Test and Evaluation Master Plan (TEMP) Development
• Documents the overall structure & objectives of the entire T&E program: Developmental Test and Evaluation (DT&E), Operational Test and Evaluation (OT&E) and Life Fire Test and Evaluation (LFT&E)

• Provides a framework to develop detailed T&E plans

• Documents T&E schedule & resource requirements

• Considered a “contract” among the PM, OSD and T&E activities

• Note: The PM and Test WIPT should use the DOT&E TEMP Guidebook 3.0 for format and content as guidance in formulating T&E plans.
Importance of the TEMP

• The most important part of TEMP planning is the logical thinking that leads up to what testing is needed.

• When done properly, a TEMP should ensure that:
  – All planned tests are actually required
  – All test data collected are used for something (no waste)
  – Data is collected in the most cost effective method (e.g., M&S vs. open-air test)
  – Enough data is collected so that if there is a failure, causes and fixes can be determined
  – Accurate T&E Funding estimates are input into the POM
Operational Mode Summary/ Mission Profile (OMS/MP)

• Prior to the completion of Materiel Solution Analysis phase, the DoD Component combat developer will prepare an Operational Mode Summary/Mission Profile (OMS/MP) document.
  – OMS/MP will include the operational tasks, events, durations, frequency, operating conditions & environment in which the recommended materiel solution (the system) is to perform each mission and each phase of a mission.
  – OMS/MP will be provided to the Program Manager, and will inform development of the plans for the next phase including: acquisition strategy, test planning, and capability requirements trades.

Paraphrased from DoDI 5000.02, Par. 5d(2)(b)3
TEMP is first due prior to the Milestone A decision (updated at MS B and MS C)
  - TEMP Guidebook lists required information & suggested format
  - TEMP development requires early involvement of testers, evaluators, and others
  - Establishes early consensus among T&E WIPT member organizations

For programs on the OSD AT&L Engagement List for DT&E or DOT&E’s oversight list for either OT&E or LFT&E, TEMP is reviewed by DOT&E and DASD(DT&E)
  - For programs not on the oversight, the CAE, or designated representative (usually the MDA), approves the TEMP
Operational Mode Summary/ Mission Profile (OMS/MP)

• Prior to the completion of Materiel Solution Analysis phase, the DoD Component combat developer will prepare an Operational Mode Summary/Mission Profile (OMS/MP) document.
  – OMS/MP will include the operational tasks, events, durations, frequency, operating conditions & environment in which the recommended materiel solution (the system) is to perform each mission and each phase of a mission.
  – OMS/MP will be provided to the Program Manager, and will inform development of the plans for the next phase including: acquisition strategy, test planning, and capability requirements trades.

Paraphrased from DoDI 5000.02, Par. 5d(2)(b)
Evaluation Methodology and Evaluation Overview

- Starting at MS A, the PM will . . . describe a (developmental) evaluation methodology in the TEMP that will:
  - Provide essential information on programmatic & technical risks
  - Provide information for major programmatic decisions

- Starting at Milestone B, the evaluation methodology will include a (developmental) evaluation framework
  - More information on the Developmental Evaluation Framework (DEF) will be presented in the upcoming “TEMP Inputs” lesson

- Starting at Milestone B, every TEMP will include an (operational) evaluation overview.
  - More information on the Operational Evaluation Framework Matrix (OEFM) will be presented in the upcoming “TEMP Inputs” lesson

Paraphrased from DoDI 5000.02
Major Test Phases & Events

- Starting at Milestone A, the TEMP should document T&E for acquisition phase completion (major test events required for milestone exit and entrance criteria).
  - Each major test phase or event should have test entrance and test completion criteria.
- Each major test phase or event should have a synopsis of the intended analysis.
  - Synopsis should indicate how the required data for test completion will contribute to one or more standard measures of program progress (COIs, KPPs, CTPs, KSAs)
Table of Independent Variables

• Every TEMP will include a table of independent variables (or "conditions," "parameters," "factors," etc.) that may have a significant effect on operational performance.

• Starting at MS B, the updated table of variables will include:
  – anticipated effects on operational performance
  – the range of applicable values (or “levels,” “settings,” etc.)
  – the overall priority of understanding the effects of the variable
  – the intended method of controlling the variable during test (uncontrolled variation, hold constant, or controlled systematic test design)

Paraphrased from DoDI 5000.02, Encl 4, Par. 5
Milestone A TEMP Content

The MS A TEMP will include sufficient information to describe in detail the T&E approach for execution during the TMRR Phase. The TEMP should include, at a minimum, the following information: For additional information, see the TEMP guides (posted on DASD(DT&E) and DOT&E websites).

