

Test and Evaluation Resources

Title 10, U.S. Code requires the Director 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 testing. One key aspect of assessing adequacy is through oversight of DoD and Service-level strategic plans, investment programs, and key budget decisions. DOT&E also conducts studies of resource needs and alternative solutions to key T&E resource needs through its Threat Systems program.

Summary

The DoD saw progress in long-standing concerns for ranges and some target projects while other critical target and instrumentation developments made only incremental improvements. Of concern are Real-Time Casualty Assessment capabilities, a future Air-Superiority Target, Anti-Ship Cruise Missile (ASCM) target fidelity and resource shortfalls, and Missile Defense targets resource shortfalls. The challenges to test resources, such as increasing sensor and weapon capabilities, remain consistent with our previous reports, while new threats to include Improvised Explosive Devices (IEDs), Computer Network Attack, and Urban and Littoral warfare place additional demands upon Service and DoD resource strategic planning.

Service investment in T&E resources is, in most cases, just meeting specific program near-term needs, while common use resources, such as aerial targets, continue to require intervention. Services increasingly look to OSD-funded programs, such as the Central T&E Investment Program (CTEIP) and DOT&E's Threat Systems program to initiate innovative T&E resources solutions that will be pursued by the Services. DOT&E, either on its own or in coordination with the Test Resource Management Center (TRMC), sponsored studies and projects to prototype modifications to targets and their control systems as well as upgrade threat systems to evaluate weapons, sensors, and counter-IED systems.

DOT&E continues to stress adequate resources for operational testing and accurate estimates in program Test and Evaluation Master Plans, especially those with fast-track strategies, to support adequate OT&E planning, and help control program cost and risk.

Focus Areas

The following 13 areas are critical to adequate future OT&E and describe the relevant issues and our involvement where applicable:

Health of the Operational Test Agencies

New acquisition approaches, joint experimentation, and short notice testing in support of wartime needs, require greater

Operational Test Agency (OTA) involvement. Yet, continued staffing and budget pressure coupled with deployment of test agency military personnel compounds a shrinking pool of experienced testers. Of specific interest, the Army Test and Evaluation Command continues to cope with shortages in civilian staffing and mid-grade officers available for operational test assignments. It may face additional challenges as civil service employees who may choose not to relocate to Aberdeen Proving Ground, Maryland, as a result of Base Realignment and Closure Commission action. Of additional concern is the transfer of operational evaluators to a development test environment. Additionally, an Air Force Operational Test and Evaluation Center military manning drawdown and projected reductions in operations funding may adversely affect its operational capability as the Air Force continues to reduce infrastructure expenses while shifting funding to higher priority programs.

DOT&E will continue to monitor the health of the OTAs and their ability to meet DoD's operational test and evaluation requirements, advocating increased resources when needed to ensure adequate operational testing and evaluation.

Aerial Targets (Full-Scale Aerial Targets and Unmanned Aerial Systems)

The DoD's FY05 Strategic Plan for Test Resources established Full-Scale Aerial Targets (FSATs) as one of four Critical Interest items. This year, DOT&E encouraged the Air Force to fund, develop, and field a QF-4 replacement. Due to a depleting QF-4 inventory, the Air Force reached a critical decision point in FY07 and initiated a program to drone F-16 aircraft. While the droning of F-16s will provide an inventory of 4th Generation FSATs, DOT&E remains concerned about the ability to test against emerging 5th Generation fighter threats. This year, DOT&E and USD (AT&L) are co-chairing a combined tri-Service study to determine the future 5th Generation test requirements and examine affordable target designs. Nevertheless, at this point there is no funding to adequately support development of a next generation target.

There was, however, considerable progress made this year for other unmanned air vehicle targets supporting naval ship defense testing. Leveraging a series of DOT&E technical exchange sessions with the Navy and an FY06 DOT&E study of available government and commercial alternatives, the Navy selected a commercial drone vehicle to fulfill the unmanned aerial vehicle target requirement. This was a significant first step toward addressing operationally realistic testing against the emerging threat.

Anti-Ship Cruise Missile (ASCM) Targets

Subsonic Targets. Development of the ASCM threat target (BQM-34SH drone with ASCM seeker) required for

ship-launched electronic decoy operational testing and the associated data analysis software have been troubled. There are not enough backup targets to ensure the test can be executed. Furthermore, the target was only recently flight tested, delaying completion of the data analysis software. As a result, scheduled testing for assessing the LPD-17-Class ship's radar signature reduction capability and launching electronic decoys to protect the ship against anti-ship cruise missiles will be delayed at least six months.

