U.S. Army Operational Testing Supports Homeland Security

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The creation of the Department of Homeland Security (DHS) is the most significant transformation of the U.S. Government since 1947, when President Harry S Truman merged the various branches of the U.S. Armed Forces into the Department of Defense to better coordinate the nation's defense against military threats. The U.S. Army stands poised to provide active support to the DHS in numerous ways, ensuring the utmost safety and reliability of equipment and services needed to continue the crucial task of protecting the United States from threats.

The Department of Homeland Security (DHS) represents a similar consolidation, both in style and substance, to President Truman's creation of the Department of Defense in 1947. In the aftermath of the terrorist attacks against the United States on September 11, 2001, President George W. Bush decided that 22 previously disparate domestic agencies needed to be coordinated into one department to protect the nation against these threats.

The new department's first priority is to protect the United States against further terrorist attacks. Component agencies will analyze threats and intelligence, guard U.S. borders and airports, protect critical infrastructure and coordinate the response of the nation for future emergencies.

The U.S. Army supports the efforts of the DHS in many ways, one of which is ensuring that reliable, safe equipment is available to help protect the U.S. homeland against potential future chemical and biological attacks. It must be understood, however, that equipment and systems that undergo operational testing do so in a *wartime* environment using typical soldiers. To adapt these systems to a civilian homeland security mission requires a shift in the operational testing paradigm, which would include rewriting doctrine, tactics, techniques and procedures for *civilian* operations.

U.S. Army Operational Test Command

The mission of the U.S. Army Operational Test Command (USAOTC) is to plan, conduct and report the results of independent operational tests and experiments in order to provide essential information for the decision-making process. USAOTC contributes to the Army's success on future battlefields by conducting realistic, objective operational tests and experiments using state-of-the-art technology and driven to excellence by a professional work force motivated by a commitment to the U.S. soldier.

USAOTC comprises nine test directorates and six staff and support directorates that plan, execute and report test events worldwide. The test directorates are commodity-oriented and cover the following functional areas: Airborne and Special Operations; Advanced Concepts Transformation Integration; Air Defense Artillery; Aviation; Command, Control, Communications and Computers; Close Combat; Engineer and Combat Support; Fire Support; and Intelligence and Electronic Warfare.

This paper focuses on those systems and equipment being tested by the Engineer and Combat Support Test Directorate (ECSTD) that directly support homeland security. ECSTD's mission is to conduct operational tests in support of the Engineer, Chemical, Military Police, Quartermaster, Transportation, and Ordnance Centers and Schools. The Maneuver Support Division of ECSTD is charged with conducting operational tests on maneuver support doctrine, equipment and systems associated with battlefield logistics, doctrine and support operations.

Addressing operational testing

Why conduct operational testing? Because U.S. Code 10, Section 2399 requires it: "A major defense acquisition program (MDAP) may not proceed beyond low-rate initial production (LRIP) until

[initial] operational test and evaluation (IOT&E) of the program is complete. Results of such tests must confirm that the items or components actually tested are effective and suitable for combat and whether the test and evaluation performed were adequate." There is no provision for a waiver in the law.

Operational test and evaluation does not include an operational assessment based exclusively on: computer modeling, simulation or an analysis of system requirements, engineering proposals, design specifications, or any other information contained in program documents.

Army Regulation 73-1 recommends the same methodology for operational tests of non-major systems. The majority of the operational tests that are planned, executed and reported by ECSTD are classified as non-major systems.

Just what *is* operational testing? It is a structured activity that takes a system or piece of equipment that has successfully passed a rigorous technical/developmental testing program (usually in a laboratory-type setting) and places the system or equipment into the hands of its intended user for further testing. Operational testing uses typical troops, realistic scenarios, logistics support and threat according to approved doctrine, tactics, techniques and operating procedures. In many cases, the test unit views the operational test as an opportunity for training so that testing and training occur simultaneously.

With these definitions and descriptions presented as a backdrop, what principal issues are examined in operational testing? Basically, ECSTD tries to obtain the answers to the following four questions: ***Does the system work? With proper training, can the soldier use it? Is it supportable?*** and, ***Is it survivable?*** These questions are answered below.

■ ***Does the system work?*** The performance of the system or equipment used by typical soldiers is scrutinized to ensure that the system will perform as advertised and that the mission will be completed. For the majority of systems, performance is the most important aspect of operational testing.

■ ***Can the soldier use it?*** Armed with technical manuals and training, the soldier must be able to effectively operate and maintain the equipment. Operational testing also validates the accuracy and readability of technical manuals and examines the impact of unit and individual training on operating and maintaining the equipment.

