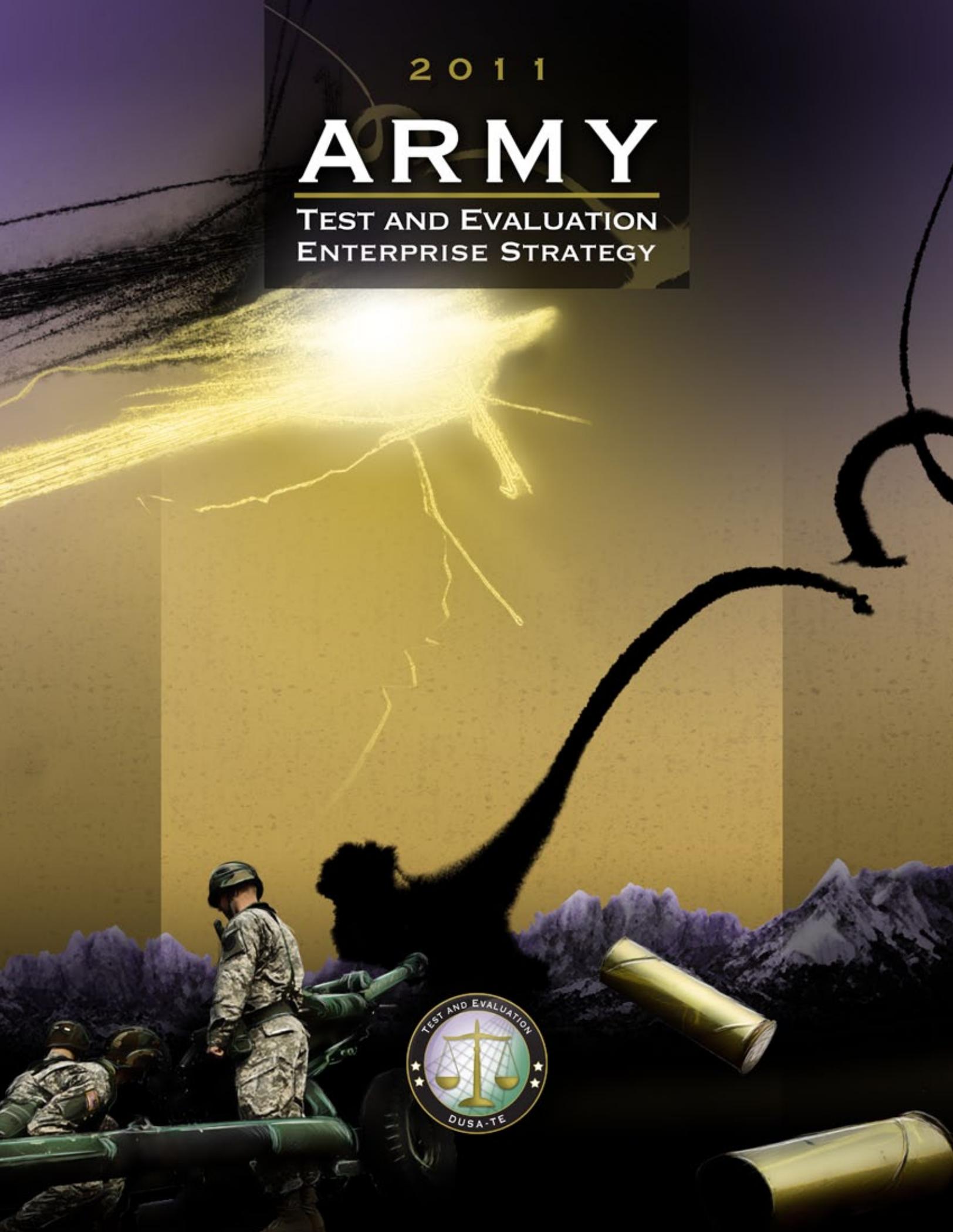


2011

ARMY

TEST AND EVALUATION
ENTERPRISE STRATEGY





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2011





INTRODUCTION

This document is the Army's Test and Evaluation (T&E) Enterprise Strategy. It outlines the various statutory and regulatory guidelines pertaining to T&E, provides an overview of the Army's T&E facilities and capabilities, summarizes the Army T&E Enterprise POM 13-17 achievements and provides strategic guidance for the T&E Enterprise as it begins to prepare for POM 14-18. The strategy summarizes the vision, objectives and investment strategy required to support the acquisition and fielding of Army equipment in concert with the Army Modernization Strategy and the Army Science and Technology Master Plan.

The Army T&E Enterprise made significant improvements over the last two POMs to repair and modernize infrastructure that was used extensively to test DoD and other government agency acquisition programs and rapid fielding initiatives in support of ongoing combat operations. We also invested efficiently to ensure the right workforce was available to provide test support and analytic services to quickly provide the best equipment available to our Soldiers. These themes continue in POM 13-17.

Current and future fiscal realities portend DoD will operate in a more resource-constrained environment. As the Army's share of Research Development and Acquisition (RDA) funding decreases, so too will the funds for T&E. Additionally, the Fiscal Year 2012 DoD supplemental funding request for Overseas Contingency Operations (OCO) was reduced by approximately 15%. Combined, these foretell a reduction of test requirements and as a result, a reduction in funding for the T&E Enterprise. To prepare, we must act now to operate more efficiently.

We must do this in an environment where Army senior leadership is pushing the T&E Enterprise to become involved earlier in the acquisition cycle. Army senior leadership wants materiel solutions faster than the acquisition cycle currently delivers new systems. The current Army Network Integration and Efficiencies effort is an example that is applicable to all acquisition systems. Changes in the way we address the challenges of the future require us to reexamine the composition of the T&E work force. These realities will require adjustment to our workforce to balance our expertise across the acquisition lifecycle.

Through all this, the Army T&E Enterprise will continue to provide senior leaders with relevant assessments enabling them to make acquisition decisions and provide safe, effective, suitable and survivable weapon systems to our Soldiers both in the current fight and for the unknown battles of tomorrow. That imperative will not change.

David K. Grimm
Assistant Deputy Under Secretary of
the Army, Test and Evaluation (Acting)





I. THE TEST AND EVALUATION (T&E) MANDATE

The requirement for T&E as an integral part of the acquisition of materiel systems is mandated by various laws, directives, and regulations. Summaries of the primary mandates are discussed below.

10 United States Code (USC) Sec. 2399, Operational Test and Evaluation of Defense Acquisition Programs, dated February 2010, is the primary statute from which Department of Defense (DoD) Directives, Instructions, and Army T&E regulations flow. Section 2399 is the primary reference for the requirement to conduct and report on operational testing. Major defense acquisition programs may not proceed beyond Low-Rate Initial Production (LRIP) until Initial Operational Test and Evaluation (IOT&E) of the program is completed. Additionally, Services may not conduct operational testing of a Major Defense Acquisition Program (MDAP) until the Director of Operational Test and Evaluation (DOT&E) of the Department of Defense (DoD) approves the adequacy of the test plans and the projected level of funding for operational T&E. The DOT&E analyzes the results of the operational test and evaluation conducted for each MDAP and provides a report to senior Defense Acquisition officials stating the DOT&E assessment of the adequacy of the T&E performed and whether the results of the T&E confirm that the items or components tested are effective and suitable for combat. A final decision to proceed with a MDAP beyond LRIP may not be made until the Director has submitted to the Secretary of Defense the report with respect to that program and congressional defense committees have received that report.

10 USC Sec. 2366, Major Systems and Munitions Programs: Survivability Testing and Lethality Testing Required Before Full-Scale Production, dated February 2010, is the primary reference for conducting Live Fire Test and Evaluation (LFT&E) to ensure survivability and lethality of the system. It states that a covered system, major munition, missile program, or product improvements to these systems may not proceed beyond LRIP until realistic survivability or lethality testing is completed

and the report required by statute is submitted to the congressional defense committees.

Department of Defense (DoD) Directive 5000.01, The Defense Acquisition System, dated 12 May 2003, provides management principles and mandatory policies and procedures for managing all DoD acquisition programs. It states that T&E shall be integrated throughout the defense acquisition process and structured to provide essential information to decision-makers, assess the attainment of technical performance parameters and determine whether systems are operationally effective, suitable, survivable and safe for intended use. The conduct of test and evaluation, integrated with modeling and simulation, shall facilitate learning, assess technology maturity and interoperability, facilitate integration into fielded forces and confirm performance against documented capability needs and adversary capabilities as described in the System Threat Assessment (STAR).

DoD Instruction 5000.02, Operation of the Defense Acquisition System, dated 8 December 2008, establishes a simplified and flexible management framework for translating mission needs and technology opportunities, based on approved mission needs and requirements, into stable, affordable and well-managed acquisition programs that include weapon systems and Automated Information Systems (AISs). Consistent with statutory requirements and DoDD 5000.01, it authorizes Milestone Decision Authorities to tailor procedures to achieve cost, schedule and performance goals. It states that the PM, in concert with the user and T&E community, shall coordinate all testing activities into an efficient continuum, closely integrated with requirements definition and systems design and development. The T&E strategy shall provide information about risk and risk mitigation, provide empirical data to validate models and simulations, evaluate technical performance and system maturity and determine whether systems are operationally effective, suitable and survivable against the threat detailed in the STAR. Adequate time and resources shall be planned to support pre-test predictions and post-test reconciliation of models and test results, for all major test events. The PM, in concert with the user and test community, shall provide safety releases to the developmental and operational testers prior



to any test using Soldiers/personnel. Completed independent Initial Operational Test and Evaluation (IOT&E) and completed LFT&E shall support a beyond low-rate initial production (LRIP) decision for acquisition category (ACAT) I and II programs for conventional weapons systems designed for use in combat as required by law.



AR 73-1, Test and Evaluation Policy, dated 1 August 2006, implements DoD policies and procedures and specifically assigns responsibilities for Army T&E activities during the system acquisition process. It implements the Army's continuous evaluation program, defines the role of the independent evaluators and includes

implementing policies for the Test and Evaluation Master Plan (TEMP). The Deputy Under Secretary of the Army, Test and Evaluation is revising this regulation and will publish the update in FY11.

DA Pamphlet 73-1, Test and Evaluation in Support of Systems Acquisition, dated 30 May 2003, provides guidance and procedures to implement T&E policy for materiel and information technology systems as promulgated by AR 73 1. It outlines the basic Army T&E philosophy; provides general guidance in support of materiel systems and information technology systems acquisition; guidance in support of system modifications and non developmental items; the Test and Evaluation Working-level Integrated Product Team (T&E WIPT); preparation, staffing and approval of the TEMP; detailed guidance on preparation, staffing and approval of critical operational issues and criteria to include key performance parameters; guidance on the planning, conduct, and reporting of system evaluation and guidance on the planning, conduct and reporting of testing (that is, developmental and operational) to include test support packages, test incidents, corrective actions, instrumentation, targets and threat simulators.

50 USC, Section 1522, Conduct of chemical and biological defense program, dated January 2009, outlines the management and oversight responsibilities for the conduct of the chemical and biological defense program. It states that the Secretary of Defense shall designate the Army as executive agent for the Department of Defense to coordinate and integrate research, development, test and evaluation and acquisition, requirements of the military departments for chemical and biological warfare defense programs of the Department of Defense. Regarding funding of the chemical and biological defense program, it states that the budget shall reflect a coordinated and integrated chemical and biological defense program for the Department of Defense. Funding requests for the program shall be set forth in the budget of the Department of Defense for each fiscal year as a separate account, with a single program element for each category research, development, test and evaluation, acquisition and military construction. Funding requests for the program may not be included in the budget accounts of the military departments. Funds for military construction for the program in the military construction budget



shall be set forth separately from other funds for military construction projects. Additionally, it states that all funding requirements for the chemical and biological defense program shall be reviewed by the Secretary of the Army as executive agent.

Public Law 107-314, National Defense Authorization Act for Fiscal Year 2003 Section 232, dated December 2002, clarifies the objectives for institutional funding of T&E facilities and differentiates overhead and direct costs. It states that the Secretary of Defense shall establish the objective of ensuring that the institutional and overhead costs of a facility or resource of a military department or Defense Agency that is within the Major Range and Test Facility Base (MRTFB) are fully funded through the major T&E investment accounts of the military department and the charge to an element of the Department of Defense for a use by that element of such a facility or resource for testing a particular program is not more than the amount equal to the direct costs of such use by that element. The act further defines the terms institutional and overhead costs as the costs of maintaining, operating, upgrading and modernizing the facility or resource; and does not include any incremental cost of operating the facility or resource that is attributable to the use of the facility or resource for testing under a particular program. The term direct costs is defined as those costs that are directly attributable to the use of the facility or resource for testing under a particular program, over and above the institutional and overhead costs with respect to the facility or resource.

DODD 3200.11 Major Range and Test Facility Base, dated 27 December 2007, provides policies and responsibilities for T&E infrastructure in support of acquisition systems. The MRTFB is a designated set of DoD installations, ranges and facilities operated and maintained for T&E missions governed by a uniform set of guidelines. The MRTFB provides a broad base of T&E capabilities sufficient to support the full spectrum of DoD T&E requirements. The Directive provides a list of Service and DoD MRTFB assets.

DODI 3200.18 Management and Operation of the MRTFB, dated 1 February 2010, establishes the management of MRTFB assets to support the DoD T&E mission. It outlines the responsibilities of the Services regarding the operation of test facilities; procedures for implementing MRTFB composition changes (adding, removing or closing facilities or ranges); scheduling of ranges and facilities; and reporting requirements.

LIVE FIRE TEST AND EVALUATION
TEST AND EVALUATION MASTER PLAN
SYSTEMS ACQUISITION
MAJOR RANGE AND TEST FACILITY BASE



II. THE ARMY TEST AND EVALUATION COMMUNITY

There are many organizations that play a role in T&E activities within the Army. The combat developer represents the user and develops and coordinates system operational requirements and test support packages; the materiel developer, or Program Manager (PM), assists with the design, planning, programming, coordination and execution of a viable T&E program; the developmental and / or operational tester plans and executes the necessary test events throughout a systems life cycle; the system evaluator plans, conducts and reports the results of the system evaluation or assessment regarding effectiveness, suitability and survivability; the logistician, who, in support of T&E, conducts the logistic evaluation of systems and assures that logistics are adequately addressed in the TEMP and detailed test plans; and the training developer develops the training strategy and training test support package for testing and certifies that the unit under test is ready for testing.