Threat D Target. The Navy stated that they will fund development of the Threat D target (also referred to as the Multi-Stage Supersonic Target (MSST)). While the initiation of the MSST development is a positive step, it appears to be coming at the expense of reductions in procurement of other target types, as well as test range investments and other facility investments within the Navy. This will adversely affect out of date equipment replacement projects and other target programs. Additionally, the delays in resolving the requirement for a target representing Threat D will result in a target no earlier than FY14, according to Navy projections, missing testing of the Standard Missile-6, Rolling Airframe Missile Block 2, and the LHA-6 Ship Self-Defense System in FY10/11. This situation directly impacts the adequacy of the IOT&E of these critical systems. Although an expectation for program initiation is for full funding, it appears that only development – not procurement – is covered at this time.

High Diver. To satisfy other near-term ship self-defense testing requirements, the AQM-37 drone will perform supersonic high-diver threat profiles. However, the AQM-37 inventory is aging and is difficult to support. Efforts to procure other supersonic high diver vehicles via foreign sources failed, so the Navy indicated that a study would be conducted to examine feasibility of modifying the GQM-163A supersonic sea-skimming target to fly the high diver profile.

Supersonic Sea-Skimming Target. Introduction of the GQM-163 "Coyote" target to support operational testing has been challenging. For example, the first demonstration of the capability to fly a dual target presentation is scheduled to occur at the same time that ship self-defense systems (the systems being operationally tested) are on the test range to demonstrate capability against threats in that quantity. In addition, procurement of sufficient quantities of these targets may be affected by the need to fund Threat D target development and procurement.

Ballistic Missile Defense Targets

The Missile Defense Agency procures targets for testing the nation's ballistic missile defense system. In the past 18 months, there were a number of target failures that impacted test schedules and objectives. See the Ballistic Missile Defense section in this report for further details.

Real-Time Casualty Assessment and Instrumentation

The continued lack of a reliable high fidelity Real-Time Casualty Assessment (RTCA) system to support current and near-term operational testing and evaluating unit combat effectiveness

is a major concern. The Army does not currently have a sufficiently high fidelity RTCA system for operational testing of large force-on-force engagements. Consequently, the Army is currently relying on a collection of existing low fidelity training systems to support the Mobile Gun System and Future Combat System (FCS) Spin-Out 1 tests in FY08 that will likely not meet expectations. This condition will exist until the fielding of an adequate high-fidelity system, which promises greater data fidelity at a lower life-cycle cost for test and training. While this replacement program has progressed sufficiently this year to support a full field demonstration in late FY08, there is no procurement programmed beyond FY09.

DOT&E has long supported compatible test instrumentation throughout the DoD's ranges. This year, CTEIP initiated the Common Range Integrated Instrumentation System to support land, naval, and air testing needs. While still in early development, there have been requirements changes that will probably affect budget and schedule. This program will be closely monitored, since operational testing will continue to rely on existing range capabilities, with their limitations and sporadic upgrades, until this new system comes online after FY12.

Urban Environment Test Capabilities

Over 40 percent of new programs have a requirement to operate in an urban environment. The Services are currently relying on new and existing training facilities to meet T&E needs that often lack key features such as densely arranged multi-story structures or can only support testing on a limited basis. While there were a number of Service studies this year to determine the most urgent requirements coupled with modest Army investments to accommodate testing in FY08, progress has been slow. We believe the need for urban test facilities will be even greater as more advanced technologies intended to enhance U.S. capabilities to operate in this environment enter development. We will work with the Services and the TRMC to emphasize urban test capabilities in the next Strategic Plan.

Land Targets for Precision Systems and Munitions

The DoD is developing precision weapon systems for dynamic and urgent task targets with reduced collateral damage. To adequately test these systems, affordable targets with appropriate signatures, speed, and maneuverability are needed. DOT&E, using OT&E and CTEIP resources, continued to lead a multi-Service Multi-spectral Mobile Ground Target initiative to prototype a family of surrogate unmanned threat land vehicles with realistic signatures and an advanced target control system. Once prototyped, the Services will continue the effort into production. The vehicle performance results to date are promising with subsequent efforts planned to improve signature quality and demonstrate multiple target vehicle control from a single command station.

Countermeasure and Counter Weapon Test Capabilities

Adequate operational testing of integrated defensive systems requires robust threat-representative hardware, validated models, simulations and test environments, to include jamming by threat forces. This year, DOT&E, along with CTEIP, supported

TEST AND EVALUATION RESOURCES

prototyping capabilities to test the effects of jamming to our weapon systems. To increase joint use of the DoD's threat simulators, DOT&E and the TRMC also initiated efforts to integrate two threat missile models with tri-Service simulators. DOT&E also sponsored initial efforts to integrate threat surface-to-air missiles at test facilities, as well as initiated a four-year effort to upgrade the Services' inventory of threat missile simulators with standard, validated fly-out models. With these efforts, the DoD will move closer to interoperable missile fly-out models.

