DIRECTOR'S INTRODUCTION

In 1983, Congress legislated in Title 10 the creation of the office of Director, Operational Test and Evaluation (DOT&E). Since then, the cold war ended and a global war on terrorism began. These developments have led to far-reaching changes in the way we fight and procure weapons. They have necessitated a rethinking of how we organize and structure our military forces, how we man and train them realistically to face these new threats, and how we equip them in a timely and effective manner with the best systems that rapidly advancing technologies can offer.

In support of these objectives, DoD has undertaken a major transformation of its acquisition process, codifying the latest changes in May 2003. In parallel, significant changes in the regulation governing requirements generation eliminated the term "requirement" in all the documentation, and replaced it with "capability" for new weapons programs.

These innovations have not altered the core mission of DOT&E. This is largely attributable to the original legislation being so clear, focused, and close to the core mission of the acquisition system. Our maxim remains one of determining whether systems will be effective, suitable and survivable in combat, and providing that information to decision makers before commitment to full-rate production or deployment with our combat forces. Congressional establishment of DOT&E was, and remains, the embodiment of the "fly before you buy" philosophy.

Critical to the transformation of how our forces fight with their systems is their growing interdependence. Systems now depend on "jointness," system-of-systems operations, network-centric warfare, and the complexity of precision attack interlinking intelligence, surveillance, reconnaissance, and weaponry. To create realistic operational test opportunities with the required links and relevant environments is expensive. The Services are often reluctant to dedicate the resources required for such testing. Accordingly, some operational tests, especially major command and control tests, tend to become secondary efforts to training exercises, as was the case for the Army's Stryker Brigade Operational Evaluation. The difficulty, simply put, is that test objectives often compete with training objectives. We will need a more integrated planning and execution approach in order to assure test adequacy. The Services must give adequate priority and resources to testing done in conjunction with exercises.

DOT&E will respond to an acquisition system no longer structured around a traditional research, development, test, and evaluation process that leads to a full-rate production Milestone. DoD will likely continue to buy more systems in low-rate initial production than are needed for testing. Given these substantial expenditures, DOT&E's early and continuous involvement prior to IOT&E and full assessment of effectiveness and suitability will be critical.

There are two new acquisition styles: *evolutionary acquisition* (which includes incremental development and spiral development) and *capabilities-based acquisition.* Neither necessarily produces a fixed configuration with which to judge a system's operational effectiveness and suitability or survivability against criteria based on military mission requirements. To address this potential problem, a significant feature of this year's update to regulations was the clear articulation of the acquisition system's purpose: to provide systems "that meet user needs with a measurable improvement to mission capability and operational support…." This is an important criterion for evaluation, no matter what other criteria are used. To meet the challenges of increasing complexity and movement away from articulated requirements, DOT&E is emphasizing two strategies:

- Comprehensive evaluation based on determining a new system's effect on mission capability rather than merely measuring its compliance with specifications.
- Objective evaluation based on direct comparison of the current system against the proposed new ways of conducting a mission. Such comparative evaluation provides the most direct answer to the question "Does the system provide a measurable improvement to mission capability or operational support?"

The F-22 IOT&E, planned for FY04, exemplifies a major system test and evaluation with a mission capability focus. The Air Force will evaluate the F-22's fighter escort mission capability by flying F-22s as escorts for attack aircraft and assessing the level of the attack mission accomplishment, and will also compare that to results of F-15s flying similar missions. This approach will demonstrate whether the F-22 is effective in carrying out required combat missions and whether it provides a measurable improvement over the existing F-15 fighter force.

Comparative evaluations have been useful in other critical ways. In the past, systems sometimes failed to meet specified requirements. By comparing it with the current way of doing a mission, DOT&E was able to evaluate the new system more meaningfully. For example, the Army's M270A1 Multiple Launch Rocket System failed to meet its requirement to be able to move within a certain number of seconds after firing (rapid movement after firing helps survivability by moving before the enemy can respond with counterfire). Even though it failed the specified time requirement, it provided a significant improvement over the current capability, and to survivability.

Comparative evaluation also gives us a means to calibrate the difficulty of a test. A comparison base allows analysis to overcome significant inadequacies in test instrumentation and execution. Cases where comparative evaluations have proved useful include IOT&Es of: F-18 E/F, Longbow Apache, and Stryker.

Nevertheless, the realities of the high operational tempo of our forces in the war on terrorism, combined with the desire to get new capabilities into these forces as quickly as possible, increase the potential for systems to circumvent a rigorous acquisition process. Worse yet, our warfighters may get weapons without knowing their operational capabilities and limitations as demonstrated by adequate operational test and evaluation.

This concern has translated into action by the T&E community to inform warfighters about systems recently used in combat, and their effectiveness, such as the Patriot PAC-3.

