INTRODUCTION

The Director, Operational Test and Evaluation (DOT&E) activities for Fiscal Year 2005 (FY05) are characterized by three dominant themes: providing information for acquisition decision makers, providing direct support to our warfighters, and assessing the adequacy of Test and Evaluation (T&E) resources for future testing needs.

In support of acquisition, DOT&E published nine Beyond Low-Rate Initial Production Reports, including those for the highly visible and often controversial F-22 Raptor and V-22 Osprey. DOT&E monitored 279 Major Defense Acquisition Programs (MDAPs) and special interest programs. This included test adequacy reviews for 56 Test and Evaluation Master Plans (TEMPs), 10 Live Fire Test and Evaluation (LFT&E) strategies, and 50 individual Test and Evaluation Plans (TEPs) for specific test events.

In continuing support to our warfighters, the LFT&E staff monitored Service efforts to upgrade armor for tactical vehicles, as well as Service efforts to resolve personal body armor testing variances. DOT&E also provided T&E advice to the Office of the Secretary of Defense (OSD) Joint Rapid Acquisition Cell (JRAC) to help ensure performance is demonstrated before fielding. The results of DOT&E Information Assurance (IA) assessments of legacy systems received wide visibility within the Department of Defense (DoD), including OSD, the Joint Staff, and the Combatant Commanders (COCOMs). The DOT&E Joint Test and Evaluation (JT&E) program acted in direct response to COCOM requests via its re-engineered Quick Reaction Test (QRT) process.

In assessing future testing resource needs, DOT&E provides strategic planning inputs to the Defense Test Resource Management Center (DTRMC) to which several DOT&E responsibilities regarding T&E resources have been transferred. DOT&E also works with the individual Services to address future testing needs for air, land, and naval warfare.

Acquisition Support

Values

DOT&E focuses on adhering to the principle upon which the office was founded—the adequacy of tests to determine operational effectiveness and suitability for combat. In making these determinations, DOT&E uses requirements and criteria generated by the Service sponsors including Key Performance Parameters (KPPs) and criteria validated by the Joint Requirements Oversight Council (JROC) to assess mission accomplishment. In other words, "To what degree can a unit equipped with these systems accomplish its missions and tasks?"

Acquisition Changes

The Defense Acquisition Performance Assessment (DAPA) panel recently released the executive summary of its report. That summary proposes significant changes to the way in which the DoD acquires new military capabilities. Included in these proposals are changes to the operational T&E process, which are included under the 'requirements' category. One of the principles to achieve objective operational testing and reporting is to keep the operational test agencies independent of setting requirements, or establishing performance criteria.

The panel emphasized stability to control costs and to meet schedules and proposed shifting to 'time-certain' development procedures. Such changes will challenge DOT&E and operational test and evaluation agencies to ensure the new military capabilities thus acquired still demonstrate satisfactory performance in operationally realistic environments.

"Fly before Buy"

The challenge is to determine operational effectiveness and suitability to support large procurement decisions before fielding for combat. DOT&E is a proponent of the principle of "fly before buy" to help ensure the DoD provides systems that work and are supportable in the field. The pressures on program managers to control costs and speed delivery in today's environment of evolutionary acquisition and spiral development are driving them toward schedule-driven acquisition strategies in which significant procurement occurs before Full-Rate Production (FRP) decisions. Acquiring a significant percentage of an acquisition program prior to the FRP decision increases the risk that COCOMs will experience increased logistical support requirements and configuration management challenges.

Missile Defense

The Missile Defense Agency (MDA) programs continue to mature. The Airborne Laser (ABL) technology program achieved first light early in FY05 and recently demonstrated full power operation of significant duration. The PATRIOT system had demonstrated multiple launch and the capability to intercept multiple targets. However, in tests of subsequent software upgrades, PATRIOT failed to destroy intended targets. The root cause determination is under investigation. The Terminal High-Altitude Area Defense (THAAD) program demonstrated a successful flight in its first developmental flight test. The Ballistic Missile Defense System (BMDS) Aegis program demonstrated continued maturation with several successful

launches culminating in a recent target intercept. The BMDS Ground-based Midcourse Defense (GMD) program had two successive failures during which interceptors failed to launch in FY05. Independent review teams confirmed quality assurance shortcomings and recommended significant actions that the MDA is implementing. Additional details regarding the MDA programs are provided in the BMDS section of this report.