Naval Platform Signature Measurement Facilities

T&E infrastructure upgrades have difficulty keeping pace with new naval platform signature reduction efforts. A DOT&E sponsored CTEIP project, upgraded the Norfolk, Virginia, degaussing facility to provide a limited test capability to evaluate the Advanced Degaussing System on new classes of ships (LPD-17, T-AKE, DDG-1000, CVN-21, and Littoral Combat Ship). The Navy fully supported this effort and will further improve this initial capability next year along with upgrades at other facilities. In addition, the Navy initiated new Radar and Acoustic signature measurement developments for low signature ships such as the DDG 1000, though no long-term support has been identified. DOT&E will continue to monitor these measurement system upgrades as their capability is critical to assessing ship vulnerability.

Joint Test Environments, Information Assurance and Operations

The continuing transformation to joint and networked operations presents a significant challenge to operational testing of "system-of-systems" and assessing mission effectiveness. We continue to support DoD's Testing in a Joint Environment Roadmap with our Joint T&E Methodology project examining methods and processes to conduct testing in joint mission environments.

Together with CTEIP, Air Force, and Army, four prototype efforts were initiated to provide capabilities to assess network performance, communications jamming and integrate Army Information Operations into the joint network to support operational testing. The Services also successfully integrated DOT&E and CTEIP Information Operations prototypes into a coordinated joint range program to support FCS Spin Out 1 testing. DOT&E also sponsored a study of threats to Global Positioning System (GPS) and demonstrated a flexible prototype field asset for open-air jamming, recording data for force-on-force and mission modeling efforts.

Testing offensive and defensive aspects of computer network operations poses significant challenges for the T&E community. DOT&E advocates a ready, available team and facilities to conduct assessments of computer network attack tools for the Combatant Commanders, as this testing is not done by the OTAs. Assessing the defensive posture of both fielded systems and systems under development requires both specialized facilities and trained personnel. The demand for personnel with the requisite skills and experience for offensive and defensive

assessments outstrips availability. DOT&E is studying this issue with other members of the information operations community in order to develop a coherent community approach.

Undersea and Littoral Warfare Test Resources

Despite continued need, the Navy's approach to testing in the littorals remains fragmented. Training Range investments, suitable for T&E on the East Coast are mired in environmental litigation with a Record of Decision expected in early CY08. Further delays will likely require more non-operationally realistic alternatives or force more of this testing to the West Coast sites. To satisfy demands for testing at more sites and in the open ocean, DOT&E sponsored a CTEIP program for a portable undersea tracking system to support minefield avoidance testing that was successfully demonstrated in 2007.

Frequency Spectrum Management

Modern complex weapons systems require increased frequency spectrum for their testing. The F-22 flight testing required data rate transfers 100 times that required to adequately test its predecessor fighter, the F-15. Yet the DoD has lost access to nearly 30 percent of the frequency spectrum used for T&E since the time the F-15 was being tested. The DoD has undertaken aggressive research for more efficient spectrum use for weapon system testing and the World Radiocommunication Conference (WRC) recently authorized aeronautical flight testing in additional radio bands. DOT&E, together with the Service OTAs and the TRMC, will assess the likely increased funding requirement for test instrumentation necessary to operate in the additional WRC bandwidth allocations.

Test Range Sustainability

DOT&E supports Sustainable Ranges initiatives and this year the DoD signed a cooperative Memorandum of Understanding with the Departments of Energy and Interior to address energy issues, mitigating encroachment and energy corridor impacts to our test and training ranges. DOT&E's continuing support of outreach efforts to the civil and private sectors in cooperation with the Land Trust Alliance has improved public understanding of DoD's efforts to ensure compatibility of testing and training with the preservation of the nation's open spaces and natural habitat. DOT&E was a co-sponsor of the 2007 Sustaining Military Readiness Conference, which supported training workshops and an opportunity for the exchange of information.

Conclusions

The DoD-wide state of T&E resources remains mixed. The Operational Testing environment continues to change as a result of increased weapon and sensor capability and new threats. As a result, T&E resources are lagging in the ability to support threat representation required for adequate OT&E. While there have been notable successes in 2007 with the introduction of some target and sensor measurement capabilities, significant issues with major target, instrumentation, frequency management and threat models remain. DOT&E will continue to encourage the DoD to address these issues. Based on recent trends, we anticipate that the Services' reliance on OSD-led initiatives

TEST AND EVALUATION RESOURCES

to mitigate test resources shortfalls, such as DOT&E's Threat Systems program, will continue to grow. Finally, we have worked during this year to ensure OT&E needs are adequately accommodated in Service and Department-level Strategic Planning.