■ ***Is it supportable?*** The operational tester must document the reliability and maintainability of equipment under test. Reliability and maintainability experts analyze data and predict: how often the equipment or its components will fail; how long it will take to make repairs; and whether or not the proper types and numbers of repair parts are stocked.

■ ***Is it survivable?*** During operational testing, soldiers wearing mission-oriented protective posture (MOPP) gear operate the equipment to determine if it will survive on the battlefield or in a contingency situation. An examination also is made of noise levels and electromagnetic interference to determine if the equipment will be detectable on the battlefield.

To find the answers to these questions, a dedicated team of soldiers, civilians and test support contractors plan an event, execute the event and report the findings of the event. But *what is involved* in operational testing?

Requirements for operational testing

Operational test planning begins with a requirement for a new or replacement system. The requirement is usually described in a series of three documents: the Mission Needs Statement (MNS), the Operational Requirement Document (ORD) and the Critical Operational Issues and Criteria (COIC). Of these three documents, the COIC are most important to the operational tester. The COIC detail the key questions with standards to be answered by an operational test.

Once the COICs are finalized, a Test and Evaluation Master Plan (TEMP) is developed. The TEMP outlines all testing required for the system prior to fielding. While the TEMP is being staffed, the focus of testing shifts to the U.S. Army Test and Evaluation Command (ATEC). ATEC is composed of the USAOTC, the U.S. Army Developmental Test Command and the U.S. Army Evaluation Center (AEC).

The next step in test planning is the formation of an ATEC system team (AST). The team is composed of evaluators, testers, analysts and contractors from the various subcommands of ATEC that plan and execute tests and report the results. Using the COICs and ORD, the AST develops a pattern of analysis (PA). The OTC AST member takes the lead in its development with input from the AST. The PA defines the data elements and data requirements that support the measures for the test. The data elements help the operational tester develop the specific requirements for the test, that is, factors and conditions, instrumentation requirements, data collection tools and test players.

Using the PA as a foundation, the operational test team develops an event design plan and a

detailed test plan. These two documents lay out the roadmap for the test event to be executed.

As stated previously, the key issue to the operational tester is system performance or effectiveness. For example, for the Analytical Laboratory System-System Enhancement Program (ALS-SEP) being tested by ECSTD in direct support of homeland security, system effectiveness is composed of four issues: how well the system proceeds to the mission area (mobility); how well the soldiers use the system to identify hazards (system integration); how well the soldiers communicate with authorities (connectivity); and how safely the mission is executed (safety).

Using typical troops, realistic scenarios, logistics support and realistic threat scenarios according to approved tactics, doctrine and operating procedures, the test event is executed in accordance with a master events list (test driver) at a designated test site. For chemical and biological systems, the test site is often at a remote location such as Dugway Proving Ground in Utah.

The goals of operational testing are to test and train simultaneously, and to use the first unit equipped as the test unit. A group of data collectors, data managers and data analysts harvest the data; reduce the data by placing them in order and organizing them; and display the data for authentication. Once the data are authenticated, they are deemed an accurate reflection of what occurred on the test site and then are archived and published in a test report.

There are many challenges to the operational tester. Again, using the ALS-SEP as an example, the tester faces the following challenges and problems. Planning timelines for test events may be dramatically foreshortened. This may impact the availability of certain assets that require longer lead times to procure. System hardware may experience operational mission failures. The test unit must be trained and certified to operate and maintain the equipment during the test. Should changes to manning rosters or training programs occur prior to the initial operational test, then system effectiveness may be affected.

As the ALS-SEP program progresses, the operations, force structure, equipment and training will continue to be affected. At this point in time, the Tactics, Techniques and Procedures (TTP) are still maturing, in the form of a standard operations guide, and are being refined for optimal effectiveness. It is anticipated that diluted concentrations of actual toxic industrial compounds will be used as samples during the operational test. However, simulated biological agents will be used in lieu of actual biological warfare agents, because their characteristics and primary identification method (handheld assays [HHA]) have been previously tested and shown to be effective. The use of training HHA should not have an impact, because the HHA effectiveness is known, and the primary focus will be the adequacy of training and integration of procedures in using the HHA. Testing of chemical or biological systems present a very formidable challenge to the operational tester. Careful planning and execution of test events will mitigate the potential chemical and biological hazards.

Operational tests are planned based on multiple input from the user(s), evaluator, threat proponent and materiel developer. Operational tests are conducted on representative systems, with typical users in realistic environments, with adherence to approved plans. Operational tests are reported to provide authenticated test data and/or findings to AEC for evaluation or to other customers as required.

Army systems supporting homeland security

Brief descriptions of some of the systems/concepts that ECSTD is currently testing, or will be testing, to support homeland security are addressed below. The first two systems described have direct homeland security applications, while the remaining efforts, although developed for military applications, could be used for civilian defense operations.