The Deputy Under Secretary of the Army, Test and Evaluation (DUSA-TE) Office provides oversight for the Army T&E Enterprise and coordinates all T&E issues with the Joint Staff and Office of the Secretary of Defense, specifically, the Under Secretary of Defense for Acquisition, Technology and Logistics, the Director, Operational Test and Evaluation and the Deputy Assistant Secretary for Developmental Test and Evaluation (DASA DT&E). DUSA-TE also oversees all Army T&E missions and functions, including formulating overarching Army T&E strategy, formulating policy and providing policy oversight, coordinating and staffing TEMPs and Test Plans (TP), guiding program direction and managing resources.

The U.S. Army Test and Evaluation Command (ATEC) is the organization that plans, executes and reports on the majority of Army tests. In addition to ATEC, the U.S. Army Space and Missile Defense Command / Army Forces Strategic Command (SMDC / ARSTRAT) conducts testing for various missile programs and Science and Technology efforts.

ATEC and SMDC / ARSTRAT conduct the majority of the developmental and operational testing for the U.S. Army Acquisition Community. While not addressed in this document, other organizations also conduct testing: the Corps of Engineers; the Intelligence and Security Command; the Army Medical Command; and the Army Special Operations Command all conduct testing on systems unique to their specific area.

Other key organizations in the Army T&E community include the Army Research Laboratory's Survivability / Lethality Analysis Directorate (SLAD), the Army Materiel Systems Analysis Activity (AMSAA), as well as the Project Manager for Instrumentation, Targets and Threat Simulators (PM ITTS). Each of these organizations will be discussed in detail in this document.

Figure 1 reflects those organizations within the Army that directly or indirectly impact Army T&E. Those organizations coded in green are the Army organizations with whom DUSA-TE interacts on a frequent basis. Those organizations coded in yellow are Army organizations with whom DUSA-TE interacts on a routine basis and they receive a portion of their institutional funding through the Test Joint Capability Area (JCA) that DUSA-TE manages and is the proponent.

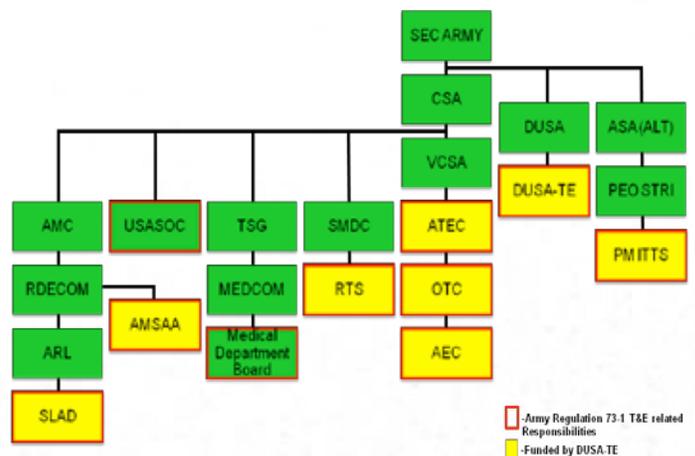


Figure 1. Army T&E Enterprise

With the speed of electronics and network capabilities ever increasing, the current acquisition system is challenged to field new capabilities before they are obsolete. To get ahead of this issue the Army established the Brigade Modernization Command, working in cooperation



with a triad between the Army T&E Enterprise, PMs and the U.S. Army Training and Doctrine Command (TRADOC) to conduct multiple symbiotic evaluations that leverage individual expertise and mission focus of each organization to understand broad interrelationships between systems.

This agile evaluation process will allow the triad members to perform various types of evaluations using the integrated data from a single test event. Evaluations involving the Material Developer, Combat Developer, Training Developer and Independent Evaluator will be done individually and collectively looking across the breadth of Doctrine, Organization, Training, Material, Leadership and Education, Personnel and Facilities (DOTMLPF). The goal is to streamline the integrated network system evaluations based on a nesting of the Operational Milestone Assessment Report (OMAR) and the DOTMLPF measures to achieve an integrated assessment faster, cheaper and more efficiently to rapidly field integrated solutions for the Warfighter.

The T&E Enterprise will use the agile evaluation methodology to drive a corresponding agile test planning process, ensuring the right systems are brought together under the right conditions to assess the overall capability to fill a defined capability gap. This structured approach to test planning, execution and reporting, will allow the Army to maximize the benefit of its acquisition resources in terms of cost, schedule, manpower and relevance.

The Secretary of Defense designated the Army as the Executive Agent responsible for the coordination and integration of research, development, test and evaluation and acquisition requirements of the military departments for the Chemical and Biological Defense program (CBDP). Figure 2 reflects those organizations that are directly or indirectly involved in testing for chemical and biological programs. The organizations that assist in the fulfillment of these responsibilities are included in Section III of this document.

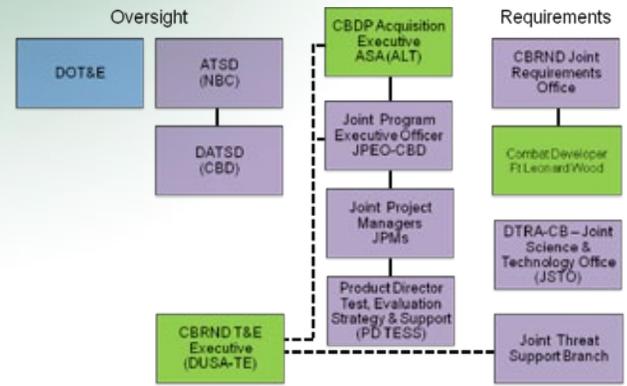


Figure 2. Chem Bio Defense Program Organizations

THE ASSISTANT DEPUTY UNDER SECRETARY, T&E (ADUSA-TE)

In accordance with General Orders 2008-06, March 2008, the ADUSA-TE is the Army T&E Executive and serves as the Director of DUSA-TE. The ADUSA-TE reports to the Deputy Under Secretary of the Army and is the senior advisor to the Secretary of the Army and the Chief of Staff, Army on all Army T&E matters. The T&E Executive is the Army member or advisor to various DoD T&E executive committees including the Joint T&E Senior Advisory Council, the Army Requirements Oversight Council (AROC), the Army Overarching Integrated Product Team (OIPT) and the Army Systems Acquisition Review Council (ASARC). The ADUSA-TE also chairs the CBDP Working-level Integrated Product Team. The T&E Executive is the Headquarters, Department of the Army (HQDA) approval authority for test-related documents including the TEMPs and Test Plans (TPs) for efficiency of testing. The ADUSA-TE also provides oversight and issue resolution to the CBDP T&E community on T&E related issues.



U.S. ARMY TEST AND EVALUATION COMMAND (ATEC)

On 20 June 2011, ATEC completed a major reorganization of the headquarters. The ATEC Headquarters (HQ) is located at Aberdeen Proving Ground, MD. The Army Evaluation Center (AEC), the Operational Test Command (OTC) and the ATEC ranges are subordinate organizations as shown in Figure 3.

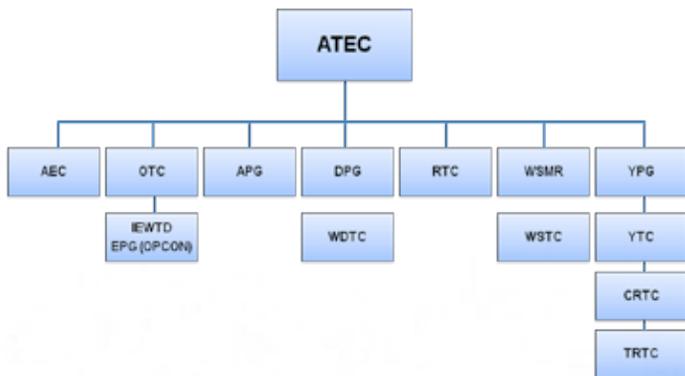


Figure 3. ATEC Organization Structure

ATEC plans, conducts and integrates developmental testing, independent operational testing, independent evaluations, assessments and experiments in order to provide essential information to decision makers. This map depicts the various ATEC range locations and headquarters.

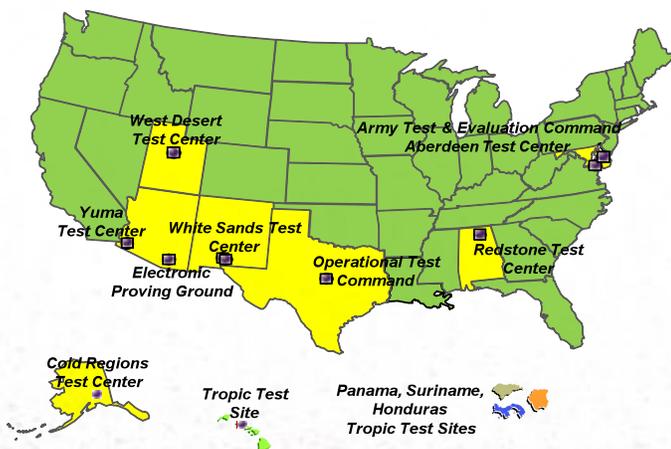


Figure 4. ATEC Test Range Locations

ATEC's primary products and services include:

- *Developmental Test (DT)*
- *Initial Operational Test (IOT)*
- *Customer Test (CT)*
- *Follow-on Operational Test (FOT)*
- *Limited User Test (LUT)*
- *Safety Testing*
- *Verification, validation, and accreditation (VV&A) of modeling, simulation, instrumentation, targets and threats simulators and simulations*
- *Live-Fire vulnerability and lethality tests*
- *Joint and Multi-Service tests involving Army materiel*
- *Force development tests in support of Army combat development process*
- *Field experiments and technology demonstrations*
- *Safety Releases/Safety Confirmations*
- *Operational Test Agency (OTA) Assessment, OTA Evaluation Report, OTA Milestone*
- *Capabilities and Limitations (C&L) Reports for Rapid Acquisition Initiatives*
- *Forward Operational Assessment (FOA) Teams*

ATEC manages the developmental test capability for testing DoD materiel, weapons and weapon systems throughout the acquisition cycle and manages the Army's live fire test mission. ATEC has been at the forefront of testing to support forward deployed Soldiers and units in support of Overseas Contingency Operations (OCO).

The Command has a large diverse inventory of test capabilities. ATEC tests military hardware across the full spectrum of cold regions, tropic, desert and other natural or controlled environments on highly instrumented ranges and test courses. ATEC offers a full range of test services, including technical feasibility of early concepts, determining system safety and performance, assessing technical risks during system development, confirming designs and validating manufacturers' facilities and processes at system, component and system-of-systems (SoS) levels.



ATEC's services are extended to all DoD, federal agencies, state and local governments, foreign and allied governments and private industry. ATEC works closely with Army PMs, the Army acquisition community and the T&E communities of the other Services.

The efficiency and effectiveness of the DoD T&E infrastructure are continuously monitored, improved and updated through the Tri-Service T&E Executive Agent structure and process. Within that structure, ATEC is the Army member of the Test Resource Advisory Group (TRAG). The TRAG oversees T&E infrastructure, identifying requirements for new capabilities and ensures that a valid test capability gap exists prior to any investment in test infrastructure.

Much of this work is performed through the application of the principles of T&E Reliance. In the Reliance process, the Services rely on each other's T&E capabilities to meet their T&E requirements when practical. Reliance also enables the Services' T&E communities to identify those proposed investments that may be duplicative so that unnecessary duplication of investments or capabilities does not occur. As an active member of integrated product teams (IPTs) that include testers and evaluators, as well as PMs and Program Executive Officers (PEOs), ATEC supports the development of the acquisition strategy, statement of work, performance specification, and test/simulation execution strategy.

In addition to conducting rigorous performance tests on weapon systems and materiel, ATEC tests equipment and systems under a variety of conditions and possible scenarios to characterize performance and ensure the safety of Soldiers. Test personnel report safety risks, recommending system restrictions when required to enhance Soldier safety. Validating the safety of systems and equipment is the key thrust of ATEC's safety verification program which is a critical part of the test mission.

ATEC developed unique modeling and simulation (M&S) initiatives providing the foundation for the command's current distributed test capability. This capability encompasses the varied roles of individual test centers which is a fundamental requirement for SoS testing.

ATEC executes its test mission at the following test ranges and centers, all of which are elements of the DoD Major Range and Test Facility Base (MRTFB), except the Redstone Test Center (RTC). Each of the ranges will have an expanded list of test capabilities in Annex A.

Aberdeen Test Center (ATC). ATC is situated at APG in Northeast Maryland and is the Army lead test agency for automotive, legally-mandated live fire vulnerability and lethality testing, direct fire, non-lethal weapons, unmanned ground vehicles, littoral warfare, Soldier systems, transportability and engineering equipment. A diverse, multi-purpose proving ground, ATC encompasses 90 square miles of engineered and dedicated land and water (40 miles of test track and 250 test ranges), including restricted airspace from the surface to unlimited altitude. ATC's comprehensive array of state-of-the-art capabilities and unique facilities, simulators and models enable testing and experimentation from the component and subsystem level to the integrated system.



ATC executes a cutting-edge information system that incorporates innovative data-acquisition technologies. Satellite/high-band communications, coupled with database technology, allow customers to access information regarding their programs in real time through the World Wide Web. This capability enables test customers to make rapid, rational and rigorous decisions throughout a system's life cycle.

ATC has a key role in conducting T&E of rapid material equipping initiatives in support of OCO and is providing technical leadership in moving the focus of developmental testing from platform centric testing to network centric system of systems testing.



West Desert Test Center (WDTC). WDTC is located at Dugway Proving Ground (DPG) in northern Utah and serves as the nation's Chemical and Biological (CB) Defense Proving Ground. The primary mission of the WDTC is testing of U.S. and Allied CB defense systems and performing nuclear, biological and chemical (NBC) contamination survivability testing of defense materiel.