- Description of the evaluation methodology that provides essential information on programmatic, technical risks, and major programmatic decisions.
- Documentation of the T&E for phase completion, that includes major test events required for milestone exit and entrance criteria.
- Description, within each test phase or event, of the overview of the intended analysis that includes: COIs, KPPs, KSAs, and CTPs.
- Inclusion of a table of independent variables that may have significant effect on operational performance.
- Components rationale for the requirements in the draft CDD.
- Documentation of the strategy and resources for cybersecurity T&E.
Milestone A TEMP Content (cont.)

- For software acquisitions, the lead OTA will conduct an analysis of operational risk to mission accomplishment covering all planned capabilities of features in the system. This analysis will include commercial and non-developmental items. Initial analysis will be documented in the TEMP.
- Identification of the resources required to execute planned T&E activities.
- Documentation of the test Infrastructure, tools, and VV&A strategy.
- Documentation of the T&E program & master schedule for major T&E events.
- Description of the interoperability assessment and resources.
- For MDAPs and MAIS, identification of the Chief Developmental Tester and Lead DT&E Organization.
- Description of the initial understanding of all T&E.
- Identification of the plan for evaluating prototypes, technology, etc.
- Description of the general approach supporting engineering activities, certifications, and system evaluations.
- Discussion of the T&E implications of the CONOPS, including test resource implications.
TEMP must include T&E activities, to demonstrate maturity of the critical technologies

<table>
<thead>
<tr>
<th>TRL</th>
<th>Technology Readiness Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Actual system proven through successful mission operations</td>
</tr>
<tr>
<td>8</td>
<td>Actual system completed and qualified through test and demonstration</td>
</tr>
<tr>
<td>7</td>
<td>System prototype demonstration in an operational environment</td>
</tr>
<tr>
<td>6</td>
<td>System/subsystem model or prototype demonstration in a relevant environment</td>
</tr>
<tr>
<td>5</td>
<td>Component and/or breadboard validation in a relevant environment</td>
</tr>
<tr>
<td>4</td>
<td>Component and/or breadboard validation in a laboratory environment</td>
</tr>
<tr>
<td>3</td>
<td>Analytical and experimental critical function and/or characteristic proof-of-concept</td>
</tr>
<tr>
<td>2</td>
<td>Formulation of technology concept or application</td>
</tr>
<tr>
<td>1</td>
<td>Basic principles observed and reported</td>
</tr>
</tbody>
</table>
Prior to MS-C the TEMP must be updated based on CPD to focus on remaining LFT&E and OT&E
TEMP Format

• Part I – Introduction
• Part II – Test Program Management and Schedule
• Part III – Test and Evaluation Strategy
• Part IV – Resource Summary
1.1 Purpose
1.2 Mission Description
1.3 System Description
   1.3.1 Program Background
   1.3.2 Key Interfaces
   1.3.3 Key Capabilities
   1.3.4 System Threat Assessment
   1.3.5 Systems Engineering (SE) Requirements
   1.3.6 Special Test or Certification Requirements
   1.3.7 Previous Testing
The Evolving Threat

- Threat assessment (TA) docs are typically only valid for a few years
- Threats can evolve rapidly (for example, the changing IED threat)
- TEMP, test scenarios, procedures, etc. may NOT be based on the most recent TA
- As threats change, Follow-On Operational Test and Evaluation (FOT&E) should be considered to assess current mission performance & inform operational users
  - New threat or target resources may be needed (current resources may not be threat representative)
  - System may not be designed against the most recent threats
  - The user probably wants T&E for any significant threats
Threat Equipment & Simulators

• As much as practical, actual threat systems should be used as targets or simulators during testing
  – Where actual threat systems are not available, VV&A threat simulators should be used

• Sources of threat equipment:
  – Automated Joint Threat Systems Handbook
    • Published by the Threat Systems Office (DOT&E) accessible via the SIPRNET
    • An information retrieval database
    • Lists threat simulators, facilities, targets, M&S, ranges, and foreign assets
Threat representations for use in OT (targets, threat simulators, M&S) require validation & accreditation, unless coordinated with DOT&E (DAG para. 9.4.2)

- Threat representations for use in DT generally require validation & accreditation (see Service regs. for guidance)

Validation of the threat representation:

- Establishes & documents a baseline comparison with the associated threat (based on current, DIA-approved threat data)
- Determines the extent of operational & technical performance differences between the two
- Typically conducted by the DoD component responsible for the threat representation
- Results are documented by a validation report
• Accreditation of the threat representation, for use in a specific test:
  – Conducted by the organization in charge of the test (OTA, PM/PEO, etc.)
  – Looks at the validation results to determine differences between the threat & threat representation (if any), and to determine the impact on the test
  – Is the threat representation adequate & suitable for a specific test?