Dedicated Operational Testing

The Global War on Terrorism (GWOT), with its demands on rotating forces into and out of theater, have made live forces dedicated to operational test events extremely scarce. Combined test teams—Contractor Testing (CT), Developmental Testing (DT) and Operational Testing (OT)—are the norm; so too are combined DT/OT test events. Wherever possible, the Service Operational Test Agencies (OTAs) combine operational testing with other exercises and training events to conserve resources. Combined test teams are generally effective, but too often test objectives are sacrificed in the interest of training objectives during combined test events. This has been particularly true in naval exercises. As a consequence, testing is not completed and timely performance information is not obtained. The result is an extended test program and delayed information to decision makers.

OT&E Trends

From the perspective of effective mission accomplishment, "To what degree can a unit equipped with these systems accomplish its missions or tasks?", demonstrated performance has gotten better over the years. Sustained mission accomplishment depends upon being able to support the systems in the field. Suitability performance regarding the ability to keep those systems available for effective employment has gotten worse. This decreasing trend in suitability results noted during operational T&E is cause for concern. This declining trend may be evidence that the Department, in attempting to field MDAPs more rapidly, is tending to focus on effectiveness, and is treating suitability (reliability, availability, maintainability, logistics, etc.) as a second tier capability.

To specifically address this adverse trend, DOT&E developed a *Guide to Achieving Reliability, Availability, and Maintainability*. DOT&E based this guide on work done by the National Academy of Sciences (NAS). One of the significant aspects of the NAS work is the need to educate senior leaders on the dependency of long-term effectiveness on suitability. The Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)) and DOT&E approved the guide in August and it is available to assist program managers on the OSD Web site:
http://www.acq.osd.mil/ds/se/ed/publications.htm

Complexity

The complexity of our weapons systems is increasing. Not only are the technologies more complex today, the interdependency of the sensors, the command, control, and communications, and the munitions in joint operations drives both our war fighting capabilities and our war fighting challenges. Complexity costs money in design, development, and testing and in the need for contractor logistics support. This has a direct bearing on what the DAPA panel is focused on—controlling costs and meeting schedules.

Warfighter Support

Vehicle Armor

The use of Improvised Explosive Devices (IEDs) in Operation Iraqi Freedom (OIF), and the rapid maturation of IED tactics, techniques, and procedures in theater challenged the Services to up-armor numerous tactical vehicles that had not been designed for front line combat. The DOT&E LFT&E staff worked closely with the Army Test Center (ATC), Aberdeen, Maryland, to ensure potential up-armor solutions were adequately tested before being implemented. The level of expertise resident at Aberdeen for testing armor makes it a center of excellence for this vital function. This expertise helped influence the design of armor ultimately developed, tested, and selected for up-armoring tactical vehicles.

DOT&E discovered some armor being made available to forces in theatre that had not gone through such formal testing. When subsequently tested, the Army found it to be ineffective. All potential armor solutions should go through the Army's survivability testing to ensure consistent and comparable results, and to ensure ineffective armor does not reach the field.

Body Armor

The development and procurement of personal body armor did not trip the fiscal threshold to be designated as a MDAP. Consequently the DOT&E LFT&E staff had not exercised T&E oversight of body armor. Upon learning that the Marine Corps recalled roughly 5,000 outer tactical vests (OTVs), I became concerned that acceptance testing may not have been adequate to preclude fielding of substandard body armor.

The LFT&E staff, working with the Army Soldier Command in Natick, Massachusetts, and both the Army T&E community and the Army Research Laboratory in Aberdeen, Maryland, determined that there were inconsistencies in the lot acceptance test methods used by various organizations. Review of records revealed some OTVs had been fielded despite not meeting acceptance criteria. This led to the Army recall of roughly 8,000 OTVs, and an additional recall of roughly 10,000 OTVs by the Marine Corps.