The test center uses its state-of-the-art laboratories and chambers in concert with extensive field test grids to fully determine the performance characteristics of items being tested. Testers determine the reliability and survivability of all types of military equipment in a chemical or biological environment. WDTC supports both developmental and operational testing, including non-medical and medical diagnostics systems. In addition to WDTC's role as CB Defense Program (CBDP) MRTFB, DPG / WDTC also provides national and interagency support in chemical and biological defense training and non-CBDP activities, which are funded separately.

This remote and isolated installation is composed of almost 1406 square miles; the terrain varies from level salt flats to scattered sand dunes and rugged mountains. The isolated location provides an acoustically and electronically quiet environment, free from population encroachment.

WDTC is located next to the Utah Test and Training Range (UTTR) and when teamed together, provide the largest overland safety footprint in the United States for the support of aircraft weapons testing, aircraft tactical testing and training activities. DPG and UTTR maintain a "team" relationship to better serve customers and help utilize the many resources available.



In support of Presidential Decision Directives (PDD), WDTC also provides unique capabilities for Domestic CB Incident Response Courses and hosts challenging full-scale field exercises, complete with detailed laboratory training programs that enable emergency response organizations to validate their tactics, techniques and procedures for use during a chemical or biological weapons incident.

WDTC is also home to ATEC's Meteorological (MET) Division. This division provides world-class meteorological and atmospheric modeling support to all of ATEC's test facilities, as well as for CB defense model development, validation and testing.

White Sands Test Center (WSTC). WSTC is a unique combination of geography, laboratories, weather, personnel and support activities that make it ideal for modern land based testing. WSTC encompasses over 3200 square miles making it the largest all overland test range in DoD. WSTC is a multi-Service use range for testing of air-to-ground and ground-to-ground munitions as well as surface-to-air, air defense and fire support systems. WSTC is the Army lead test range for surface-to-air weapons testing.

The missile range is in the Tularosa Basin of south-central New Mexico with their headquarters located 20 miles east of Las Cruces, NM and 45 miles north of El Paso, TX. It is a fully instrumented (radar, telemetry, optical, global positioning system, timing, and meteorological) land range with restricted airspace that also supports space vehicle launches and landings as a backup site.

The modern Cox Range Control Center and Launch Complex facilities provide an extraordinarily effective range control and missile/rocket launch capability. In recognition of this unique capability, ATEC established WSTC as the command's Inter-Range Control Center (IRCC) for its Distributed Test Capability. In this capacity, WSTC will coordinate across ATEC's multiple locations to provide an integrated live, virtual and constructive test environment in support of network-centric, SoS testing. White Sands operates facilities that provide a full spectrum of battlefield environments for testing such as nuclear, electromagnetic, directed energy and natural environment. WSTC provides the off-range target sites for medium

and intermediate range ballistic missiles launched to support extended range tests. The Army will conduct the preponderance of Network Integration Testing at WSTC.



Tenant capabilities collocated at WSTC include: the Navy’s land-locked ship simulator (“Desert Ship”) which supports tests of shipboard fire control and ship-based missiles and the Air Force High Speed Test Track. In addition, White Sands supports various tests for the National Aeronautics and Space Administration (NASA), other government agencies and private industry.

The High Energy Laser System Test Facility (HELSTF) can conduct testing on high and intermediate power laser weapons systems, as well as perform a variety of tests to characterize High Energy Laser (HEL) performance. HELSTF is an accredited predictive avoidance site with the U.S. Strategic Command Laser Clearinghouse and is an approved above-the-horizon HEL test facility. There are test areas for full-scale target explosive and hazardous testing, material effects testing, and testing while under vacuum (simulated space environment). Capabilities exist for dynamic live-fire lethality testing against missiles, rockets, projectiles, remotely controlled ground targets and airborne targets.

Electronic Proving Ground (EPG). With a remote location and radio frequency interference-free environment, EPG is the principal Army test center for electronic systems, including the developmental testing of Command, Control, Communications, Computers, & Intelligence (C4I) systems and navigation and avionics systems. Located at Fort Huachuca, AZ, EPG has access to the 76,000 acres of this southeastern Arizona installation to conduct tests.

EPG is the premier government activity for testing distributed communication systems with emphasis on systems of systems testing. Facilities include a full range for testing of electromagnetic compatibility and vulnerability of tactical electronic equipment, the intra- and interoperability of tactical automated C4I systems (including software and documentation), Electromagnetic Interference (EMI), Electromagnetic Compatibility (EMC), Electromagnetic Vulnerability (EMV) and Thermal, Electromagnetic and Physical Equipment Stress Testing (TEMPEST) and electronic countermeasures testing. EPG has an in-house developed suite of test instrumentation including test control, test stimulation, test data acquisition and virtual jamming.



EPG also has personnel resident at Fort Hood, TX, working in the Central Technical Support Facility (CTSFF) as well as the National Counterterrorism/Counterinsurgency Integrated Test and Evaluation Center (NACCITEC) at Yuma Proving Ground. EPG has extensive test capabilities in the areas of global positioning system testing, propagation simulation, C4I battlefield simulations and the use of existing battle simulations in test and training activities.



Yuma Proving Ground (YPG). YPG, located in Southwestern AZ, is the Army lead test organization for DT conducted in extreme natural environments and consists of three subordinate test centers: Yuma Test Center (YTC), Cold Regions Test Center (CRTC) and Tropic Regions Test Center (TRTC). YTC conducts desert environment testing in AZ, CRTC conducts cold weather testing at Fort Greely, AK and TRTC conducts tropics region testing, operating from facilities in Schofield Barracks, HI and other tropic areas.

YPG is significantly involved in testing new technologies to detect and defeat Improvised Explosive Devices (IEDs) that continue to plague U.S. and coalition forces in Iraq and Afghanistan. YPG conducts these tests at the NACCITEC that includes the Joint Experimentation Range Complexes and other ranges including a 30,000-acre test site that resembles Iraq and Afghanistan in both climate and terrain.

Yuma Test Center (YTC). YTC is located on YPG and has over 1,300 square miles of desert terrain for testing and is larger than the state of Rhode Island. YTC is capable of realistically, accurately and safely testing nearly everything in the ground combat arsenal. This is the Army's desert environment test center and long / medium range artillery testing facility. YTC is the Army lead test range for gun and munitions testing.



In addition, many miles of test courses are used for testing prototype and operational combat vehicle systems, both wheeled and tracked. Developmental testing of Army manned

and unmanned aerial weapon systems are accomplished, to include armament (air-to-ground) and target acquisition equipment. Production acceptance testing for Army munitions programs is conducted at YTC. YTC tests all parachute systems for personnel and air delivery of materiel and supports extensive global positioning systems testing. In addition to its systems test mission, multiple range facilities and support systems have been developed to allow joint Service combined arms testing and training. YTC offers state-of-the-art mine, countermine and demolitions test facilities.

Cold Regions Test Center (CRTC). The Army's cold, winter, mountain and northern environmental test center is a large outdoor test area of over 1047 square miles with special use restricted airspace from the surface to unlimited altitude. The testing effort is centered at the Bolio Lake Test Complex, AK, from which CRTC accommodates a full range of cold weather or temperate climate tests depending on the season. Bolio Lake provides automotive cold start capabilities and a base for Soldier equipment tests. Ranges are also available for mine, explosives, small arms, direct fire, sensor, air defense, missile, artillery, smoke and obscurant and mobility testing.



CRTC can accommodate indirect fire testing with the capability of observed fire to 30 km and unobserved fire to 50 km. Indirect fire up to 100 km can also be accomplished by utilizing ranges near Fort Wainwright, AK with the impact on Fort Greely areas.

Supporting infrastructure includes a state-of-the-art test track and mobility testing complex, as well as facilities for surveillance testing, ammunition



storage, administrative areas, communications circuits, meteorological sites and an extensive network of roads and trails. Airfield-based and tactical air operations are supported and airdrop zones and facilities are available.

Tropic Regions Test Center (TRTC). TRTC provides customer services in Hawaii and other tropic areas in Central America, where it conducts tests on a wide variety of military weapon systems, materiel and equipment. Testing in the tropics addresses such environmental aggressors such as heat, humidity, solar radiation, insects, fungus, bacteria, rainfall and other factors that combine to rapidly reduce the performance of people, machines and materials.

Current and planned test capabilities include: Soldier systems test sites, corrosion testing at fixed facilities, a MANPACK portability course, exposure cages, firing range access and small caliber weapons firing. TRTC offers a diverse number of testing sites to meet the environmental testing needs of customers now and in the future.



Redstone Test Center (RTC). RTC, located at Redstone Arsenal, AL, is the Army's foremost tester of small rockets, missiles, aviation subsystems and components and associated hardware and equipment. It is unique in its provisions for testing inert and explosive components. Extensive laboratory and range test capabilities have proven to be effective means of verifying component, subsystem and system performance before committing to flight testing.

RTC is the only lightning effects tester of explosive items in DoD and is the Army's primary Electromagnetic Environmental Effects (E3) test facility for aviation systems. RTC operates the Army's largest rocket motor static test facility. The Center offers complete test capabilities for small rocket and missile systems to include flight, warhead and motor performance. All types of natural and operationally induced dynamic, environmental and electromagnetic testing can be performed. Sensor systems testing (radar and electro-optical) are conducted under simulated battlefield conditions including obscurants and countermeasures. RTC performs life-cycle and developmental technical tests, as well as quality assurance and stockpile reliability testing at Redstone Arsenal and throughout the world.



RTC also conducts airworthiness qualification and developmental flight testing of Army aircraft and associated systems. RTC maintains a fleet of test bed aircraft representing the Army's diverse fielded aviation systems (AH-64A/D, UH-60A/L/M, CH-47D/F, OH-58D and C-12). Several of these aircraft are specially equipped and instrumented to perform in-flight performance and handling qualities and evaluations whereby technical engineering data can be recorded or transmitted to ground stations for real time or post flight analysis. Instrumentation packages can be tailored for each flight test, making the aircraft a flying laboratory with a flexible "Open Air Range" capability. With a core competency in developmental flight testing of manned and unmanned aircraft and a professional cadre of military and civilian experimental test pilots, flight test engineers and technicians, RTC routinely conducts its mission throughout the continental U.S.



U.S. ARMY OPERATIONAL TEST COMMAND (OTC)

OTC, headquartered at Fort Hood, TX, plans, conducts and reports on independent operational tests, experiments and Rapid Acquisition Initiative (RAI) assessments to support Army acquisition program evaluation requirements and other events (whether test, experimentation or exploratory) that are conducted in simulated operational or combat environments with typical user Warfighters and as appropriate, representative materiel. The key difference of an operational test from other types of events is the employment of typical users to operate the system in the environment in which the system is expected to be employed after fielding.

OTC has the mission to conduct realistic testing in the critical areas of equipment, doctrine, force design and training. The command conducts the operational tests required by public law (Title 10) that provide significant data to Army decision makers on key Army systems and concepts.

OTC conducts Operational Assessments (OA) in support of RAIs which are conducted in response to current mission requirements. There are many RAI designated systems undergoing accelerated equipping timelines in order to provide equipment to meet the requirements of operational forces. During early stages of both Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF), the military issued many systems to units and troops without conducting sufficient T&E. The Army Staff determined that the absence of independent T&E was unacceptable for future RAI equipping activities. As a result, ATEC works with the appropriate agencies to determine which systems undergo independent T&E and to what degree.

Since 2004, ATEC has maintained a permanent forward deployed presence in theater to support ongoing operations. OTC was tasked to organize and deploy a team to conduct this mission. In January 2005, FOA Team I deployed for a six-month mission to conduct operational assessments on systems that included Rapid Fielding Initiatives (RFIs) and equipment procured in response to Operational Needs Statement (ONS) requests generated in theater. Since that time, ATEC has

maintained a FOA team presence in theater. Since the inception of the FOA team deployments, the ATEC mission has continued to evolve. That mission now encompasses: 1) Deploying FOA teams to support Overseas Contingency Operations (OCO); and 2) Liaising with major in-theater headquarters and integrating forward assessment teams to collect data on selected systems, provide essential information to Army leadership and acquisition decision makers and to expand Warfighter knowledge of system capabilities and limitations.

OTC is composed of 8 test directorates to include the newly formed Integrated Test and Evaluation Directorate (ITED) and two test support directorates – the Methodology and Analysis Directorate (MAD), and the Test Technology Directorate (TTD). Four of the test directorates are co-located with the HQ, USAOTC at Fort Hood, TX. They are the Aviation (AVTD), Maneuver Support and Sustainment (MS2TD), Maneuver (MTD), Mission Command (MCTD) Test Directorates. The MAD and TTD are also located at Fort Hood. The forward test directorates are the Intelligence and Electronic Warfare Test Directorate (IEWTD) at Fort Huachuca, AZ; Fires Test Directorate (FTD) at Fort Sill, OK with their own forward Missile Test Division at Fort Bliss, TX; Airborne and Special Operations Test Directorate (ABNSOTD) at Fort Bragg, NC; and the recently formed Integrated Test and Evaluation Directorate (ITED) at Fort Bliss, TX.

OTC also includes cells at two other locations. The cell at Fort Benning, GA provides support to the Maneuver Center of Excellence, and the cell at Fort Leonard Wood, MO supports the Maneuver Support Center of Excellence.

The backbone of OTC lies within the eight test directorates. They perform the detailed planning, execution and reporting for all tests and field experiments and RAI assessments involving doctrine, training, organization and materiel within their assigned functional areas. Figure 5 shows OTC's command structure.