• Note: if representative threat representation cannot be obtained, obtain any necessary waivers and report this as a test limitation
TEMP Part II - Test Program Management and Schedule

2.1 T&E Management
   2.1.1 T&E Organizational Construct

2.2 Common T&E Database Requirements

2.3 Deficiency Reporting

2.4 TEMP Updates

2.5 Integrated Test Program Schedule

Figure 2.1 - Integrated Test Program Schedule
User Involvement in T&E

• **Benefits:**
  – Increased operational realism
  – Greater chance of finding system shortcomings
  – Improved test design & execution
  – Helps ensure user needs are represented in the development of the system
  – Relatively low cost (TDY/travel only, for active duty military)

• **Risks:**
  – Difficult to obtain
  – More/expensive training may be required
  – “Here today...gone tomorrow”

• **Note:** User involvement is desired for DT, but required for OT
Contractor Involvement in T&E

• DT&E – minimal restrictions concerning contractor involvement
  – The program should identify each developmental test phase or major developmental test event in the TEMP, as contractor or government DT&E
  – Contractor involvement within DT&E should be identified in both the program RFP and TEMP

• OT&E – Title 10, U.S.C. places restrictions on the use of contractors in support of IOT&E
  – Contractors may only participate in IOT&E of major defense acquisition programs to the extent they will participate when the system is deployed in combat
  – These limitations don’t apply to DoD support contractors
OTA Interactions With Other Agents

• OTA interactions with the program office and other T&E organizations:
  – T&E WIPT often includes representatives from each organization involved with the test program, including PM & OTA
    • OTA rep handles all items related to OT&E
    • OTA can give input to other organizations via the WIPT
  – DOT&E – TEMP approval, OT results, etc., for programs on the OT or LFT&E Oversight List
    • See DoDI 5000.02, Encl. 5 for more information
  – With other OTAs – MOA on Multi-Service Testing (On Student Disc)
3.1 T&E Strategy
  3.1.1 Decision Support Key

3.2 Developmental Evaluation Approach
  3.2.1 Developmental Evaluation Framework
  3.2.2 Test Methodology
  3.2.3 Modeling and Simulation (M&S)
  3.2.4 Test Limitations and Risks

3.3 Developmental Test Approach
  3.3.1 Mission-Oriented Approach
  3.3.2 Developmental Test Events and Objectives

3.4 Certification for OT&E

3.5 Operational Evaluation Approach
  3.5.1 Operational Test Events and Objectives
  3.5.2 Operational Evaluation Framework
  3.5.3 Modeling and Simulation
  3.5.4 Test Limitations

3.6 Live Fire Evaluation Approach
  3.6.1 Live Fire Test Objectives
  3.6.2 Modeling and Simulation
  3.6.3 Test Limitations

3.7 Other Certifications

3.8 Future Test and Evaluation
Developmental Evaluation Framework Matrix (DEF)

- Starting at MS B, TEMP Part III will include a Developmental Evaluation Framework that:
  - Identifies key data (that contributes to assessing progress on) KPPs, KSAs, CTPs, DT objectives, interoperability and cybersecurity requirements, reliability growth, maintainability attributes, DT objectives, and others (as needed)
  - Shows the correlation/mapping between test events, key resources, and decisions supported
  - The DEF will support a MS B assessment of planning, schedule, and resources; and a MS C assessment of performance, reliability, interoperability, and cybersecurity

Paraphrased from DoDI 5000.02 Encl 4 par 5a(11)
DEF Content & Format

• DEF entries are requirements grouped into 4 critical evaluation areas (Performance, Reliability, Interoperability, Cybersecurity)
  – Each functional evaluation area should list the significant decision points supported (major milestones, and other, program-unique decision points)

• A Developmental Evaluation Framework will include elements (columns, rows or cells) bearing essential information
  – A sample DEF (the Time-Phased NEW Radar Example) is included in this section of the TST 204 student book
  – This sample DEF shows required DEF content (see DAG 9.6.2.1 on the Student CD-ROM, for a detailed list & descriptions of the required content)
  – DEF format should be tailored to the needs of the individual programs (This sample DEF is meant to merely suggest format).
• Starting at Milestone B, every TEMP will include an evaluation overview.

• The overview will show how the major test events and test phases link together to form a systematic, rigorous, and structured approach to evaluating system performance across the applicable values of the independent variables.

• Test resources will be derived from the evaluation overview.