■ *Weapons of Mass Destruction (WMD) Civil Support Teams (CST).* The WMD CST will support civil authorities at a domestic Chemical, Biological, Radiological, Nuclear and High-Yield Explosives (CBRNE) incident site by identifying CBRNE agents/substances, assessing current and projected consequences, advising on response measures and assisting with appropriate requests for additional support. The WMD CST is organized and equipped to rapidly respond to the scene using unit vehicles as the primary transportation method. Most of the equipment is stored in the vehicles for rapid deployment and is designed to be removable for maximum flexibility. The vehicles and equipment have been certified for air transport.

■ *Analytical Laboratory System–System Enhancement Program (ALS-SEP).* The ALS-SEP provides analytical technologies with enhanced capabilities for the detection and identification of chemical warfare agents and toxic industrial chemicals/toxic industrial materials (TIC/TIM). The ALS-SEP also has the capability to provide presumptive analyses with the team's handheld biological assays and to identify radiological isotopes. Within the ALS-SEP, shel-

ter operators have the ability to prepare, extract and store environmental samples, and to document environmental conditions, as well as their sample handling procedures, observations and analysis results. They also have a real-time capability to consult with subject matter experts and authorities on the results of their analyses. The ALS is a tool used by the WMD CST.

■ ***Nuclear Biological Chemical Reconnaissance Vehicle (NBCRV).*** The NBCRV configuration will be composed of a base infantry carrier vehicle. The base vehicle will have integrated life support (collective protection), environmental control (heating and cooling), driver's vision enhancement and power supply subsystems.

■ ***Joint Service Light Nuclear Biological Chemical Reconnaissance System (JSLNBCRS).*** The JSLNBCRS will have an onboard, integrated nuclear, biological and chemical (NBC) sensor suite to allow it to perform NBC reconnaissance, surveys and surveillance, as well as monitoring, marking, reporting and sampling.

■ ***Joint Service Lightweight Standoff Chemical Agent Detector (JSLSCAD).*** The JSLSCAD is a fully automatic, passive infrared detector that will detect the presence of nerve, blister and blood chemical agent vapor clouds at distances up to 5 kilometers. The JSLSCAD will provide real-time, on-the-move, chemical agent vapor detection for contamination avoidance or reconnaissance operations.

■ ***Joint Biological Standoff Detection System (JBSDS).*** The JBSDS is designed to detect, range and track probable biological aerosol clouds on a stationary platform up to 5 kilometers. The JBSDS will discriminate between biological and non-biological clouds and includes a detect-to-warn subsystem.

■ ***Biological Integrated Detection System (BIDS).*** The BIDS detects and identifies specific biological agents (eight agents) and has the capability of being upgraded and modified to identify other biological agents.

■ ***Joint Biological Point Detection System (JBPDS).*** The JBPDS will rapidly determine the presence of airborne biological agents and hazards in a point detection mode. It also will monitor the air for biological agents, conduct sample collection and identify 10 biological weapons agents (and can be upgraded to identify 12 agents).

■ ***Chemical Biological Protective Shelter (CBPS).*** The CBPS is a highly mobile, self-contained, chemically and biologically protected shelter that provides a contamination-free, environmentally controlled medical treatment area for personnel. It also will function as the primary shelter system for a surgical team.

■ ***Joint Protective Aircrew Ensemble (JPACE).*** The JPACE will be a lightweight, chemical and biological protective ensemble worn as a substitute for current flight suits. It will provide protection for a wear time of 30 days and a protection time of up to 16 continuous hours following a chemical and biological exposure without being decontaminated. JPACE also will provide protection against chemical and biological agents, which would cause ocular and other incapacitating features, for a minimum of 16 hours. It will allow the wearer to remove or eliminate liquid wastes during operations without exposure to contaminants in the surrounding air or surfaces.

■ ***Joint Chemical Environmental Survivability Mask (JCESM).*** The JCESM is a lightweight mask that provides 6 to 8 hours of respiratory and face protection against vapor and aerosol chemical/biological agents from upwind contaminated areas, as well as protection against minimal levels of liquid contamination.

Summary

With the 21st century now underway, the world has become a very dangerous place. The terrorist attacks on the United States on September 11, 2001, along with the proliferation of weapons of mass destruction in various locations across the globe, force the examination of all aspects of homeland security. With the formation of the DHS, the United States took a significant step toward protecting all Americans from terrorist threat.

The ECSTD, under the auspices of the USAOTC at Fort Hood, Texas, is leading the way to operationally test systems and equipment and to ensure that the soldiers have safe equipment that will work. By executing their missions, ECSTD and USAOTC are contributing significantly to the Army's support of homeland security. ❑

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