities are highest level (focus) of T&E strategy = results related to mission.
  – Providing conclusions in Warfighter’s terms.
  – Mission context driven into DT and OT conduct = integrated T&E programs.

• **Items to Sustain:**
  – Use of ATLs, and especially the AUTL, as source of evaluation metrics.
  – SoS description aligned with PM’s Work Breakdown Structure.
  – Use of mission context and SoS description to drive T&E requirements.

• **Items Being Improved:**
  – Linkages between Warfighter tasks and system attributes.
  – Reference missions and tasks and mission/task capabilities standards.
  – Procedures to roll-up system and operational performance into mission accomplishment.
Desired End State

- Synchronized with Combat Developer.
- Synchronized with systems research, development and engineering.

Collaborative environment defined by a common framework.
MBT&E Point of Contact
Christopher Wilcox
US Army Test and Evaluation Command
US Army Evaluation Center
ATTN: TEAE-FI (Mr. Chris Wilcox)
4120 Susquehanna Ave.
Aberdeen Proving Ground, MD 21005

Office: (410) 306-2193
chris.wilcox1@us.army.mil