Work is in progress to develop a standard test process for body armor lot acceptance testing. Once determined, this process will become the DoD standard. DoD intends to make this process available to civilian law enforcement agencies and organizations for their use.

Rapid Fielding

DOT&E advises the OSD JRAC to help ensure rapid fielding initiatives consider the adequacy of performance testing. JRAC projects do not meet criteria to be designated as MDAPs. Without adding T&E oversight to the JRAC bureaucracy, DOT&E focused on asking two critical questions, "Does the system work as intended?" and "How do you know it works?" This minimalist approach has neither delayed rapid fielding due to testing nor has it caused an administrative burden. It has benefited the Service OTAs by ensuring adequate funds and resources are made available to do appropriate testing.

Information Assurance (IA)

The DOT&E initiative to assess IA for legacy systems is truly a success story. Directed as part of the FY03 National Defense Authorization Act (NDAA), DOT&E established a working relationship with the COCOMs and a formal program that directly aids the warfighters. At the request of COCOMs, DOT&E added IA assessments to selected pre-deployment exercises of units returning to Iraq.

The results of these legacy system IA assessments have been shared among the COCOMs and briefed to the Secretary of Defense and the Chairman, Joint Chiefs of Staff. The Chairman has released two messages to COCOMs regarding IA, based in part, upon the results of our assessments. Also, U.S. Strategic Command (USSTRATCOM) directed an IA stand-down for the entire DoD in November. Additional details regarding the IA assessment program are provided in the Information Assurance section of this report.

Joint Test and Evaluation (JT&E) Program

When USD(AT&L) transferred the JT&E program to DOT&E, we began a re-engineering effort to make the JT&E program more responsive to the warfighters. The creation and implementation of Quick Reaction Tests (QRTs) is designed to respond directly to stated needs of the COCOMs, and to deliver useful products to the warfighters in a timely manner—months, not years. Products delivered have received the endorsement of COCOMs and the Joint Staff.

The rigor of the T&E process enables delivery of products that instill confidence in the user because the process is credible. Examples of products delivered using QRTs are the:

- Joint Shipboard Ammunition and Ammunition Boards (JSAABR) refined the process to certify existing non-Naval weapon systems for shipboard use
- Joint Forward Operating Base (JFOB) Handbook - Force Protection Handbook for deployed forces
- U. S. Special Operations Command Convoy Handbook - pocket-sized handbooks covering combat convoys and convoy leaders training

Additional details regarding QRTs are provided in the Joint Test and Evaluation section of this report.

Test Resources

Defense Test Resources Management Center (DTRMC)

The USD(AT&L) completed manning of the DTRMC with a permanent director, staff, and contractor support in FY05. Additionally, DOT&E transferred administration and management of the Central Test and Evaluation Investment Program (CTEIP) and the Test and Evaluation Science and Technology (T&E/S&T) program and oversight of the Major Range and Test Facilities Base (MRTFB) to the DTRMC in FY05.

The DTRMC published a strategic plan that continues to evolve and mature. The FY05 strategic plan is more comprehensive than previous plans, but remains focused on the MRTFB. I expect, as strategic planning matures, T&E resources such as the OTAs and the workforce, will be included. DOT&E has worked to establish a partnership with the DTRMC to ensure the DoD T&E investment strategy is adequate to meet future testing needs. This is an ongoing process.

Congressional direction called for the DoD to reverse the trend of increasing test costs to MRTFB customers with the objective of charging only for direct test costs. During FY05, the DoD changed its financial management regulations to

require the Services to comply with the new policy in the latest budget. As a result, roughly $580 Million has been realigned to the MRTFB institutional funding lines. While this is a significant change, some time will be needed to assess its efficacy.

Air Warfare

During FY05, in response to DOT&E and USD(AT&L), the Defense Science Board (DSB) conducted a high-level review of aerial targets to assess DT/OT issues, current and future threat projections and trends, and Service target payloads and control systems. The study resulted in three key recommendations:

- Proceed with a replacement of the QF-4 drone target with an existing aircraft platform, striving for an unmanned vehicle while developing a new target to represent likely future threats
- Proceed with aggressive efforts to develop and procure three types of supersonic anti-ship cruise missile targets (GQM-163A, MA-31, Threat D)
- Migrate to a common target control system and provide a centralized management and planning function to the aerial targets community

In response to these recommendations, the Air Force adopted a replacement strategy that will drone existing F-16s. This strategy does not address concerns over the capability of a QF-16 to represent future threat aircraft. Also, plans to make the QF-16 manned-capable increases the cost due to personnel safety considerations.