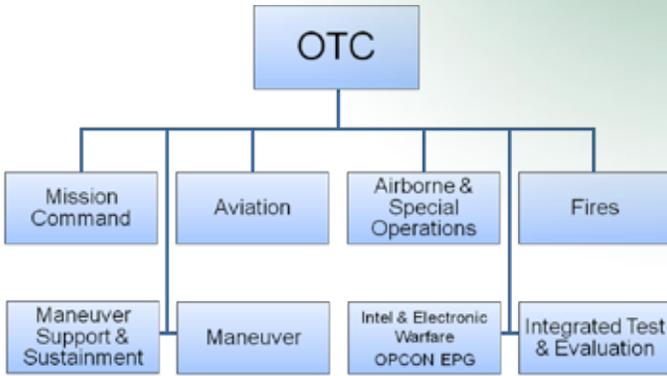


Figure 5. OTC Organizational Structure



Aviation Test Directorate (AVTD). AVTD consists of two divisions: Cargo and Lift and Attack and Reconnaissance. These divisions plan and conduct testing of all manned and unmanned aviation systems, tactical trainers and aviation countermeasure programs. AVTD essential functions include:

- *Conducting tests under the most realistic conditions possible to approximate the anticipated aviation environment*
- *Testing new aviation concepts, materiel and systems to consider their effects on the total force*

Airborne and Special Operations Test

Directorate (ABNSOTD). ABNSOTD is located at Fort Bragg, NC and is the Army's independent operational tester for airborne, airdrop and Joint Special Operations Forces. ABNSOTD essential functions include:

- *Test Soldier-essential Army combat systems that can be transported in, airdropped from or transported outside of Army or Air Force aircraft*
- *Determine risks associated with new aircraft, systems or procedures prior to use by operational paratroopers*
- *Test joint service equipment and aerial delivery methods, including:*
 - » *Parachute systems*
 - » *Air delivery techniques for new or modified combat equipment*
 - » *Individual weapons or equipment used by airborne forces*
 - » *Equipment transported inside or outside of military or commercial aircraft*
- *Conduct airdrop certification for delivering equipment loads and personnel to combat zones by testing:*
 - » *Internal loads aboard fixed-wing aircraft and helicopters*
 - » *External loads using helicopters*
 - » *Static line parachute procedures*
 - » *Military free-fall parachute procedures*
 - » *Low velocity or dual row airdrop loads using high performance USAF aircraft*



- *Testing equipment in theater without negatively impacting tactical missions*
- *Balancing support to the Warfighter with traditional acquisition efforts*



Fires Test Directorate (FTD). FTD is the longest standing test directorate within OTC and began testing in 1902. FTD is located at Fort Sill, OK and consists of the Artillery Test Division, Missile Test Division and a Support Division. FTD essential functions include:

- *Team with evaluators, developmental testers and materiel, combat and training developers to address test requirements and conduct operational test on field artillery & air defense artillery systems*



- *Develop and maintain all fire support, field artillery and air defense artillery instrumentation*
- *Represent OTC at the Fires Center of Excellence*

Intelligence Electronic Warfare Test Directorate (IEWTD) (OPCON to EPG). IEWTD, located at Fort Huachuca, AZ conducts operational tests for intelligence, surveillance, reconnaissance, electronic warfare, C-IED and biometric systems. IEWTD also operates an Intelligence Systems Integration Laboratory that is a state-of-the-art facility to conduct tests, experiments, demonstrations, training and other distributed activities in a collaborative secure environment. IEWTD essential functions include:

- *Provide robust live, virtual and constructive synthetic operational test environments employing validated threat models and simulations under realistic battlefield conditions to test current and future systems*
- *Conduct operational assessments at worldwide locations to support RAI, JIEDDO and the Warfighter's urgent requirements*
- *Develop validated intelligence and threat modeling and simulation tools*
- *Provide fully instrumented threat systems, dynamic realistic operational scenarios and*

automated data extraction tools to measure system performance under test conditions

- *Test the performance, effectiveness, suitability and survivability of systems under mission-type scenarios*

Integrated Test and Evaluation Directorate (ITED). ITED, located at Fort Bliss, TX, conducts tests on programs of record, rapid acquisition systems and emerging technology in semi-annual integrated networked baseline events. The ITED essential functions include:

- *Maintain close ties with the ATEC, Brigade Modernization Command (BMC), PEO-I and DA G3/5/7 to rapidly plan, coordinate and execute operational testing in a network-centric environment*
- *Provide data to inform senior Army materiel and other DOTLMPF decisions*
- *Establish CONUS Forward Operational Assessment capability to conduct rapid acquisition system assessments slate for fielding in support of Overseas Contingency Operations*

Maneuver Support and Sustainment Test Directorate (MS2TD). MS2TD conducts tests on combat engineer, chemical, transportation, military police, quartermaster, ordnance and medical service systems. MS2TD's essential functions include:

- *Designing tests for Army and other armed forces customers and agencies*
- *Testing a broad spectrum of Army and Joint service materiel, systems and concepts*





Maneuver Test Directorate (MTD). MTD conducts test of armor and infantry systems, is the lead directorate to test weapons and systems of the Army's Transformational Force and is also the lead directorate for Stryker testing. MTD's essential functions include:

- *Conduct tests for weapons, scopes, lasers, armored vehicles and future combat rifles*
- *Provide rapidly deployable teams to conduct operational assessments on systems in support of the Army's Rapid Equipment Fielding Initiative*



Mission Command Test directorate (MCTD).

MCTD conducts tests on Command, Control, Communications, Computer and Intelligence, Surveillance and Reconnaissance (C4ISR) systems. The MCTD essential functions include:

- *Test systems that process and transmit voice, data, messaging and video information through networks at the tactical, operational, strategic and sustaining-base levels*
- *Lead directorate for testing NETCENTRIC Battle Command and Communications systems*
- *Conduct forward operational assessments of Battle Command and Communication systems*



U.S. ARMY EVALUATION CENTER (AEC)

The AEC located in APG, MD, is the Army's independent system evaluator. During FY 2011, the AEC headquarters will fully consolidate at APG. AEC plans, supports, conducts and provides independent evaluations, assessments and experiments providing essential information to decision makers.

AEC has ten evaluation directorates: Ballistic Missile Defense (BMDED); Command and Control (C2ED); Fires (FED); Intelligence (IED); Integrated Logistics Support (ILS); Maneuver Air (MAED); Maneuver Ground (MGED); Reliability and Maintainability (RAM); Sustainability (SED) and Survivability (SVED). AEC also has a field office in Fort. Bliss, TX. Figure 6 shows AEC's organizational structure.

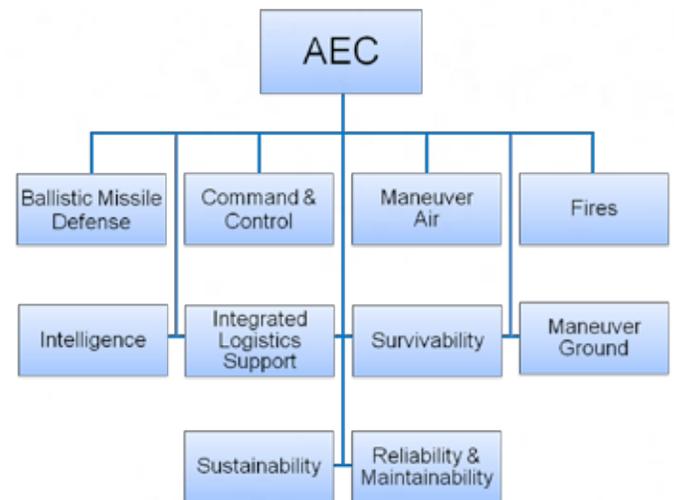


Figure 6. AEC Organization Structure

AEC is involved early and throughout the acquisition and total life-cycle process to ensure that T&E programs, strategies and objectives are consistent throughout the acquisition program. Since the results of T&E figure heavily in design and milestone decisions, early T&E involvement in the acquisition process serves to add value to the final product of any acquisition program. Working in coordination with ATEC and OTC, AEC assesses system performance to determine whether it is meeting developmental and operational expectations. This effort assists in discovering any potential problem early - when fixes are easier and less costly to the materiel developer.



AEC also supports key Army initiatives, such as, Advanced Warfighting Experiments (AWE), Army Technology Objectives (ATO), Joint Concept Technology Demonstrations (JCTD) and other fast track initiatives. In addition, AEC conducts the Army Continuous Evaluation program and live fire evaluations on all covered systems. AEC evaluates and reports on each system's effectiveness, suitability and survivability to Army senior leadership and when requested, to Congress.

U.S. ARMY SPACE AND MISSILE DEFENSE COMMAND / ARMY FORCES STRATEGIC COMMAND (USASMDC / ARSTRAT)

The USASMDC / ARSTRAT, located at Redstone Arsenal, AL provides the world's best space and missile defense capabilities to the Warfighter and provides for the protection of our homeland and the worldwide interests of the United States. To fulfill its test mission, USASMDC / ARSTRAT operates the Ronald Reagan Ballistic Missile Defense Test Site (RTS) located on the United States Army Kwajalein Atoll (USAKA) in the Marshall Islands. USASMDC / ARSTRAT includes combat, materiel and technology developers, as well as users, testers and evaluators.

U.S. ARMY KWAJALEIN ATOLL / REAGAN TEST SITE (USAKA / RTS)

USAKA / RTS operates a DoD MRTFB activity by providing multi-level strategic and ballistic missile defense system testing to include system interoperability testing, sensor system research and development testing, and conducting space operations to include space object identification, space surveillance and new foreign space launch tracking in support of the U.S. Strategic Command and NASA. The RTS vision is to be the Army's premier space operations and full-spectrum missile testing activity that, through transformation, provides increasingly relevant products and net-centric capabilities to support combatant commanders.



USAKA / RTS is located 2136 miles southwest of Hawaii on the Kwajalein Atoll in the Republic of the Marshall Islands. Eleven of the 100 islands comprising the Atoll are leased by the United States from the Republic of the Marshall Islands government. Contractor operated radar, optics, telemetry and communications equipment on eight islands provide instrumentation for ballistic missile and missile defense interceptor testing and space operations support.

Currently, USASMDC / ARSTRAT operates the majority of installation and medical services provided on USAKA for a community of 1500 military, government civilian, contractor and dependent personnel. Contractor operated logistics support services include housing, food services, medical/dental, K-12 schools, child-care, police, fire protection, postal, recreation, television, newspaper and transportation services. The Army is currently in the planning stage of reassigning USAKA to the Installation Management Command (IMCOM), as well as the other services to the appropriate Army or DoD agency. The test and space operations support functions of RTS will remain under the authority of the USASMDC / ARSTRAT.

The RTS conducts developmental and operational tests in support of the Air Force Minuteman III program, various programs of the Missile Defense Agency (MDA) and emerging hypersonic weapon technologies currently being developed by the Defense Advanced Research Project Agency (DARPA), the Air Force and the Army. Additionally, USAKA / RTS provides support to the commercial



entities Orbital Pegasus and Space-X for launch of their Falcon Launch Vehicle Family.



Because of its unique geographical location, the USAKA/RTS radars provide, within a half-hour of launch, critical first-revolution coverage of most Chinese, Russian, Japanese, French Guiana, Indian, and other Asian-continent launches. RTS also provides space operations support, maintains the near earth satellite catalog and provides tracking and surveillance of deep space and synchronous satellites, particularly those in low inclination orbits. USAKA/RTS supports the Compact of Free Association with the Republic of the Marshall Islands.

PROJECT MANAGER FOR INSTRUMENTATION, TARGETS AND THREAT SIMULATORS (PM ITTS)

PM ITTS, under the Program Executive Office, Simulation, Training and Instrumentation (PEO STRI), has the primary mission to manage the acquisition of optimized instrumentation, target and threat system products and services in support of U.S. Army, DoD, government agencies, industrial, and international customers. PM ITTS provides the centralized acquisition expertise of the research, development, production and fielding of test assets and investments in support of full-spectrum developmental and operational testing for the U.S. Army.

As directed by AR 73-1, Test and Evaluation Policy, and AR 381-11, Intelligence Support to Capability Development, PM ITTS is the Army's single manager and proponent for test Instrumentation, Targets, and Threat Simulators (ITTS) and represents the Army on joint service programs. In this role, PM ITTS develops and acquires ITTS through a tailored DoD 5000 series acquisition process that accounts for total life-cycle management of ITTS materiel. PM ITTS operates, manages, maintains, and accounts for the Army's inventory of targets and threat simulators/representations. Additionally, PM ITTS plans, programs, budgets, defends and oversees the execution of major test ITTS funding. PM ITTS provides representation as part of the Threat Accreditation Working Groups for targets and threat simulators and facilitates all Threat Validation Working Groups on behalf of DUSA-TE.



In support of its mission, PM ITTS manages three management offices responsible for the development, fielding and in some cases, the maintenance and operation of the items they produce for the T&E community. Figure 7 shows the PM ITTS organization structure.

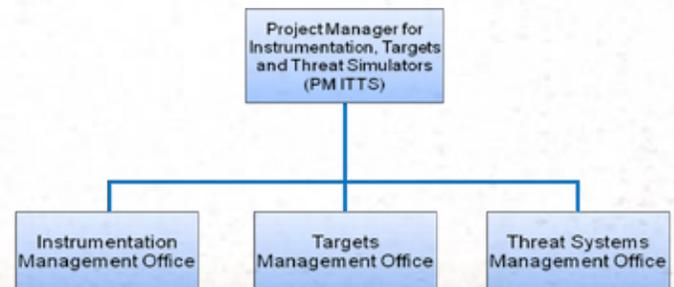


Figure 7. PM ITTS Command Structure



One of these offices, the Instrumentation Management Office (IMO), is located with the PM office in Orlando, FL, while the Targets Management Office (TMO) and the Threat Systems Management Office (TSMO) are located at Redstone Arsenal, AL.

Instrumentation Management Office

(IMO). The IMO mission is to manage the development, acquisition, and fielding of major test instrumentation systems used for developmental and operational T&E of the Army and Tri-Service related acquisition efforts. The mission includes eliminating duplication, combining requirements, and placing emphasis on mobility and reuse. IMO applies formal project management techniques to all of its projects, providing the best value to the customer. These projects provide the Army and other customers with test infrastructure and test infrastructure technology to support the T&E of current and future weapon systems. PM ITTS IMO projects are major test instrumentation development projects as defined in Army Regulation 70-1 Army Acquisition Policy (2-3u(4)) and Army Test and Evaluation Command (ATEC) Regulation 70-15 which have a value of greater than \$1M in a fiscal year (FY) or \$5M over the life of development.

