Test and Evaluation Planning Guide
For
Combating Terrorism
and Public Safety Systems and Products

Introduction and Purpose

This guide provides the general procedures and formats for developing a Test and Evaluation Master Plan (TEMP). It is derived from the DOD T&E process, and provides a framework to generate detailed test and evaluation plans and documents schedule and resource implications associated with a test and evaluation program. The plan is intended to be tailored to any R&D project and can be made as simple or detailed as necessary depending on the system or technology involved.

There are two types of testing that any system or product must undergo in its development cycle:

1)   Developmental Testing - testing done in a controlled environment to ensure that all system/product components meet technical specifications and criteria. This testing is normally done by the system/product developer. Developmental testing includes the qualification testing of components used in the system.

2)   Operational Testing - testing conducted by representative users in real world, operational scenarios that duplicate actual use of the system or product, including realistic field conditions, and a full range of climatic conditions.

The TEMP identifies both the necessary developmental test and evaluation, and operational test and evaluation activities. It relates program schedule, test management strategy and structure, and required resources to:

(1) Critical operational issues;
(2) Critical technical parameters;
(3) Objectives derived from Operational Requirements;
(4) Evaluation criteria; and
(5) Program Milestone decision points.

The TEMP should be a living document that is updated throughout the development process. It should be updated at program milestone decision points, and on other occasions when the program has changed significantly.

TEMP Format and Content

1.   PART I--SYSTEM INTRODUCTION

a.   Requirement Description. Reference the requirements statement or briefly summarize the need for the technology or product.

b.   System Use Assessment. Define the operational environment in which the system or product is to be used (urban, rural, SOF, EOD, NBC environment etc.)

c.   Measures of Effectiveness and Suitability.   List the performance (operational effectiveness and suitability) capabilities and characteristics identified as defined by the source of the requirement. These operational effectiveness and suitability parameters and constraints should include manpower, personnel, training, software, computer resources, transportation, compatibility, interoperability and integration, etc.

For each listed capability or characteristic, define or provide the minimum acceptable value or requirement from the requirements statement.

d.   System Description. Briefly describe the system/product design, or reference another program document that includes the following items:

(1)   Key features and subsystems, both hardware and software (such as architecture, interfaces, security levels, reserves, etc.), allowing the system to perform its required operational mission.

(2)   System or product interfaces with existing or planned systems/equipment that are required. Address the relative maturity, and integration/modification requirements for system/product implementation. Include interoperability with existing and/or planned systems of other organizations (Military, Federal, State, local - LE, Fire, Rescue, SWAT, EOD, HAZMAT, EMS, etc.)

(3)   Critical system characteristics or unique support concepts resulting in special test and analysis requirements (e.g., legal/liability use considerations, post deployment hardware and software support, resistance to countermeasures; security considerations, etc.).

e.   Critical Technical Parameters

   (1)   List, in a matrix format, the critical technical parameters of the system (including software
               maturity and performance measures) that have been evaluated or will be evaluated during
               the remaining phases of developmental testing. Discuss the relationship between the critical
               technical parameters and the objectives and thresholds of the requirement.
   (2)   Next to each technical parameter, list the accompanying objectives and thresholds.
   (3)   Highlight critical technical parameters that must be demonstrated before entering the next
               program phase and ensure that the actual values that have been demonstrated to date are
               included in the last column
   (4)   Compatibility, interoperability, and integration (CII) issues critical to the operational
               effectiveness of suitability of the system/product should be addressed by obtaining
               information from the user community. Obtain and define all critical measures of effectiveness
               and performance that the evaluation will be based on.

2.   PART II--INTEGRATED TEST PROGRAM SUMMARY

 a.   Integrated Test Program Schedule

(1)   Display on a chart the integrated time sequencing of the critical test and evaluation phases and events, related activities, and planned cumulative funding expenditures.

(2)   Include event dates such as milestone decision points; operational assessments, test article availability; software version releases; appropriate phases of developmental test and evaluation; and operational test and evaluation; initial production deliveries, etc.

b.   Management

(1)   Discuss the test and evaluation responsibility of all participating organizations (developers, testers, evaluators, users).

(2)   Provide the date when the decision to proceed with initial production is planned, in order to evaluate the test planning and schedule in support of this decision point.

