

Test and Evaluation Resources

The Director is required under the law to assess the adequacy of the planning for, and execution of, operational testing and evaluation of systems under oversight. The test workforce, ranges, and test facilities, as well as assets used in threat representation, are important elements in assessing the adequacy of operational and live fire testing. One means DOT&E uses for assessing test adequacy planning is to monitor DoD and Service-level strategic plans, investment programs, and budget decisions. DOT&E also conducts studies of resource needs and alternative solutions to meet such T&E resource needs through its Threat Systems program.

Summary

During the preceding year, there has been progress in resolving long-standing test resource deficiencies associated with some target programs, notably contract award for development of the Multi-Stage Supersonic Target (Threat D target). Incremental progress was also made in addressing deficiencies associated with other target and instrumentation requirements. Of continuing concern are Real-Time Casualty Assessment capabilities, the QF-4 replacement and 5th Generation Air-Superiority Target (5th Generation), Anti-Ship Cruise Missile (ASCM) target fidelity, Electronic Warfare test environments, and an Urban Environment Test Capability. Other deficiencies, such as a high-speed automotive test track and increasing sensor and weapon capabilities, remain consistent with previous reports. Increased emphasis on means to test countermeasures for IEDs, infrared surface-to-air missiles, Computer Network Attack, and Urban and Littoral warfare continue to reshape test resource planning.

During FY08, Service investment in T&E resources continued to address near-term, specific program needs. Concurrently, a number of T&E infrastructure facilities faced growing pressure to consolidate or close. The current demand for some of these facilities is low and future use cannot be predicted with certainty. Consequently, strong incentive exists to close test facilities for which there is not a solid customer base. When major test facilities are closed, the cost of reconstituting their capability significantly affects the defense budget.

OSD-funded test resource investment programs, such as the Central T&E Investment Program (CTEIP), Resource Enhancement Program, and DOT&E's Threat Systems Program, continue to provide sponsorship of critical solutions for test resource deficiencies. These investment lines sponsor studies and projects that reach across the spectrum of T&E resources. Recent projects include aerial and land targets, target control systems, and upgraded threat systems to evaluate weapons and sensors.

As DoD implements Integrated Testing, DOT&E will closely monitor the adequacy of T&E infrastructure to support operational and live fire testing and the early developmental

testing of system acquisitions. To realize Integrated Testing's promise of efficiency in terms of cost and schedule, exposure to robust and operationally relevant test environments early in developmental testing is necessary. Identification and documentation of test resource requirements in program Test and Evaluation Master Plans is essential in order to develop budgets that will support an adequate T&E resource base.

Resource Shortfalls

The following are important to achieve adequate OT&E in the future:

Aerial Targets

Full-Scale Aerial Targets remain a concern due to the declining supply of QF-4 airframes. Progress continues toward a replacement for the QF-4. The Air Force has completed several QF-16 airframe and engine studies and is proceeding toward the pre-System Development and Demonstration (SDD) phase in FY10. DOT&E continues to monitor the threat environment and examine options for representing future, 5th Generation fighter threats. A joint DOT&E and USD(AT&L) study on affordable 5th Generation target designs will be completed in 2009. Preliminary study results are encouraging. However, funding to support development of a next generation target has not been identified.

Anti-Ship Cruise Missile Targets

Multi-Stage Supersonic Target (MSST) (Threat D target). The MSST attained Milestone B in August 2008. The Navy is projecting Initial Operational Capability in FY14. This fails to meet test schedules for the Standard Missile-6, Rolling Airframe Missile Block 2, and the LHA 6 Ship Self-Defense System in FY10/11. This delay directly affects adequacy of testing for determining effectiveness and suitability for each of these systems.

Supersonic Sea-Skimmer. Delays in certification of the flight termination system for the GQM-163A target adversely affected the adequacy of the initial operational test and evaluation of the LPD-17 combat system. Repeated delays resulted in not conducting critical OT&E during the testing window.

Supersonic High Diver. Delays in development of the high diver variant of the GQM-163A continue due to problems concerning certification of its flight termination system. This postpones determination of whether the GQM-163A high diver variant will be an adequate surrogate for the threat.

Next Generation Subsonic Aerial Target (SSAT). The current inventory of subsonic targets (BQM-74E and BQM-34S) is showing its age. Threat representation adequacy (performance and signature) coupled with end of production requires development of a new subsonic aerial target. The Navy has outlined a notional SSAT acquisition plan that will deliver a

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successor target in FY12. While addressing a number of threat performance issues, the next target will not replicate one unique characteristic of ASCMs: the turning maneuver. Threat missiles change course by skidding into a turn. All existing targets and probable SSAT designs are winged vehicles and change course using a banking maneuver. This affects the radar cross section the target presents to shipboard sensors and weapons in addition to imposing limits on minimum flight altitude and use of threat seeker simulators. These factors affect target presentation realism.