Targets Management Office (TMO). The TMO mission is to manage the operation and life cycle of targets, operational threat vehicles, target control systems and ground range systems used in live and virtual testing and training. Additionally, TMO will provide best value acquisition, superior life cycle sustainment and operation for the U.S. Army, DoD and international customers and execute missions as assigned or directed by PEO STRI and PM ITTS.

Threat Systems Management Office (TSMO).

The TSMO mission is to manage the Army threat systems program to include the total life cycle of threat systems for testing and training in live, virtual, and constructive environments; and to execute other missions as assigned or directed by PEO STRI and PM ITTS in support of Army, DoD, Intelligence Community (IC), and international customers. The primary function of TSMO within its mission is threat Information Operations (IO) which

is inclusive of threat Computer Network Operations (CNO), Electronic Warfare (EW) and Military Deception (MILDEC).

PM ITTS customers are ATEC, TRADOC, Army field commands, reserve components, Army laboratories, other DoD Services and agencies, international cooperative activities, foreign military sales (FMS) and project managers/program executive offices requiring instrumentation, targets and threat systems. Additionally, the DoD Test Resource Management Center (TRMC) has delegated PM ITTS to act as their agent for program execution, financial management and tracking of annual funding execution for Army-led Joint Improvement and Modernization (JIM) projects including test systems that are developed to address tri-Service needs under the Central Test and Evaluation Investment Program (CTEIP). PM ITTS executes projects under CTEIP for which the Army has the lead responsibility. PM ITTS is the Executing Agent for TRMC's Directed Energy Test (DET) Test Technology Area (TTA) and is the Consolidated Contracting Activity (CCA) to support the remaining six TTAs for TRMC Science and Technology (S&T) office. For the live, virtual, and constructive simulation domains, PM ITTS executes developmental and operational test investments, including instrumentation, aerial/ground targets and target control systems and threat simulators and simulations. PM ITTS provides scalable threat simulations for the virtual testing and training environments, manages a variety of foreign materiel in support of testing and training and manages procurement lines in support of the production of test and training investment assets.

In addition, PM ITTS sponsors the Army Model Exchange in coordination with the Army Research, Development and Engineering Command (RDECOM) to provide a repository for government owned digital models for foreign and domestic vehicles and aircraft, promoting reuse for all DoD agencies involved in modeling and simulation.



ARMY RESEARCH LABORATORY'S SURVIVABILITY / LETHALITY ANALYSIS DIRECTORATE (SLAD)

SLAD, a subordinate activity of the Army Research Laboratory, is the Army's premier source of analysis and assessment of survivability, lethality, and vulnerability for senior leaders, developers and evaluators. SLAD is located at APG, MD, with additional sites at White Sands Missile Range, NM and Fort Monmouth, NJ. Figure 8 depicts the SLAD organizational structure.

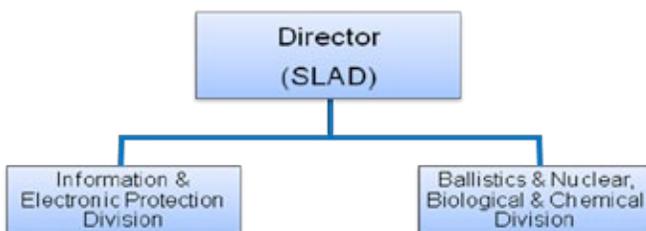


Figure 8. SLAD Organization Structure

SLAD's principal mission is to ensure that Soldiers and their equipment survive and function effectively on the battlefield. SLAD assists the Army achieve its modernization goals by helping acquire systems that help Soldiers survive in all environments against the full spectrum of battlefield threats. SLAD's products are the only Survivability, Lethality and Vulnerability (SLV) analyses in the Army that are integrated across the full spectrum of battlefield threats. These threats include ballistics, electronic warfare (EW), information assurance (IA) and computer network defense (CND) and chemical, biological, radiological and nuclear (CBRN). SLAD's core competencies are the analyses of ballistic vulnerability / lethality, electronic warfare, information assurance / computer network defense and SoS.

Ballistic Vulnerability / Lethality – Analyze weapons effects against materiel and personnel; conduct ballistic experiments; execute live-fire tests on Army aviation systems; and develop software tools to perform ballistic vulnerability and lethality analyses. These activities enable SLAD to recommend design improvements for enhancing the survivability of high-priority Army systems, to drive design decisions by PMs, and to support formal evaluation.

Electronic Warfare – Analyze the performance of Army sensors, electronic, and communications and network systems in a complex electromagnetic environment; identify susceptibilities; conduct laboratory investigations, hardware-in-the-loop experimentation and anechoic chamber measurements; develop hardware and software tools for open-air experiments; and provide mitigation techniques. These activities enable SLAD to provide recommendations to help drive design decisions by PMs and assist the Army's independent evaluator.

Information Assurance / Computer Network Defense (IA / CND) – Analyze the security of Army-specific off-the-shelf systems software to identify specific vulnerabilities and recommend mitigations; develop threat exploits; model real-world threat attacks; develop tools to portray threats; study and analyze threat technology; and experiment and test threat computer network operations against developmental and fielded systems. These activities enable SLAD to directly influence the design of systems and inform Army evaluations.

Systems-of-systems – Develop and apply methodologies and software tools to model the performance of systems of systems against ballistic, network attack, and EW threats. This capability is crucial to undertaking technology and system tradeoffs to illuminate and evaluate survivability aspects of competing capability packages in an SoS context and fills a critical and fundamental gap in the Army's acquisition and test and evaluation capabilities.

SLAD serves as a unique bridge between Research and Development (R&D) and T&E, providing value throughout the acquisition lifecycle. With experimental and analytical capabilities, SLAD is uniquely able to provide the data and insights required to formulate materiel requirements, enhance materiel design and inform acquisition decisions.



ARMY MATERIEL SYSTEMS ANALYSIS ACTIVITY (AMSAA)

AMSAA is the Army's Center of Excellence for materiel and logistics systems analysis to support decision making throughout the entire system life cycle. The AMSAA headquarters is at APG, MD, with additional sites at Redstone Arsenal, AL, and Letterkenny Army Depot, PA.

AMSAA also has analysts and engineers stationed as strategic partners at AMC Headquarters, Army Field Support Brigades in Iraq and Afghanistan and other organizations that AMSAA supports with critical analysis products and services. AMSAA's primary mission is to conduct analyses across the Materiel Lifecycle to inform critical decisions for current and future Soldier needs. Figure 9 depicts AMSAA's organizational structure.

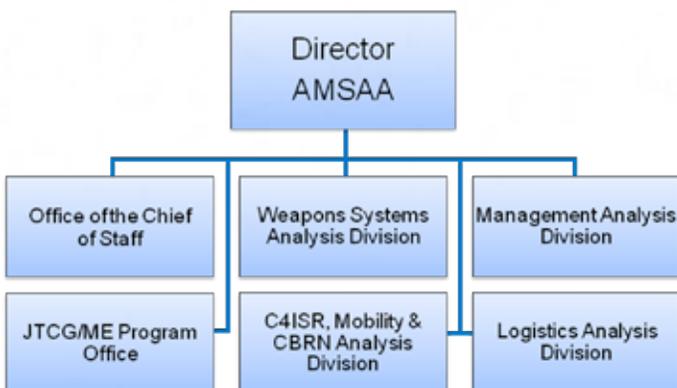


Figure 9. AMSAA's Organizational Structure

AMSAA's unique mix of analytical skills, expertise and core capabilities are vital in supporting Army Current Operations and Transformation decisions. The Weapon Systems Analysis Division (WSAD) provides item and system performance data, analyses and M&S for all Army direct fire, indirect fire and Soldier Systems. The Command, Control, Communications, Computers, Intelligence, Reconnaissance and Surveillance (C4ISR), Mobility, Chemical, Biological, Radiological and Nuclear (CBRN) Analysis Division (CIMCAD) provides item and system performance data, analyses and M&S for the full range of Army Combat Support and Combat Service Support systems.

These divisions focus on weapon and materiel systems performance from both the force projection and effectiveness aspect (i.e., application) as well as the vulnerability and survivability aspects of the system. In addition, CIMCAD provides data, analysis and methodology to support the Army in assessing its battlefield awareness capabilities, shortfalls and vulnerabilities from a C4ISR perspective. Finally, the Logistics Analysis Division is responsible for the collection and analysis of field data, assessment and evaluation of logistical concepts and policies and evaluating the cost and economic and resource implications of current and future logistical practices. AMSAA's independent analytical role across all of these functional areas is integral to the Army decision-making process and the T&E community.

AMSAA is organized and focused on five core business areas: item and system performance data, analyses and investment strategies; acquisition and technology support; logistics analyses (for materiel systems and wholesale/retail logistics systems, processes and programs); M&S for materiel and logistics systems; and business case, cost and resource analyses. These interdependent core competencies allow AMSAA to provide the Army with unique analytical capabilities spanning the full spectrum of Army Current Operations and Transformation programs and initiatives. In addition, AMSAA has developed foundational capabilities to conduct and support comprehensive SoS analysis in support of key Army decision-making needs.

AMSAA is the Army's center for item and system level performance analyses and certified data. In accomplishing the materiel systems analysis mission, AMSAA analyzes the performance and combat effectiveness of conceptual, developmental and existing systems. AMSAA has developed and uses unique models and methodologies to predict critical performance variables, such as weapon accuracy, target acquisition, rate of fire, probability of inflicting catastrophic damage and system reliability. AMSAA is responsible for the generation of these performance and effectiveness measures and for ensuring their standard use across major Army and Joint studies. AMSAA conducts and supports various systems analyses, including: analysis of alternatives (AoAs), system cost and performance tradeoffs, early technology tradeoffs,



weapons mix, technical risk level assessments and requirements analyses. The Army Materiel Command (AMC), the Army Secretariat and Staff, the Training and Doctrine Command (TRADOC), PEOs/PMs and DoD leadership uses this information to make acquisition, procurement and logistics decisions in order to provide quality equipment and procedures to the Soldiers.

AMSAA's M&S capabilities support the development, linkage and accreditation of live, virtual and constructive simulations and provide unique tools that support systems analysis of individual systems and the combined-arms environment. AMSAA maintains a significant number of models and simulations, most of which were developed in-house to address specific analytical voids. This M&S infrastructure provides a hierarchical modeling process that is unique to AMSAA and allows for a comprehensive performance, effectiveness and logistics prediction capability that can be utilized to make trade-off and investment decisions prior to extensive and expensive hardware testing and procurement. AMSAA is the Army's executive agent for the Verification, Validation & Accreditation (VV&A) of item and system level performance models. In this role, AMSAA assists model developers with

the development and execution of verification and validation plans to ensure new models and simulations faithfully represent actual systems.

AMSAA serves as the Army's Executive Agent for Reliability, Availability and Maintainability (RAM) standardization improvement by developing and implementing reliability and maintainability acquisition reform initiatives. AMSAA develops and applies reliability-engineering approaches that assess the reliability of Army materiel and recommends ways to reduce life cycle costs. The Physics of Failure (PoF) program pioneered the development of design and analysis tools to predict reliability and minimize potential redesign at the component level by utilizing computer-aided engineering tools in the analysis of root-cause failure mechanisms during the system design process.

A key component of AMSAA's analytic tool set is the capability to approach materiel acquisition challenges from a systems engineering perspective. In addition to developing a strong working relationship with the Army's acquisition community, AMSAA works closely with DoD to support Early Development Planning. AMSAA is working within this Office of the Secretary



of Defense (OSD) initiative to introduce more comprehensive analysis, earlier in the acquisition cycle, to support better identification of possible solutions to user needs, prior to program initiation. The largest impact of AMSAA systems engineering focused analysis is obtained earliest in the acquisition cycle. One of the key components of this early analysis phase is an initial, independent assessment of technology maturity by AMSAA. As an organic analytic capability, directly available to serve key Army decision makers, AMSAA uniquely provides a much-needed level of independent insight to inform tough decisions.

AMSAA does not work alone within the Army analytical community. AMSAA teams with the Center for Army Analysis (CAA) and the TRADOC Analysis Center (TRAC) to provide major in-house analytic support to inform Army decision makers throughout the system lifecycle. Working primarily at the systems level, AMSAA develops data and methodology and conducts analysis, which then feed higher-level studies at TRAC and CAA. In addition, AMSAA works directly with the Army Evaluation Center (AEC) to support the ongoing evaluations of Army and Joint materiel.

AMSAA is developing an Army Center for Reliability Growth (CRG) capability, which is a joint effort with AEC. The CRG mission is to develop critical tools, methodology, policies, formal guidance and educational materials needed to assist acquisition programs to achieve required system reliability standards and growth curves. The CRG will provide enhanced reliability growth standards, policy and tools that will enable the Army to improve reliability for future weapons systems, thus eliminating billions of dollars in sustainment costs over the system life cycle.

In addition to AMSAA analysts being co-located with key customers and stakeholders in CONUS and in theater, AMSAA maintains a large cadre of sample data collectors with units worldwide. These data collectors work directly with military personnel at the unit level to collect much-needed “real” data to support materiel fixes and improve unit supportability and readiness of our forces worldwide. This data feeds larger analyses and addresses real-time issues raised by commanders who need responsive solutions.

TEST INFRASTRUCTURE MODELING AND SIMULATION CHEMICAL AND BIOLOGICAL DEFENSE INSTRUMENTATION





III. CHEMICAL AND BIOLOGICAL T&E COMMUNITY

The Joint Chemical and Biological Defense Program (CBDP) is a DoD funded program that was established in 2003 in accordance with Public Law 103-160. The Assistant to the Secretary of Defense (Nuclear, Chemical and Biological Programs) directs the program and the Army serves as the Executive Agent. The primary components of the program are: Joint Program Executive Office, Chemical and Biological Defense (JPEO-CBD), Joint Requirements Office (JRO) CBRND (contained within J8 of the Joint Staff), Defense Threat Reduction Agency Joint Science and Technology Office (DTRA/JSTO), Assistant Secretary of the Army, Acquisition, Logistics, and Technology (ASA(ALT)) (Acquisition Executive), and Assistant to the Deputy Under Secretary of the Army for Test and Evaluation (CBDP T&E Executive).