3. PART III--DEVELOPMENTAL TEST AND EVALUATION OUTLINE

a.   Developmental Test and Evaluation Overview. Explain how developmental test and evaluation will: verify the status of engineering and manufacturing development progress; verify that design risks

have been minimized; and substantiate achievement of contract technical performance requirements; and be used to certify readiness for operational testing. Specifically, identify:

(1)   Any technology/subsystem that has not demonstrated its ability to contribute to system performance and ultimately fulfill mission requirements.

(2)   The degree to which system hardware and software design has stabilized so as to reduce manufacturing and production decision uncertainties.

(3)   The qualification test requirements for any vendor-supplied components.

b.   Future Developmental Test and Evaluation. Discuss all remaining developmental test and evaluation that is planned, beginning with the date of the current TEMP revision and extending through completion of production. Place emphasis on the next phase of testing. For each phase, include:

(1)   Configuration Description. Summarize the functional capabilities of the system's developmental configuration and how it will differ from the production model.

(2)   Developmental Test and Evaluation Objectives. State the test objectives for this phase in terms of the critical technical parameters to be confirmed. Identify any specific technical parameters that may be "showstoppers".

(3)   Developmental Test and Evaluation Events, Scope of Testing, and Basic Scenarios. Summarize the test events, test scenarios and the test design concept. Quantify the testing (e.g., number of test hours and test events). List the specific component or subsystem testing, and testbeds the use of which are critical to determine whether developmental test objectives are achieved. As appropriate, particularly if an organization separate from the designated test organization will be doing a significant part of the evaluation, describe the methods of evaluation. Describe how performance in natural environmental conditions representative of the intended area of operations (e.g., temperature, pressure, humidity, immersion, fog, precipitation, clouds, blowing dust and sand, icing, wind conditions, steep terrain, wet soil conditions, high sea state, storm surge and tides, etc.) and interoperability and compatibility with other systems, as applicable, to include unplanned stimuli, should be tested.

(4)   Limitations. Discuss the test limitations that may significantly affect the evaluator's ability to draw conclusions, the impact of these limitations, and resolution approaches.

4.   PART IV--OPERATIONAL TEST AND EVALUATION OUTLINE

a.   Operational Test and Evaluation Overview

(1)   The primary purpose of operational test and evaluation is to determine whether systems are operationally effective and suitable for the intended use by representative users before production or deployment.

(2)   The TEMP should show how program schedule, test management structure, and required resources are related to operational requirements, critical operational issues, test objectives, and milestone decision points. Operational testing should evaluate the system (operated by typical users) in an environment as operationally realistic as possible, including threat-representative hostile perpetrators and the expected range of natural environmental conditions.

b.   Critical Operational Issues

(1)   List in this section the critical operational issues. Critical operational issues are the operational effectiveness and operational suitability issues (not parameters, objectives or thresholds) that must be examined in operational test and evaluation to evaluate/assess the system's capability to perform its mission. Examples of operational suitability may include considerations such as size, weight,

packaging/transport requirements, power, personnel safety, bystanders, etc.)

(2)   A critical operational issue is typically phrased as a question that must be answered in order to properly evaluate operational effectiveness (e.g., "Will the system detect the presence of an intruder at an adequate range to permit successful engagement?") and operational suitability (e.g., "Will the system be safe to operate in an urban environment?")

(3)   Some critical operational issues will have critical technical parameters and thresholds. Individual attainment of these attributes does not guarantee that the critical operational issue will be favorably resolved.   Evaluation by a user group is needed to ensure that the system/product performs acceptably.

(4)   If every critical operational issue is resolved favorably, the system should be operationally effective and operationally suitable when employed in its intended environment by typical users.

c.   Future Operational Test and Evaluation. For each remaining phase of operational test and evaluation, separately address the following:

(1)   Configuration Description. Identify the system to be tested during each phase, and describe any differences between the tested system and the system that will be fielded including, where applicable, software maturity performance and criticality to mission performance, and the extent of integration with other systems with which it must be interoperable or compatible. Characterize the system (e.g., prototype, engineering development model, production representative or production configuration).

(2)   Operational Test and Evaluation Objectives. State the test objectives including the objectives and thresholds and critical operational issues to be addressed by each phase of operational test and evaluation and decision review(s) supported.