- The Patriot PAC-3 completed its IOT&E prior to deployment but failed to demonstrate a ripple fire capability (which is the doctrine for ballistic missile threats). An early failure to salvo two missiles during testing was linked to a software problem that was corrected. During deployment the system successfully engaged two ballistic missile threats with ripple fired PAC-3 missiles.
- The ATFLIR lasers in the first Engineering Demonstration Models (EDMs) were not reliable enough to use in targeting laser-guided weapons. Operational commanders decided to not use those ATFLIR pods, deployed by the Navy to provide an early operational capability, in combat operations over Afghanistan. A second deployment of improved EDM pods in Iraq supported dozens of laser-guided weapons during combat operations with a 100 percent success rate.
- Joint Global Positioning System Combat Effectiveness (JGPSCE) field tests discovered potential weapon systems vulnerabilities to GPS degradation. The quick-look test results concerning these vulnerabilities provided valuable and timely information to warfighters during Operation Iraqi Freedom (OIF).
- To support an impending Stryker deployment to Iraq, the Live Fire Test and Evaluation armor-testing program was intensive. The objective was to verify that the armored vehicle system provides crew protection against munitions up to 14.5mm and reduces system vulnerability to rocket propelled grenades. The Army conducted limited testing of every armor configuration on the brigade vehicles and applied interim mitigation measures to those armor configurations that failed.
- The Joint Technical Coordinating Group for Munitions Effectiveness (JTCG/ME), which is part of DOT&E's Live Fire responsibility, published two interim versions of their Air-to-Surface Weaponeering System joint munitions effectiveness manual in direct support of Operation Enduring freedom (OEF) and OIF. Details are in the live fire section.

Missile defense provides another example of how the operational test and evaluation community is adjusting to the new acquisition environment of capabilities-based acquisition, and spiral development. In close coordination with the Missile Defense Agency (MDA), the Operational Test Agencies (OTAs), and the Joint Staff, a joint assessment team oversees development, review and approval of test plans, and provides input to military utility studies. Details are in the missile defense section.

Last year's annual report stated that T&E needed to serve the development process better by changing how it dealt with *people, processes,* and *facilities*. Developments on each account occurred during this past year. DoD put forward, and Congress enacted, a number of recommendations on *people* that will help maintain a flexible, expert workforce. These
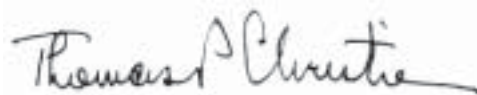
include a recommendation in the DOT&E report that would allow increased use of pay banding initiatives. The size of the T&E workforce remains a major concern.

With respect to *process* improvements, last year DOT&E recommended increasing the tempo of testing (related to the workforce size), develop common instrumentation, provide earlier involvement of operational military personnel, test before deployment, make testing more valuable, and address the shortfall in methodologies of Information Assurance and Interoperability.

- To increase the tempo of testing, we need to increase test resources and the means to move, share, analyze data and improve test design. Details are in the resources section.
- The Central T&E Investment Program (CTEIP) stresses the need for common solutions to instrumentation and other test capability problems.
- To make early involvement more effective, DOT&E has begun to apprise the Services at Milestone A of T&E information needs with evaluation plans.
- Early involvement of DOT&E should help the warfighters with respect to deployment before testing. This makes information available before the need to use a system in combat. It requires the early and sustained involvement of the Service OTAs, which continue to be understaffed. For example, the Air Force Operational Test and Evaluation Center will lose 68 military and 11 civilian personnel authorizations in FY04.
- A major finding noted last year was the need to test the way we fight. To do that, DOT&E recommended creating a Joint test and evaluation capability (Joint TEC). In 2003, our efforts to establish this capability evolved to address a Joint Forces Test Capability. Details are in the resources section.
- Congress directed DOT&E to assist Combatant Commanders in testing and evaluating fielded systems with respect to computer attack and other forms of information warfare, an effort known as Information Assurance (IA). This effort will focus on providing evaluations conducted in conjunction with major Combatant Commander training exercises. Details are in the IA section.
- DOT&E assumed management of the Joint Test and Evaluation (JT&E) Program in 2003. We have redirected that program to ensure joint tests provide quick and more relevant information to warfighters. An initial effort, undertaken at the suggestion of the Army, Air Force, and Marine Corps OTA Commanders, will evaluate the causes of battle damage to platforms in Iraq. The JT&E Program also served our forces well in preparation for OIF. Details are in the JT&E Program section.

Last year, legislation established a Defense Test Resource Management Center (DTRMC), responsible to the Under Secretary of Defense for Acquisition, Technology, and Logistics. The DTRMC is tasked with developing a strategic plan for infrastructure investment and with certifying the adequacy of budgets for test infrastructure and test programs. DOT&E will transfer both the CTEIP and the T&E Science and Technology Program to the DTRMC once it is fully established and staffed. In last year's annual report, DOT&E outlined the needs of T&E infrastructure. It included specific recommendations for improvement in *facilities* by warfare area. We believe the DTRMC, when it produces its strategic plan, must address these needs.

In the twenty years since the establishment of DOT&E by Congress, much has changed. This office has relied on its well-defined role as prescribed in the law. This has worked well, producing systems that improve mission capability such as those demonstrated in OIF. However, due to changing acquisition regulations and the growing complexity of combat, DOT&E will bolster its role, while maintaining our focus on evaluation of mission capability, adequate testing, and timely information that comes from early and continuous involvement.

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Director