As a joint program, all Services' T&E communities are represented by the CBPD T&E Executive. The CBPD T&E Executive: Oversees and provides governance for the CBPD Enterprise missions, functions and resources to support CBPD acquisition and fielding decisions; integrates T&E infrastructure gaps, priorities and requirements from across the CBPD community, including all Services and Joint T&E, acquisition and requirements stakeholders; ensures that CBPD T&E capabilities / infrastructure are adequately resourced and planned for adequate and credible T&E; and designates the lead Operational Test Agency (OTA) for acquisition programs. A brief description of the primary facilities, T&E capability developers, and assets are listed below:

ARMY

West Desert Test Center (WDTC). WDTC is designated as an element of the MRTFB for Chemical and Biological testing. The mission focuses on end-item testing of chemical and biological equipment for the Department of Defense for milestone decisions. The chemical and biological test facilities consist of the Combined Chemical Test Facility with 35 test suites supporting live-chemical-agent liquid, vapor, and aerosol

testing; the Life Sciences Test Facility with multiple live-biological-agent test chambers at the Biosafety Level-3 (BSL-3) with aerosolization capability; Materiel Test Facility with three environmentally controlled, vehicle-size live-chemical-agent chambers, the largest of which is 30x50x50 feet; outdoor test grids, and instrumentation for CB simulant field and chamber tests; and the Joint Ambient Breeze Tunnel (JABT) for chemical and biological simulant system tests and cloud characterization; and the Active Standoff Chamber (ASC) for testing standoff chemical and biological detectors with simulants. WDTC has a limited capability for transportable instrumentation to support simulant tests and operational tests in off-site environments. Additionally, a Whole System Live Agent Test (WSLAT) facility is coming online which will allow a complete system to be tested in a live agent environment.

U.S. Army Edgewood Chemical Biological Center (ECBC), located at APG, MD, is the nation's principal research and development center for non-medical chemical and biological defense. ECBC develops technology in the areas of detection, protection, and decontamination, including the design and development of algorithms for use in end-item defensive systems. Their facilities consist of BSL-3 and live-chemical-agent and simulant-aerosol-particulate bench chambers; CB protective filter and mask testing with live agents and simulants; small animal live agent testing; limited field simulant and interferent testing; two hazardous material explosion facilities for testing military unique chemical and industrial material; aerosol simulant chambers; non-traditional agent chamber; and the Aerodynamic Research Laboratory, comprising approximately 11,000 square feet of experimental aerodynamic facilities that include four wind tunnels for component and materials tests; and a 5 mph Breeze Tunnel, which primarily supports early R&D phases. ECBC is currently constructing an Non-Traditional Agent (NTA) test chamber, a new capability that is the first of its kind for emerging threats.



AIR FORCE

The Air Force Operational Test & Evaluation Center (AFOTEC) is the operational test activity of the Air Force and utilizes the BSL-1 lab for simulants at Eglin Air Force Base (AFB). Eglin AFB facilities consist of simulant vapor challenge test chambers, a collective protection (ColPro) Dynamic Entry/Exit Test Module, several test ranges, and an outdoor decontamination pad for use with chemical simulants. The Air Force Research Laboratory (AFRL) facilities, located at Wright Patterson Air Force Base consist of a BSL-3 lab and chemical stimulant test chambers.

NAVY

Naval Surface Warfare Center (NSWC), Dahlgren Virginia. The mission of the NSWC focuses on research, development, test, and evaluation in the fields of military safety testing, integrated warfare systems, weapons and ammunition, sensors and directed energy, and homeland and force (military personnel and equipment) protection. In support of their force protection mission, NSWC operates a CB test center for ship systems with capabilities including BSL-3, biotoxin and chemical agent simulant test capabilities; materials T&E laboratory for small-scale component, small and large coupon test samples—fully equipped for dynamic mechanical materials test methodology; corrosion laboratory; large coupon dynamic environmental test chambers; ship wash-down decontamination test facility with simulant; small-weapons post-decontamination functionality testing range; Long Term Chemical, Biological and Radiological (CBR) Filtration Evaluation Facility; and small-scale component and material decontamination tests using simulants.

JOINT PROGRAM MANAGER, NUCLEAR, BIOLOGICAL AND CHEMICAL CONTAMINATION AVOIDANCE (JPM- NBCCA) PRODUCT DIRECTOR, TEST EQUIPMENT, STRATEGY AND SUPPORT (PD TESS).

PD TESS was established in 2005 by the Joint Program Executive Office, Chemical and Biological Defense (JPEO-CBD) under the auspices of JPM-NBCCA. The mission of PD TESS is to support the T&E community with the development, acquisition, and validation of test capabilities to adequately test and evaluate chemical, biological, radiological and nuclear defense (CBRND) systems. The dynamic nature of the expanding CB threat necessitates an increased requirement for state-of-the-art technology and analytical tools to test and evaluate equipment being developed by CBDP community for the Warfighter. Through frequent coordination with the CBDP community to include the CBDP T&E Executive, JPEO-CBD, the Joint Requirements Office (JRO), service combat developers, operational test agencies (OTAs), and the S&T community, PD TESS provides solutions to T&E infrastructure requirements and validates new T&E capabilities that support the goal of achieving improved DOD, inter-agency and international T&E standards.



IV. POM 13-17 ARMY T&E AND CHEMICAL /BIOLOGICAL DEFENSE PROGRAM (CBDP) INVESTMENT STRATEGY

The following paragraphs will highlight the four major program portfolios the Army utilizes to manage T&E and CBDP resources and summarizes the program elements and any specific adjustments made during this POM.

STRATEGIC CONTEXT

The Army T&E Enterprise and CBDP investment strategy is synchronized with the Army Modernization Plan and the Army Science and Technology Master Plan to best support the acquisition and fielding of Army equipment. Additionally, the OSD CBDP FY 12-17 Program Strategy Guidance (PSG) emphasizes the importance of RDT&E infrastructure as an enabler for program success. It increases emphasis on the support of Homeland Defense (HLD), Overseas Contingency Operations (OCO), emerging threats, radiological/nuclear defense, biological surveillance and chemical, biological and radiological contamination survivability. This guidance remains the basis for the current and planned CBDP with supplemental direction to increase programmatic focus on medical countermeasures (MCM) and biosurveillance.

Major focus areas are to:

- *Sustain, restore and modernize test capabilities*
- *Invest in test technologies to: lower costs; improve reliability and capability; and reduce labor requirements*
- *Enhance network and cyber test methodologies and capabilities*
- *Improve threat realism in T&E events*
- *Standardize T&E methodologies and coordinate with the interagency and international partners where practical or feasible*
- *Identify the need for right sizing T&E infrastructure investment to address the testing of future CBDP systems and evolving CBD threats in accordance with the CBDP Joint Priority List (JPL)*

STRATEGIC GOALS

- *Sustain and operate Army and CBDP MRTFB, other test ranges and capabilities*
 - » *Ensure test ranges are postured to meet customer needs*
 - » *Optimize resources for best value*
 - » *Divest test capabilities not critical to the mission*
 - » *Increase support for medical programs, primarily diagnostics*
- *Focus investments on emerging threats and advanced technologies*
 - » *Ensure operational realism during testing*
 - » *Consider existing capabilities within and outside of DoD before identifying gaps, in order to reduce investments in redundant capabilities*
 - » *Add biosurveillance and NTA test capabilities and / or capacity*
 - » *Strategically assess best value, risks, and trade-offs*
 - » *Align S&T efforts with development of M&S tools and instrumentation*
 - » *Improve analytical capabilities*
- *Expand T&E standards development*
 - » *Leverage and integrate efforts across defense, federal, and other agencies*
 - » *Add biosurveillance, diagnostics, and medical areas to meet President's goals*
 - » *Accelerate implementation of the T&E standards development process*
 - » *Plan the path forward, with stakeholder involvement, for a test quality control program through the International Organization for Standardization (ISO) certification / accreditation of CBDP labs*
- *Leverage field exercises and training*
 - » *Improve capability to obtain field performance data*
 - » *Improve gap identification and T&E processes*



STRATEGIC APPROACH

1. ARMY TEST INFRASTRUCTURE

Provides funding for the direct support of test operations at ATEC ranges, the ATEC headquarters and test directorate personnel, Follow-on Test and Evaluation (FOT&E), Joint Test and Evaluation (JT&E) and Operational Test and Evaluation (OT&E) for all ACAT II-III systems where no system PM has been assigned and civilian and contract salaries for ATEC and the USAKA/RTS.

ARMY TEST RANGES AND FACILITIES

Funds operation of DT ranges and test centers. This includes; indirect operating costs not billed to customers; test equipment replacement, revitalization and upgrades to maintain test capabilities; improvements to safety, environmental protection, test efficiency and technological advances. Also provides for integrated test planning, safety assessment and verification. ATEC has unique DT capabilities to support independent T&E for funded weapon system programs and is required to assure technical performance, safety, reliability, supportability and quality of materiel in development and production.

METEOROLOGICAL (MET) SUPPORT TO RDTE ACTIVITIES

Funds standard and specialized weather forecasts and data for test reports to satisfy DoD and Army test requirements. Also funds the development of methodologies and acquires instrumentation and systems that allow meteorological teams to support current and future DoD and Army requirements.

SUPPORT OF OPERATIONAL TESTING

Funds OTC's T&E coordination offices, the ATEC Headquarters and recurring costs for OTC that are essential for conducting realistic and continuous testing in the critical areas of equipment, doctrine, force design and training. These recurring costs include civilian pay, core requirements for test support contracts, temporary duty, supplies and equipment. OTC, through its directorates, performs

detailed planning, execution, reporting of IOT&E and force development test and experimentation. Also funds the Army's direct costs to plan and conduct Multi-Service OT&E (MOT&E) of programs without an Army PM and Army requirements for JT&E to evaluate concepts and address needs and issues that occur in joint military environments.

PROGRAM-WIDE ACTIVITIES

Funds civilian labor and support costs for the technical direction and administrative functions of ATEC headquarters. Also funds information technology support for command-wide databases in support of the DT mission with oversight and management responsibility of all ATEC ranges and test centers.

ARMY KWAJALEIN ATOLL

Funds the government-managed/contractor-operated USAKA/RTS to support T&E of major Army and DoD missile systems. Programs supported include Army missile defense demonstration and validation tests; Inter-Continental Ballistic Missile (ICBM) development and operational tests; U.S. Space Surveillance Network; National Aeronautics and Space Administration (NASA) Space Transportation System (Space Shuttle); and orbital debris experiments. Also funds contractor salaries to accomplish installation operations and maintenance (O&M). Funds are required to maintain minimal O&M support to include facilities maintenance and repair, air and ground transportation, medical, food services, education and information management to the self-contained islands of USAKA.

The Army is currently developing a long-term sustainment strategy for all of the base operations support services provided at USAKA. The intent is to transfer the management and funding of these services to the Army or DoD staff agency that would normally provide these services on Army installations.



DOD HIGH ENERGY LASER SYSTEMS TEST FACILITY (HELSTF)

Funds the HELSTF to support Tri-Service HEL research and development; damage, vulnerability, lethality and propagation laser testing; and HEL weapon system testing. HELSTF also supports testing of laser effects for targets ranging from material coupon testing up through full-scale static and dynamic targets, explosive targets and testing of targets in a simulated space environment. Funds the upgrade of the mission control systems, develops state-of-the-art HEL diagnostic capabilities, data reduction, and a mobile HEL diagnostic test suite to support development, operational and SoS testing for potential HEL weapons in all relevant environments.

On 1 October 2011, the Army will transfer this test range from the SMDC / ARSTRAT to the ATEC.

2. TEST ANALYSIS AND EVALUATION

Provides funding for the personnel, equipment, software and other associated tools that enable the Army's analysis of test data. This analysis enables senior leaders to make informed decisions throughout the weapon systems procurement process.

LETHALITY AND SURVIVABILITY ANALYSIS

Funds analytical products necessary for the inherently governmental ATEC and AEC mission. Developed through measurement, experiment, test support and M&S, these products are used to improve the survivability of the force. Funds quantitative lethality and survivability analyses and data for fielded and developmental systems as the Army continues its transformation into a modular Brigade Combat Team (BCT) based organization. Specific survivability analysis products include assessments of systems such as MRAP; Stryker; BCT Modernization; Ground Combat Vehicle (GCV); fire support systems; direct fire munitions; air defense and missile defense systems; aviation systems including Unmanned Aerial Vehicles (UAV); communications and other systems enabling network enabled battle command; Computer Network Defense (CND); and select joint service systems particularly relevant to the Army's joint

and expeditionary role. Products include analysis and data concerning individual Soldier items including protective equipment such as helmets and vests. These survivability products are leveraged into rapid-equipping initiatives and other technical support for operational forces involved in the current fight. Continued development of these products also guarantees preservation of the Army's critical technical corporate memory for expert survivability advice.

MATERIEL SYSTEMS ANALYSIS

Funds civilian labor at AMSAA to conduct materiel systems analysis and integrated survivability and lethality analyses on all major and designated non-major Army systems. Focus areas include: information warfare; ballistic and live fire; Electronic Warfare (EW); chemical and biological warfare; RAM; and Electromagnetic Environmental Effects (E3). In particular, it funds civilians to conduct analysis efforts in the areas of item and system level performance; data development and certification; M&S; reliability and maintainability; standardization improvement; Verification, Validation and Accreditation (VV&A) of item and system level performance models; and performance and combat effectiveness of fielded systems and conceptual and developmental models to predict critical performance variables. Also funds the conduct of various systems analyses, such as: AoAs; system cost and performance tradeoffs; early concept and technology tradeoffs; weapons mix analyses; technical risk assessments; force protection analyses; and requirements analyses. In addition, funds M&S capabilities, that support the development, linkage and accreditation of live, virtual and constructive simulations and provides unique tools to support systems analysis of individual systems and the combined-arms environment.