Real Time Casualty Assessment

A high fidelity Real Time Casualty Assessment (RTCA) adds realism, motivates Soldiers, synchronizes the battle, and drives real-time play in Army test and training events. RTCA also generates combat loss and exchange ratios to support force effectiveness evaluations. The Army Test and Evaluation (T&E) community has an existing laser-based capability and, together with the training community, is developing a geometric pairing-based RTCA system to support the needs of both the Test and Training Communities.

Operational Test – Tactical Engagement System (OT-TES) is the Army's current laser-based, T&E RTCA system, which can support up to company size test and training events. The system is undergoing a communications upgrade required due to commercial encroachment into the current OT-TES ultra-high frequency television channel, obsolescence of encryption hardware, and need for increased data transmission rates to accommodate smart munitions testing. The communications upgrade system will enter Production Qualification Testing in 2QFY09 followed by a Limited User Test in 1QFY10. The strategy is to field a Company-on-Company capability together with player units for air defense and rotary wing aircraft.

OneTESS, the follow-on to OT-TES, will support test and training for up to brigade size units. The system recently completed Field Functional Test at the National Training Center, Fort Irwin, California. However, results were not favorable, and the Program Strategy is currently being re-worked. If successfully implemented, system fielding could occur as early as FY15. Procurement is currently limited to 6,000 player units for the National Training Center, and 600 player units for the Army's Operational Test Command.

Frequency Spectrum Management

Competition for frequency spectrum and bandwidth has begun to affect operational testing. For example, in FY08, operational testing of the EA-6B ALQ-99 Low Band Transmitter was forced to move from Naval Air Warfare Center (Weapons Division) to Naval Air Station, Fallon, Nevada. This was due to electronic emitter constraints imposed by the Federal Communications Commission and Federal Aviation Administration. Such constraints limited the times at which tests could be conducted. This resulted in a test scheduling conflict that could not be resolved except by transferring the testing to another location. At the alternate location, fewer test resources were available. Consequently, this reduced the number of test objectives that

could be attempted. Limitations on testing such as occurred with ALQ-99 will become more prevalent as competition for use of radio frequency spectrum increases. This trend threatens the adequacy of operational testing and is therefore a concern.

Urban Operations

Urban operations are a feature of current and future land combat. However, there is no single initiative or program that will satisfy emerging requirements to test urban combat capabilities. Neither test technologies nor facilities and infrastructure adequate to support testing are in place. The FY07 Strategic Plan for T&E Resources proposed a study to identify urban combat T&E deficiencies. This effort is underway with the support of Joint Forces Command and the Army Test & Evaluation Command. Additionally, the urban canyon effect caused by thoroughfares as they wind among tall structures within the urban environment exacerbates the ability to obtain Time-Space-Position Information (TSPI) from participating components. To address this issue, the Test Resource Management Center (TRMC) has commissioned a Next-Generation TSPI (NG-TSPI) Study, which will specifically investigate tracking capabilities in a GPS Denied/Low GPS Signal environment.

A variety of efforts are underway to address urban combat test deficiencies. These include a projected Combined Arms Training Facility at Fort Bliss, Texas; one of the intended testing sites of the Future Combat System. Recent approval of PBD 704 provides funding in FY10-FY15 to support an Urban Environment Test Capability for testing and evaluating technologies and systems used for full-spectrum and joint military operations in a realistic urban environment. Efforts have also been made to characterize the impact of Electromagnetic Spectrum Effects and how they may affect system performance in an urban setting. Some DoD technology initiatives may contribute indirectly to test capability for urban combat systems. These include Non-Intrusive Instrumentation and position location tracking in a GPS-denied environment. Additionally, Yuma Proving Ground, Arizona, continues to expand test infrastructure and is improving capabilities of the Counter IED Test Range. This range currently supports many aspects of counter-IED and counter-terrorism testing.

Automotive High-Speed Test Track

The Army lacks the ability to conduct high-speed operational testing of up-armored wheeled vehicles. This capability is necessary to assure consistency with current Operations Enduring Freedom and Iraqi Freedom tactics, techniques, and procedures for programs such as Mine Resistant Ambush Protected Vehicle. The U.S. Army Corps of Engineers has awarded a contract for Phase One and construction is ongoing at the Automotive Technology Evaluation Facility at Aberdeen, Maryland. Designs for Phases Two and Three to complete the track are well underway. DOT&E continues to support the Army's effort to develop this needed capability to compliment the Live Fire and Roadway Simulator test capabilities at Aberdeen Proving Ground.