(3)   Operational Test and Evaluation Events, Scope of Testing, and Scenarios. Summarize the scenarios and identify the events to be conducted, type of resources to be used, any simulation(s) to be employed, the type of representative personnel who will operate and maintain the system, the status of product support, the operational and maintenance documentation that will be used, the environment under which the system is to be employed and supported during testing, the plans for interoperability and compatibility testing with other organizations and support systems as applicable, etc. Identify planned sources of information (e.g., development testing, testing of related systems, modeling, simulation, etc.) that may be used by the operational test organization to supplement this phase of operational test and evaluation. If operational test and evaluation cannot be conducted or completed in this phase of testing (e.g. in the feasibility stage of development) and the outcome will be an operational assessment instead of an evaluation, this should clearly be stated and the reason(s) explained.

(4)   Limitations. Discuss the test limitations including operational realism, resource availability, limited operational (urban, rural) environments, limited support environment, maturity of tested system, safety, liability, etc., that may impact the resolution of affected critical operational issues. Indicate the impact of the test limitations on the ability to resolve critical operational issues and the ability to formulate conclusions regarding operational effectiveness and operational suitability. Indicate the critical operational issues affected in parenthesis after each limitation.

5.   PART V--TEST AND EVALUATION RESOURCE SUMMARY

a.   Provide a summary (preferably in a table or matrix format) of all key test and evaluation resources, both government and contractor, that will be used during the course of the program. Specifically, identify the following test resources:

(1)   Test Articles. Identify the actual number of and timing requirements for all test articles, including key support equipment and technical information required for testing in each phase by major type of developmental test and evaluation and operational test and evaluation. If key subsystems (components, assemblies, subassemblies or software modules) are to be tested individually, before being tested in the

final system configuration, identify each subsystem in the TEMP and the quantity required. This process may be certified by vendor documentation in appropriate circumstances. Specifically identify when prototype, engineering development, preproduction, or production models will be used.

(2)   Test Sites and Instrumentation. Identify the specific test sites and /facilities to be used for each type of testing. Compare the requirements for test sites and facilities dictated by the scope and content of planned testing with existing and programmed test site/facility capability, and highlight any major shortfalls, such as inability to test under representative natural environmental conditions. Identify instrumentation that must be acquired specifically to conduct the planned test program. Describe how environment compliance requirements will be met.

(3)   Test Support Equipment. Identify test support equipment that must be acquired specifically to conduct the test program.

(4)   Test Expendables. Identify the type, number, and availability requirements for all expendable items that will be required for each phase of testing. Identify any major shortfalls.

(5)   Operational Test Support. For each test and evaluation phase, identify the type and timing of any critical operating test support required. (host organization manpower, vehicle needs/availability, computer system modifications or use, communications net use, etc.)

(6)   Simulations, Models and Testbeds. For each test and evaluation phase, identify the system simulations to be used, including computer-driven simulation models and hardware/software-in-the-loop testbeds. Identify the resources required to validate and certify their credible usage or application before their use.

(7)   Special Requirements. Discuss requirements for any significant non-instrumentation capabilities and resources such as: special data processing/data bases, unique mapping/charting/geodesy products, extreme physical environmental conditions or restricted/special use air/sea/landscapes.

(8)   Test and Evaluation Funding Requirements. Estimate, by month, the funding required to pay direct costs of planned testing. State the funding currently available and identify any major shortfalls.

(9)   Manpower/Personnel Training. Identify manpower/personnel and training requirements and limitations that affect test and evaluation execution.

b.   The TEMP should project the key resources necessary to accomplish demonstration and validation testing and early operational assessment. The TEMP should estimate, to the degree known at contract award, the key resources necessary to accomplish developmental test and evaluation, and operational test and evaluation. These should include elements of any Federal labs and facilities and capabilities designated by industry and academia. As system/product development progresses, the preliminary test resource requirements should be reassessed and refined and subsequent TEMP updates should reflect any changed system concepts, resource requirements, or updated user requirements (including interfacing systems and interoperability with new products/systems). Any resource shortfalls which introduce significant test limitations should be discussed with planned corrective action outlined.

6.   Attachments

a.   Bibliography - Cite in this section all documents referred to in the TEMP, especially all pertinent development documents as delineated in the Commercialization Plan.

b.   Reports - Cite all reports documenting previous technical and operational testing and evaluation.
     c.   Points of Contact - Provide a list of points of contact.