ARMY EVALUATION CENTER

Funds integrated technical and operational evaluations and life-cycle continuous evaluation of assigned Major Defense Acquisition Programs (MDAP), Major Automated Information Systems, and In-Process Review (IPR) programs for major milestone decisions, materiel changes and materiel



releases in support of the Army Acquisition Executive and force development. Also funds civilian labor for the evaluation and test design missions and associated costs including temporary duty, support contracts, supplies and equipment. Additionally funds the “early involvement” initiative that co-locates ATEC liaison personnel with the PEOs and efforts to improve RAM. These initiatives leverage science and technology that leads to cost savings and design efficiencies early in a system’s development, thereby avoiding more expensive product improvement programs later in a system’s life cycle.

3. T&E INSTRUMENTATION

Provides RDTE and OPA funding for the development and procurement of instrumentation, targets and threat simulators on Army test ranges.

ARMY TECHNICAL TEST INSTRUMENTATION & TARGETS

Funds critical front-end investments for the development of new test methodologies, standards, advanced technology concepts for long-range requirements, future capabilities and advanced instrumentation prototypes for the ATEC. These capabilities support DT requirements of current Army systems and those supporting Army transformation, such as building the Army’s network-centric test capability using the Department of Defense architecture framework to integrate live, virtual and constructive models in realistic live and synthetic environments. Sustainment and improvement of instrumentation maintains existing testing capabilities at ATEC facilities by replacing unreliable, uneconomical and irreparable instrumentation and provides incremental upgrades of instrumentation and software to improve test data collection capabilities. Develops and sustains instrumentation and capabilities to provide the data necessary to support acquisition milestone decisions for all commodity areas throughout the Army and in direct support of all Army transformation elements.

Also provides the critical foundation necessary to develop and sustain ATEC’s current and future modeling and simulation (M&S) efforts critical to test and evaluate the increasingly complex systems of the future. As a result, this project also finances the technical development, enhancement, upgrade and maintenance of essential OT instrumentation necessary to achieve cost effective data collection, reduction, analysis, telemetry and processing. Also funds OTC’s effort to modernize and develop more robust, reliable and less intrusive non-major instrumentation and improve command and control, mobility and expand remote data collection capabilities.

MAJOR TEST AND EVALUATION INVESTMENT

Funds development and procurement of major test instrumentation to perform DT of weapon systems at ATEC ranges and test centers. Funds the development of major field instrumentation for OT, Force Development, Test and Experimentation (FDT&E), and AWE for OTC to support Army transformation. Each initiative is directly tied to tactical systems that support each of the five Joint Functional Concepts outlined in the Army Modernization Plan.

Funds improvement and modernization (I&M) for the Ronald Reagan Ballistic Missile Defense Test Site (RTS). Funding upgrades and combats parts obsolescence of the radars, telemetry, optics, communications, range safety, command and control and other equipment essential to meet requirements of the Services and DoD agencies. This effort will result in an overall reduction in the costs to sustain the instrumentation at USAKA / RTS.

THREAT SIMULATOR DEVELOPMENT

Also funds threat Computer Network Operations (CNO) teams. These teams replicate the hacker intent of state and non-state threats through identification of system vulnerabilities that could be exploited by threat forces replicating loss of service or exploiting network enabled systems to gain critical information.



TARGET SYSTEMS DEVELOPMENT

Funds development, acquisition, operation, storage, maintenance, and update of realistic high performance threat surrogates; acquisition of foreign equipment; development of virtual target computer models of ground vehicle targets; management of the ground target research, development, test and evaluation processes; multi-spectral aerial targets and of virtual target computer models of aerial targets; and the enhancement or update of developed and acquired targets to ensure availability for T&E customers.

Modern weapons require T&E using threat representative aerial targets to assess their effectiveness on the battlefield. In order to stress systems under test, aerial targets must have flight characteristics, signatures and other performance factors that emulate the modern threat. The target systems encompass a family of rotary and fixed-wing targets; full-scale, miniature and subscale targets; virtual targets; ancillary devices; and their control systems. Also funds the management of current assets and operates a centralized spare parts program and long-range planning to determine future target requirements.

SPECIAL EQUIPMENT FOR USER TESTING

Funds multiple programs for the Army threat simulator program and major OT instrumentation. The Army threat simulator program procures actual foreign hardware and Non-Developmental Items (NDI) that are integrated into a threat simulator design for user testing and training. Also funds the major OT instrumentation, FDT&E and AWEs. Initiatives are tied to tactical systems that support each of the five joint functional concepts outlined in the Army Modernization Plan (Force Application; Protection; Focused Logistics; Battlespace Awareness; Command and Control). In addition, these funds procure a variety of special equipment for user testing and supports the integration of the live, virtual and constructive domains in support of T&E.

Working closely with the threat intelligence community and ATEC, the Army established a threat systems requirements process for identifying new or upgraded threat systems to support T&E. Each capability is pursued in concert and coordination with existing Army and tri-Service capabilities to eliminate duplication of products and services while providing the proper mix of resources required to support Army testing and training.

PRODUCTION BASE SUPPORT AND INDUSTRIAL FACILITIES

Funds the establishment, modernization and expansion or replacement of test facilities used in production testing of weapons and tracked combat vehicles, aircraft, missiles, general support equipment, communication and electronic materiel and the components of these systems. Funding supports upgrade and replacement of technically or economically obsolete production test instrumentation to ensure complete and accurate test data is collected and safety and environmental hazards are minimized. Modernization of test instrumentation and equipment generally provides increased automation and efficiencies, improved data quality and quantity and cost avoidance to Army PMs.

4. CBDP FUNDING

CBDP T&E infrastructure must leverage the products transitioning from S&T and ensure integration into future test capabilities, especially for modeling and simulation. Coordination is ongoing with the Joint Science and Technology Office (JSTO) to focus on meeting T&E needs in S&T core programs; better defining test technology and methodology needs; and ensuring that core efforts in threat agent characterization and model development also support T&E.

Test adequacy is our highest priority. Establishing T&E Standards for both current and future testing facilitates quality test data while reducing expensive redundant testing. The current restrained budget environment increases the urgency of this effort. Acceleration of this effort can only be accomplished with increased funding.



Another key thrust for CBDP T&E infrastructure planning is to ensure quality control of all tests. Planning is being initiated to move toward ISO certification of test processes to ensure full quality and cost effectiveness of all testing. Quality control is critical to the reliability of test data, and is necessary to obtain the full benefit of T&E Standards implementation.

The need for new DoD CBDP T&E infrastructure will be determined based on a review of existing T&E capabilities, including industry, interagency, and international capabilities, in order to avoid redundancies. The cost effectiveness and affordability of any new CBDP T&E investment must be demonstrated before pursuing. In accordance with the Nov 10, 2010 DUSA-TE memorandum entitled “Efficient Use of the Department of Defense (DoD) Test Infrastructure”, PMs should avoid investing in contractor T&E facilities or assets outside of exceptional cases. Exceptional cases will be thoroughly documented as to why investment in the DoD test infrastructure is not endorsed by the JPEO-CBD.

T&E Infrastructure gaps remain in many areas. Some are currently being addressed, such as the NTA Research, Development, Test and Evaluation (RDT&E) capabilities, biological standoff and point detection test capabilities. Several are funded in future years and schedules are being aligned with the programs they support: Improved Decontamination testing, Test Grid upgrades for biological simulant detection challenges, and next generation swatch materials tests. A list of specific CBDP prioritized T&E capabilities gaps will be provided under separate cover.

Previously, test capability investments were aligned with testing in support of Milestone C. Most acquisition programs now require earlier testing in support of Milestone B, in order to adhere to the new DOD 5000 and Weapon Systems Acquisition Reform Act (WSARA) guidance and to reduce program risk. This requires earlier planning for T&E investments. Recent funding profiles have not permitted acceleration T&E infrastructure currently being developed. However, each T&E infrastructure project is being reviewed to

identify those that need to be accelerated to avoid unacceptable risk to an acquisition program, so that they can be prioritized in the POM process.



Development of an overall modeling architecture and tools is a critical need for all phases of RDT&E. These tools will facilitate assessment of operational risks and the impacts and contributions of each system and potential new system or upgrade to campaign/mission success.



V. TEST LINES OF OPERATION (LOO) FOR TRANSFORMATION

The United States Army has endured nearly a decade of sustained combat operations. Every day our Soldiers are on the front lines serving their country in order to defend our great Nation against a determined foe. Soldiers have sacrificed much during this period of protracted conflict and the future will demand further sacrifice. They deserve the very best equipment available to prosecute current and future conflicts.

The Army's current RDA funding amount has declined approximately 15% since Fiscal Year 10 and is forecast to remain at this reduced level well into the future. Additionally, the DoD Fiscal Year 12 supplemental funding request for OCO was reduced by 15%. The combination of these reductions in defense spending will lead to less overall funding for all acquisition efforts and result in less equipment to test. We should expect these downward trends in defense spending to continue. The T&E Community needs to aggressively prepare now to operate in a more resource constrained environment that will result in both less funding and less testing. While the T&E Enterprise adjusts to the era of reduced defense spending, we must never lose focus on our ultimate goal to provide the best equipment possible to our Soldiers.

It is also imperative for the T&E Community to stay synchronized with the larger Army Acquisition Enterprise to ensure that while we are operating with reduced funding, the T&E Enterprise continues to provide improved weapon systems to our Soldiers and does so faster. To prepare for the future the T&E Community will address the following Lines of Operation (LOO) in POM 14-18.

LOO 1. Balance the Workforce. The T&E Enterprise has grown substantially since 9-11 in order to accommodate the increased workload during wartime. With the anticipated reduction in RDA and OCO Supplemental funding the T&E Enterprise must prepare now for a reduction in testing and begin to posture the T&E workforce for continued success.

Army T&E organizations must develop a human capital strategy that reduces both the overhead in the organizational headquarters and at the test ranges while maintaining and improving on the critical skill sets required to test the increasingly more sophisticated weapon systems of the future. We must prioritize test capabilities, maintain core competencies and adjust the workforce to meet future requirements. In order to maintain a vibrant workforce the T&E Enterprise must recruit and train new testers and ensure that the vast knowledge currently resident with the existing workforce is passed on.

Additionally, T&E organizations must look for opportunities to leverage technology or automation investments to optimize the productivity of the workforce, thus becoming more efficient.

LOO 2. Test Capability Investment and Modernization. Over the last decade of persistent conflict, the T&E Enterprise was stretched to meet the demand for testing systems to field to the Warfighter. Test equipment, instrumentation and facilities were used at a quicker tempo than originally envisioned and as a result, require either refurbishment, replacement or modernization.

To implement test capability investment and modernization the Army T&E Enterprise must: develop life cycle management plans for the major test instrumentation items that invests to replace test capabilities before they become obsolete or conduct a service life extension as these capabilities reach the end of their intended life span; determine the significant sustainment cost drivers for existing test instrumentation, facilities and ranges and develop focused investment plans to reduce these costs; and determine if there are efficiencies to be gained by using alternative testing methods such as modeling and simulation with Live-Virtual-Constructive (LVC) technology to generate valid data points for evaluation.

System evaluations are driven by the analysis of data and that data is collected via test technology. Evolutionary weapon systems are becoming more complex and revolutionary weapon systems bring an entirely new capability to the warfighter. Both are driving the requirement for new test technologies. The Army T&E Enterprise must ensure that required test technologies are



developed and available in time to test future warfighting capabilities and provide useful insight to senior decision makers. Some of these technologies will have a role across various Service test requirements and as such the Army T&E Enterprise must take advantage of both the DoD Central Test and Evaluation Investment Program (CTEIP) and the Test and Evaluation Science and Technology Program to fund test technology shortfalls. These DoD programs will enable the Army to leverage funds from outside the Army to obtain test technologies to cover existing capability gaps.

LOO 3. Seamless Test Integration from S&T throughout the System Life-Cycle and Future T&E Capability Requirements. To keep pace with the Army's modernization efforts the T&E Enterprise must have an eye on the future. We must identify future Army and other Service systems that will require an upfront investment or a change in methods to test new systems. For example, Directed Energy, Net-centric, Unmanned and

Autonomous Systems and Multi Spectral and Hyper Spectral Sensors are promising new technologies that may require an investment in order to properly test these future systems.

Developmental Testers must get involved earlier in the acquisition cycle in order to reduce the risk for PMs as they prepare for OT. The T&E Enterprise must coordinate with the Army Science and Technology (S&T) community to identify promising technologies earlier and provide assistance in order to advance new technologies sooner. Our evaluation agencies must identify opportunities to assist Army S&T with technology readiness assessments. The Army T&E Enterprise possesses a wide-range of test and analytic capabilities that can and should play a key role in the accomplishment of this objective. LOO 3 supports the Army G-8's 2010 Modernization Plan LOO of developing and fielding new capabilities by leveraging technologies harvested for the Army S&T program and shortening the time between requirement identification and solution delivery.

LOO 4. Test Capability Divestment. As test requirements decrease, the T&E Enterprise needs to determine if there is excess capacity that it can divest. Test Organizations will need to justify maintaining redundant test capabilities based upon actual and forecasted test requirements. If excess capacity exists, develop a plan to divest and/or consolidate excess test capabilities in order to become more efficient. Test organizations must also determine whether they can obtain required test data with less equipment which will enable the T&E community to reduce sustainment and investment requirements. Additionally, test organizations must examine opportunities to leverage existing test capabilities throughout DoD when that makes sense.

This process will require leaders to make tough decisions that will enable the T&E Enterprise to adjust to the reality of reduced defense budgets. It is imperative that as the T&E Community examines how to operate with reduced funding, they maintain flexible and agile organizations capable of rapidly responding when our Nation's adversaries act in a manner our Defense Leaders did not anticipate. Countering improvised or homemade explosives is a current example that caught the Department off guard and required a rapid adjustment in the Army





T&E Enterprise. Regardless of reduced funding levels, the main focus of the Army T&E Enterprise to provide the best equipment possible to our Soldiers will remain constant.