Land Warfare

Land warfare evaluations under realistic combat environments are limited by a lack of Real Time Casualty Assessment (RTCA) instrumentation. Such instrumentation enables participants to be removed from combat scenarios in response to attacks. RTCA instrumentation is needed to replace the aging and unwieldy MILES gear. It is also needed to adequately assess the effects of air-to-ground operations. The technology exists to miniaturize the next generation of RTCA instrumentation so it could be embedded into vehicles, and not unduly encumber individual soldiers. New RTCA instrumentation has the added benefit of being able to support the training community.

Naval Warfare

DOT&E continues to emphasize realism and an enterprise approach to test defensive capabilities of shipboard combat systems against threat-representative anti-ship cruise missile targets. Key to the enterprise approach for realistic testing are the self defense test ship and a modeling and simulation test bed for estimating performance for variations in sea state, ship signature, and radar propagation. The enterprise approach promises significant cost savings and avoids disparate "point determinations" of capabilities for different ship classes. In a November 2005 memorandum to my office, the Deputy Chief of Naval Operations (N6/N7) stated, "Navy is committed to funding the Enterprise Anti-Air Warfare Ship Self Defense Test and Evaluation strategy to prove our warfighting systems perform to the requirement."

Future Challenges

Software Dominance

Platform focused acquisition is being overtaken by software intensive systems-of-systems and network-centric concepts. Platforms provide the space, weight, cooling, and power for significant software-driven mission capabilities. However, integrating software packages is proving to be a time consuming challenge for complex systems. Frequent demonstrations of integrated software performance early and throughout the development cycle is key to ensuring software-driven mission capabilities are both ready for OT&E and to be fielded.

DOT&E has observed that mission capabilities of MDAPs—Acquisition Category I (ACAT I) programs—may be driven significantly by software capabilities of smaller programs (i.e., ACAT III programs). There is a need to take a more holistic view of managing and developing mission capabilities that includes not only the platform but all of the systems, regardless of ACAT, that contribute to the mission capabilities. DOT&E recommended such an approach to the Defense Acquisition Executive.

Testing in a Joint Environment

The DOT&E-led collaborative effort to develop a capability to test in a Joint mission environment continued throughout FY05. To create such a Joint mission environment, DOT&E developed a roadmap. The Deputy Secretary of Defense (DEPSECDEF) approved the roadmap early in FY05. The roadmap promotes:

- Institutionalizing the need to test in realistic Joint operational environments
- Defining capabilities in common, measurable, war fighting terms

- Establishing persistent connectivity between Battle Labs, Hardware-in-the-Loop facilities, Software-in-the-Loop facilities, DT facilities, and live force instrumentation
- Using connectivity to build the environments for Joint experimentation, development, test, and training

One key goal in the roadmap is to achieve "persistence." *Millennium Challenge* and more recent exercises have proven the technology works. The Multi-Service Distributed Event (MSDE) in August 2005 required about 300 people and 120 days to establish the network for the exercise. Just as we saw in *Millennium Challenge*, the lack of persistence resulted in users dismantling the MSDE network when the exercise was complete. We need an environment in which information exchange can be achieved simply by changing the address. The roadmap points the way to building such a Joint mission environment by linking existing single-Service assets when needed to create a DoD Joint asset.

DOT&E remains committed to establishing this capability for the Department. DOT&E sponsored a feasibility study as part of its JT&E program to determine appropriate Joint Test and Evaluation Methods (JTEM). This will include recommended policies and processes for conducting testing in a Joint mission environment. DOT&E worked to obtain funding for the Joint Mission Environment Test Capability (JMETC) infrastructure—linking existing facilities. DOT&E led the implementation planning effort throughout FY05 and the established partnerships, as reported in last year's annual report, continue to grow and mature.

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