Paraphrased from DoDI 5000.02 Encl 5 par 5e
TEMP Part III will include an Evaluation Overview, with the following info.:

- Test Goals
- Mission-oriented T&E measures
- Test design info. (factors, scientific and statistical methods & measures, etc.)
- Test period (OA, IOT&E, FOT&E, etc.)
- High level resources summary (time, people, places, and things) needed to execute an adequate test
- The Evaluation Overview also aids Integrated Testing by identifying opportunities for using DT data for OT evaluation
• A separate summary of decision points and the information needed to support them should be included in a table, to serve as a quick reference for evaluations in the TEMP.

  – See the “Decision Support Key” example, in this section of the TST 204 Student Book.
What is Live Fire Test and Evaluation (LFT&E)?

- LFT&E evaluates the ability of systems to meet and defeat expected battlefield threats.
  - Assessment of **lethality and/or survivability** of covered systems
  - LFT&E seeks to **affect design** as early in the acquisition cycle as possible
  - LFT&E results are integrated with OT results to evaluate **overall system effectiveness, suitability and survivability.**
Lethality Testing

• Testing of a production representative munition or missile,
  – for which the target is representative of the class of systems that includes the threat
  – and the target and test conditions are sufficiently realistic to demonstrate the lethal effects the weapon is designed to produce.

• Note: Lethality is primarily addressed by LFT&E
Survivability

- Includes the elements of...
  - Susceptibility (assessed in OT&E)
  - Vulnerability (assessed in LFT&E)
  - Recoverability (primarily assessed in LFT&E)
- Is an important contributor to Operational Effectiveness & Suitability
- Survivability assessment should be conducted for all systems under OSD OT&E oversight, that may be exposed to threat weapons
  - Whether the system is designated for LFT&E oversight or not
Survivability
Includes assessments of

**Susceptibility**

“How likely is the system to be hit?”

Function of:
- Speed/altitude
- Agility
- Tactics
- Use of CMs
- Stealth
- Etc...

**Vulnerability**

“Will the system still work if hit?”

Function of:
- Armor plating
- Redundancy
- Damage control procedures
- Etc...

**Recoverability**

Once damaged, what needs to be done to...
- Prevent loss
- Reduce casualties
- Regain mission capable status
OTA Evaluations of Survivability

- Survivability is assessed as part of the OT&E process
  - Test events are conducted, to assess the system’s survivability against typical threats
  - Other methods such as M&S, analysis, & military judgment can be used to augment test data

- Examples of survivability MOPs:
  - Distributional statistics (such as median) of time the launcher spent on the firing point
  - Demonstrated launch angle
  - Missile firing visual signature effects
Waiver from Full-Up, System-Level (FUSL) LFT&E

• A system on the OSD oversight list for LFT&E may not proceed past LRIP, until report on results of FUSL LFT&E is submitted to Congress

• If FUSL LFT&E is “unreasonably expensive & impractical,” a waiver package must be sent to the Congressional defense committees (via service officials, DOT&E, etc.) prior to Milestone B

• Or if the program is initiated at MS B (or MS C), a waiver package must be submitted as soon as practical after MS B (or MS C)

• Note: waiver package includes certification by USD(AT&L) or Component Acquisition Executive; and a DOT&E-approved alternative plan for conducting LFT&E in the absence of FUSL testing

(Paraphrased from 10 USC 2366)
4.1 Introduction

4.2 Test Resource Summary
   4.2.1 Test Articles
   4.2.2 Test Sites
   4.2.3 Test Instrumentation
   4.2.4 Test Support Equipment
   4.2.5 Threat Representation
   4.2.6 Test Targets and Expendables
   4.2.7 Operational Force Test Support
   4.2.8 Models, Simulations and Test-beds
   4.2.9 Joint Operational Test Environment
   4.2.10 Special Requirements

4.3 Federal, State, Local Requirements

4.4 Manpower/Personnel Training

4.5 Test Funding Summary

This information will be covered in the upcoming “Test Resources” lesson.
TEMP Appendices

- Appendix A – Bibliography
- Appendix B – Acronyms
- Appendix C - Points of Contact
- Appendix D - Scientific Test & Analysis Techniques
- Appendix E - Cybersecurity
- Appendix F - Reliability Growth Plan
- Appendix G - Requirements Rationale (required by DoDI 5000.02)
- Additional Appendices as Needed
TEMP Development Summary

• Documents the overall structure & objectives of the entire T&E program: Developmental Test and Evaluation (DT&E), Operational Test and Evaluation (OT&E) and Life Fire Test and Evaluation (LFT&E)
• Provides a framework to develop detailed T&E plans
• Documents T&E schedule & resource requirements
• Considered a “contract” among the PM, OSD and T&E activities
• Format for TEMP is in the DOT&E TEMP Guidebook