LOO 5. Conducting efficient and effective testing. Army senior leaders require testing to be responsive to operational imperatives and enable risk-informed production and fielding decisions. The Army T&E Enterprise is committed to ensuring the operational and live fire T&E enable complete evaluation of operational effectiveness, operational suitability, survivability and lethality. DoD is in the initial stages of a long period of fiscal austerity that may drive decisions to restructure many acquisition programs. The T&E community is not immune to this reality and must seek efficiencies and improve effectiveness in order to provide improved weapon systems to our Soldiers. To allow the Army to make the most efficient use of the resources available we must work as a team and strive to ensure rigorous and efficient testing leads to adequate evaluations for all our programs, to include rapid acquisitions, technology development, networked (and non-networked) integration events in addition to Programs of Record. The T&E community will strive to develop the most efficient T&E programs possible. Test planning must also continue to be centered on conducting rigorous and efficient testing that leads to adequate evaluations. The goal is to understand systems performance within cost and schedule constraints in support of Army decision making. Providing quality data for system evaluation to ensure fielded systems are operationally effective, suitable and survivable will continue to be paramount for Army testing.

LINES OF OPERATION

LIVE-VIRTUAL-CONSTRUCTIVE

CENTRAL TEST AND EVALUATION INVESTMENT PROGRAM

ARMY SCIENCE AND TECHNOLOGY



VI. SUMMARY

This strategy is a broad overview of Army Test and Evaluation and provides an introduction to the primary policy documents, the T&E community and the manner in which Army T&E is institutionally funded. The Army T&E Strategy provides additional information and specific actions necessary to guide the Army T&E community toward the achievement of its stated vision, mission, and goals. Additionally, the Strategy for DOD Test & Evaluation Resources offers a wealth of information gathered from each of the Services regarding test capability area domains specifically targeted at building a tri-Service infrastructure that will be capable and available to meet the testing and evaluation needs of our weapon systems and military materiel.

Additional information regarding the Army test and evaluation community and current activities may be obtained on the Army Test and Evaluation Portal on AKO: <http://www.hqda.army.mil/teo>

For questions and comments regarding this document, please feel free to contact the following:

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GLOSSARY

ABNSOTD	Airborne & Special Operations Test Directorate
ACAT	Acquisition Category
ADUSA-TE	Assistant Deputy Under Secretary, Test & Evaluation
AEC	Army Evaluation Center
AFB	Air Force Base
AFOTEC	Air Force Operational Test & Evaluation
AFRL	Air Force Research Laboratory
AIS	Automated Information System
AMC	Army Materiel Command
AMSAA	Army Materiel Systems Analysis Activity
AoA	Analysis of Alternatives
APG	Aberdeen Proving Ground
AROC	Army Requirements Oversight Council
ASA(ALT)	Assistant Secretary of the Army (Acquisition, Logistics & Technology)
ASARC	Army Systems Acquisition Review Council
ASC	Active Standoff Chamber
ATC	Aberdeen Test Center
ATO	Army Technology Objective
ATEC	Army Test & Evaluation Command
AVTD	Aviation Test Directorate
AWE	Army Warfighting Experiment
BMDDED	Ballistic Missile Defense Evaluation Directorate
BCT	Brigade Combat Team
BSL	Biosafety Level
C2ED	Command & Control Evaluation Directorate
C4I	Command, Control, Communications, Computers & Intelligence
C4ISR	Command, Control, Communications, Computers, Intelligence, Surveillance & Reconnaissance
CAA	Center for Army Analysis
CB	Chemical & Biological
CBDP	Chemical & Biological Defense Program
CBR	Chemical Biological Radiological
CBRN	Chemical, Biological, Radiological & Nuclear
CBRND	Chemical, Biological, Radiological & Nuclear Defense
CCA	Consolidated Contracting Agency
CIMCAD	Mobility, Chemical, Biological, Radiological & Nuclear Analysis Division
C-IED	Counter Improvised Explosive Device
C&L	Capabilities & Limitations
CND	Computer Network Defense
CNO	Computer Network Operations
ColPro	Collective Protection
CONUS	Continental United States
CRG	Center for Reliability Growth
CRTC	Cold Regions Test Center
CT	Customer Test
CTEIP	Central Test & Evaluation Investment Program
CTSF	Central Technical Support Facility
DARPA	Defense Advanced Research Project Agency
DASA DT&E	Deputy Assistant Secretary for Developmental Test & Evaluation
DET	Directed Energy Test
DPG	Dugway Proving Ground
DoD	Department of Defense
DOT&E	Director of Operational Test & Evaluation
DOTMLPF	Doctrine, Organization, Training, Material, Leadership and Education, Personnel and Facilities
DT	Developmental Test
DTC	Developmental Test Command



DTRA	Defense Threat Reduction Agency
DUSA-TE	Deputy Under Secretary of the Army – Test & Evaluation
E3	Electromagnetic Environmental Effects
ECBC	Edgewood Chemical Biological Center
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
EMV	Electromagnetic Vulnerability
EPG	Electronic Proving Ground
EW	Electronic Warfare
FDT&E	Force Development Test & Evaluation
FED	Fires Evaluation Directorate
FMS	Foreign Military Sales
FOA	Forward Operational Assessment
FOT	Follow-on Operational Test
FOT&E	Follow-on Test & Evaluation
FTD	Fires Test Directorate
FY	Fiscal Year
GCV	Ground Combat Vehicle
HEL	High Energy Laser
HELSTF	High Energy Laser Systems Test Facility
HLD	Homeland Defense
HQ	Headquarters
HQDA	Headquarters, Department of the Army
I&M	Improvement & Modernization
IA	Information Assurance
IC	Intelligence Community
ICBM	Intercontinental Ballistic Missile
IED	Improvised Explosive Device
IED	Intelligence Evaluation Directorate
IEWTD	Intelligence & Electronic Warfare Test Directorate
ILS	Integrated Logistics Support
IMCOM	Installation Management Command
IMO	Instrumentation Management Office
IO	Information Operations
IOT	Initial Operational Test
IOT&E	Initial Operational Test & Evaluation
IPR	In-Process Review
IRCC	Inter-Range Control Center
IOS	International Standards Organization
IT	Information Technology
ITED	Integrated Test & Evaluation Directorate
ITTS	Instrumentation, Targets & Threat Simulators
JABT	Joint Ambient Breeze Tunnel
JCA	Joint Capability Area
JCTD	Joint Concept Technology Demonstration
JIEDDO	Joint Improvised Explosive Device Defeat Organization
JIM	Joint Improvement & Modernization
JPEO-CBD	Joint Program Executive Office, Chemical & Biological Defense
JPL	Joint Priority List
JPM-NBCCA	Joint Program Manager, Nuclear, Biological and Chemical Contamination Avoidance
JRO	Joint Requirements Office
JSTO	Joint Science & Technology Office
JT&E	Joint Test & Evaluation
LFT&E	Live Fire Test & Evaluation
LOO	Line of Operation
LRIP	Low-Rate Initial Production
LUT	Limited User Test
M&S	Modeling and Simulation



MAD	Methodology & Analysis Directorate
MAED	Maneuver Air Evaluation Directorate
MCM	Medical Countermeasures
MCTD	Mission Command Test Directorate
MDA	Missile Defense Agency
MDAP	Major Defense Acquisition Program
MET	Meteorological
MGED	Maneuver Ground Evaluation Directorate
MILDEC	Military Deception
MOT&E	Multi-Service Test & Evaluation
MRTFB	Major Range & Test Facility Base
MS2TD	Maneuver Support & Sustainment Test Directorate
MTD	Maneuver Test Directorate
NACCITEC	National Counterterrorism/Counterinsurgency Integrated Test & Evaluation Center
NASA	National Aeronautics & Space Administration
NBC	Nuclear, Biological & Chemical
NDI	Non-Developmental Item
NSWC	Naval Surface Warfare Center
NTA	Non-Traditional Agent
O&M	Operations & Maintenance
OA	Operational Assessment
OCO	Overseas Contingency Operations
OEF	Operation Enduring Freedom
OIF	Operation Iraqi Freedom
OIPT	Overarching Integrated Product Team
OMAR	Operational Milestone Assessment Report
ONS	Operational Needs Statement
OPA	Other Procurement Army
OSD	Office of the Secretary of Defense
OT	Operational Test
OTA	Operational Test Agency
OTC	Operational Test Command
OT&E	Operational Test & Evaluation
PDD	Presidential Decision Directives
PD-TESS	Product Director, Test Equipment, Strategy and Support
PEO	Program Executive Office
PEO STRI	Program Executive Office for Simulation, Training & Instrumentation
PM	Program Manager
PM ITTS	Program Manager for Instrumentation, Targets & Threat Simulators
PoF	Physics of Failure
PSG	Program Strategy Guidance
R&D	Research & Development
RAI	Rapid Acquisition Initiative
RAM	Reliability, Availability & Maintainability
RDECOM	Research, Development & Engineering Command
RDT&E	Research, Development, Test & Evaluation
RFI	Rapid Fielding Initiative
RTC	Redstone Test Center
RTS	Reagan Test Site
S&T	Science & Technology
SED	Sustainability Evaluation Directorate
SLAD	Survivability / Lethality Analysis Directorate
SMDC / ARSTRAT	Space & Missile Defense Command / Army Forces Strategic Command
SoS	System of Systems
STAR	System Threat Assessment Report
SVL	Survivability, Vulnerability & Lethality
SVED	Survivability Evaluation Directorate
T&E	Test & Evaluation



T&E WIPT	Test & Evaluation Working-level Integrated Product Team
TEMP	Test & Evaluation Master Plan
TEMPEST	Thermal, Electromagnetic & Physical Equipment Stress Testing
TMP	Targets management Office
TP	Test Plan
TRAC	Training & Doctrine Command Analysis Center
TRADOC	Training & Doctrine Command
TRAG	Test Resource Advisory Group
TRMC	Test Resource Management Center
TRTC	Tropics Region Test Center
TSMO	Threat Systems Management Office
TTA	Test Technology Area
TTD	Test Technology Directorate
UAV	Unmanned Aerial Vehicle
USAF	United States Air Force
USAKA	United States Army Kwajalein Atoll
USC	United States Code
UTTR	Utah Test & Training Range
VV&A	Verification, Validation & Accreditation
WDTC	West Desert Test Center
WSAD	Weapon Systems Analysis Division
WSARA	Weapon System Acquisition Reform Act
WSLAT	Whole System Live Agent Test
WSTC	White Sands Test Center
YPG	Yuma Proving Ground
YTC	Yuma Test Center



ARMY MRTFB TEST CAPABILITIES

Aberdeen Test Center

Automotive Vehicles Track
Command, Control, Communications & Computer Complex
Direct Fire Systems
Electromagnetic Environmental Effects Complex
Engineering Equipment Facility / Range
Indirect Fire Systems Range
Littoral Warfare Complex
Environmental Effects (MIL-STD 810) complex
Nuclear Weapons Effects Laboratory
Soldier Systems Complex
Transportability Range
Unmanned Ground Vehicles Track
Vulnerability / Lethality Track / Range

Electronic Proving Ground

Command, Control, Communications & Computer Complex
Electromagnetic Environmental Effects Complex
Environmental Effects (MIL-STD 810) complex

High Energy Laser System Test Facility

Laser Complex

Reagan Test Site

Missile Defense Systems Complex

West Desert Test Center

Active Standoff Chamber (Chemical / Biological simulant detection test chamber)
Carr Test Support and Storage Complex
Joint Ambient Breeze Tunnel (JABT) - *CB detection and cloud characterization Complex (simulant only)*
Chemical Warfare Agent (CWA) Performance Complex (CCTF and MTF)
Decontamination CWA and Simulant Performance Complex
Life Sciences Test Facility (LSTF) and Baker Lab - Biological Warfare Agent (BWA) Performance Facility
Special Ops test/training support Complex
Outdoor Range Test Grid Complex - *Instrumentation and support (outdoor field simulant DT/OT) Complex / Range*
Meteorological Complex

White Sands Test Center

Air / Missile Defense Systems Complex
Command, Control, Communications & Computer Complex
Electromagnetic Environmental Effects Complex
Electronic Countermeasures-IED Range
Environmental Effects (MIL-STD 810) complex
Missile / Rockets Complex
Nuclear Weapons Effects Complex
Vulnerability / Lethality Complex



Yuma Test Center

Air Delivery Systems / Air Drop Range
Air / missile Defense Systems Range
Aircraft Systems Complex
Automotive Vehicles Track
Direct Fire Systems Range
Engineering Equipment Range
Indirect Fire Systems Range
Environmental Effects (MIL-STD 810) complex
Soldier Systems Complex
Unmanned Aircraft Systems Range

Cold Regions Test Center

Environmental Effects (MIL-STD 810) complex
Extreme Natural Environments Range

Tropics Region Test Center

Extreme Natural Environments Range



ARMY NON-MRTFB TEST CAPABILITIES

Redstone Test Center

Aircraft Systems Complex

Missile / Rocket Test Complex

Unmanned Aircraft Systems Range

Environmental Effects (MIL-STD 810) complex

Electromagnetic Environmental Effects Complex

Yuma Test Center

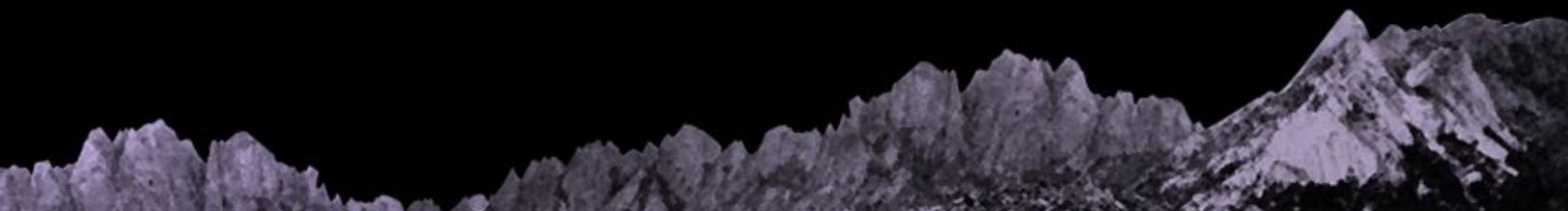
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