Network Testing in a Collaborative Environment

The scale and complexity of tests, and network testing in particular are driving testers toward greater reliance upon simulations and federations of simulations for data collection, reduction and analyses tools, and visualization systems to meet the requirements for testing families of systems, system-of-systems, and joint test events. The Army Operational Test Command (OTC), in response to the challenges imposed by testing systems-of-systems and families of systems continues to pursue use of simulation tools to support its operational test program. The OTC Analytic Simulation and Instrumentation Suite (OASIS) is the Army's approach to a federation of simulations. The core Army objective is to support a cross command collaborative environment and battle command systems integration. OTC exercised its federation of simulations in a series of increasingly complex demonstrations during FY08, and determined that OASIS is ready to field in a test support role. To date, the Army effort has been focused on Future Combat System testing. Near term test programs that may potentially benefit from OASIS include DCGS-A, JEM/JWARN JTRS, and WIN-T.

Diesel-Electric Submarine Targets

DOT&E is sponsoring an independent assessment of options that would permit *Virginia* class attack submarine testing in an anti-diesel scenario without Navy-imposed restrictions. These restrictions result in less than adequate anti-diesel interaction for *Virginia* IOT&E. Since an anti-diesel submarine scenario may be the most demanding anti-submarine warfare mission that *Virginia* could face, the lack of adequate interaction with a modern, diesel-electric submarine has precluded evaluation of *Virginia* anti-submarine warfare effectiveness.

Target Control Systems

The 2005 Defense Science Board (DSB) Task Force on Aerial Targets identified the need for common and interoperable Target Control Systems (TCSs) across the Services. The FY06 Addendum to the Strategic Plan for T&E Resources restated this need. With passage of time, legacy TCSs have become progressively more difficult to sustain. In FY08, the Services continue to operate unique TCSs. Near term TCS investments are spread across the Services without corporate guidance to promote interoperability. During FY08, DOT&E funded a study to examine existing TCSs and identify Common Control Elements (CCEs) that may be suitable for incorporation in existing and future TCSs at different DoD ranges. This is consistent with recommendations made in the 2005 DSB report. The study group identified five CCEs. Two of these concerned increased interoperability between TCSs. In FY09, a demonstration of one of these two CCEs will be conducted and the study group will consider plans to implement the second CCE. DOT&E has also

started a project to examine the applicability of open standards to the targets community.

2007 Strategic Plan For T&E Resources – Capability Gaps

Undersea and Littoral Warfare Test Resources

There is a continuing need to develop test range capability for littoral warfare programs. A Record of Decision under National Environmental Policy Act procedures is expected to be issued in 2009 concerning the proposed East Coast Undersea Training Range. Recently, the Navy added a fourth site to those under consideration for the Range. This will require an additional period of public comment. Currently, the Navy's position is that the East Coast Underwater Training Range will be used only for training. Upgrades to permit its use as a test resource are not programmed beyond the limited funds allocated for the Portable Underwater Tracking System – a Resource Enhancement Program (REP). Consequently, a shallow water/littoral test capability will remain a T&E resource deficiency as identified in the 2007 Strategic Plan.

Multiple Small Craft Scoring Capability

Identified as a T&E capability gap in the OSD Test Resource Management Center's 2007 Strategic Plan, the ability to score small craft swarming attacks on surface ships is essential to evaluate near-term naval warfare programs' weapons and sensors as well as tactics, techniques, and procedures. Currently, scoring capabilities are limited to non-real time solutions across a limited target field. DOT&E selected, and CTEIP funded, a technology development effort under the Target Management Initiative program that became the Surface Target Vector Scorer. The CTEIP Joint Improvement and Modernization program funded the Soft Impact Location Capability project to address another T&E capability gap. The technologies under examination in these projects may also have applicability to land-based testing.

Time-Space Position Information in a GPS-Denied Environment

In future combat environments, GPS data may be denied. Similarly, in realistic test events, GPS data may be denied. This will affect not only the accuracy of the weapon system under test but also the accuracy of TSPI associated with the test. Other sources of TSPI exist to provide data needed for evaluation of weapon performance, but the fidelity of such data is not equal to that obtainable from GPS. Consequently, alternate means of obtaining TSPI of sufficient quality to support adequate evaluation of high performance weapon systems is required. In pursuit of this objective, a 2008 TRMC study will develop Use Cases in which the Next Generation-TSPI System must work in the GPS-denied environment. One of those use cases addresses urban canyon operations previously discussed.

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