
THE ESSENTIAL COMPONENT OF TESTING: **THE SOLDIER**

CPT W. BRANDON SCHREINER

I could not believe my eyes. It was the summer of 2009, and I was just beginning my second tour in Iraq as an Infantry executive officer. I was in Al Taqaddum, known as “TQ,” and I had never been in a place more remote, desolate, and utterly hot. Yet, here in the middle of the desert, I was staring in disbelief at the latest answer to the improvised explosive device (IED). Organized in ranks and files that stretched for as far as I could see sat an enormous quantity of mine-resistant, ambush protected (MRAP) vehicles. I was there to sign for my vehicles and had just stepped inside the gated compound. The sight was astonishing and mystifying: how did these get here? Every one of the colossal 26-ton vehicles was fully outfitted and combat ready.

Over the course of my next two deployments, I watched with gratitude and amazement as I saw how well these MRAPs performed. They routinely defeated IEDs that would have surely crippled the original up-armored HMMWV I had used as a platoon leader. At the time, the magnitude of this success perplexed me. Now, several years later, I am an acquisition officer serving as an operational tester and have new insights. As a former Infantryman, I would like to share these insights with the Infantry community. This article provides an overview of the unique role operational testing plays within the large Army acquisition effort to get new products into the hands of Soldiers. Soldiers are the essential component in an operational test (OT). Soldiers provide critical feedback for new equipment development and simultaneously benefit from the peculiar perks of an OT.

There are nearly 600 individuals who are devoted to operational testing in the Army, just a fraction of the 38,000 civilian and 2,000 military whom the Acquisition Corps comprises. Testers work alongside many other government

agencies to focus primarily on the performance of new equipment. Though a small part of the workforce, operational testers account for a majority of interaction between acquisitions and the end-user: the Soldier. The small team of operational testers routinely partners with units across the Army to conduct OTs. These tests combine Soldiers with new equipment in a “test-drive” using a scenario deliberately and meticulously designed to challenge the equipment under realistic conditions and provide Soldiers the best opportunity for feedback.

On the surface, an OT appears similar to a standard unit training event. However, the primary focus is not training. The goal of an OT is to gather Soldier feedback and determine strengths and capabilities of new equipment. An OT captures how Soldiers rate the effectiveness, suitability, and survivability of the equipment under test as it supports them in their accomplishment of the mission. Information collected from an OT goes to senior Army leaders, and along with other information, supports acquisition and fielding decisions.

OT events occur later in a product’s development. The U.S. Army Training and Doctrine Command (TRADOC) initially determines new equipment requirements and then passes them to a Program Manager (PM) to develop and field. In the final stages of development before fielding, every new product must conduct the major OT event required by law: the Initial Operational Test and Evaluation (IOT&E).

An IOT&E is normally the final gate for a new piece of equipment. There are also other OT events, such as a Limited User Test (LUT) or Development Test/Operational Test (DT/OT). These are similar to an IOT&E but not necessarily a final gate. PMs program LUTs and DT/OTs early in a product’s developmental timeline to incorporate

A shipment of MRAPs sits inside Camp Liberty in Iraq on 30 October 2007.

Photo by SGT Mark B. Matthews



Soldiers at key intervals to prepare for a successful IOT&E.

Every test has an assigned test officer — usually a captain, major, or GS-12 (a civilian roughly equivalent to an Army major) who is responsible for the success or failure of the test — and a test NCO in charge. Tests range in size and scope, from one day to three months in length and \$50,000-\$10 million in cost.

OT teams can comprise as few as three individuals or as many as 100 — including contractors — depending on the size of the test. Regardless of test cost or size, all OTs share the most important factor: the Soldier. A barrage of questionnaires, surveys, after action reports (AARs), and other methods are used to capture Soldiers' complete feedback during an OT.

During the test, Soldiers are asked specific questions on equipment performance and continuously encouraged to give their candid opinions. The effort to collect information from Soldiers — the eventual end users — is the crux of an OT. It is not out of the ordinary for one Soldier to answer more than 1,000 survey questions throughout an OT. Specifically trained individuals on the test team, operations research systems analysts (ORSAs), are in charge of this data collection and churn the mountain of raw Soldier feedback into quantifiable information.

The U.S. Army Operational Test Command (OTC) is located on West Fort Hood, Texas, and serves as the one-star headquarters for the community of testers. OTC's nearly 600 personnel are dispersed over seven test directorates (Airborne and Special Operations, Aviation, Fires, Integrated Test and Evaluation, Maneuver, Maneuver Support, and Mission Command), a headquarters, and additional staff sections specializing in design methodology, test technology, and integration.

The mission of OTC, the Army's only independent test organization, is to conduct "independent operational testing to inform acquisition and fielding decisions for the Army and select joint Warfighting systems." It has a one-of-a-kind mission I find replete with variety and intriguing problem sets. It also stays busy: last year OTC conducted 64 tests across the world. Test officers may conduct up to six major events in one year while simultaneously managing the planning requirements for another six the next year.

OTC and OTs represent a mere slice of the total acquisition effort to field the best new equipment to our Soldiers. Once TRADOC determines a new requirement, the timeline for equipment development can span years. An extreme example is the Bradley Fighting Vehicle, which took 17 years to develop.

There are also a slew of other concerned entities. PMs fall under 11 Program Executive Offices (PEOs), such as PEO Soldier or PEO Ground Combat Systems. PEOs and their subsidiary PMs oversee acquisition timelines and program life

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cycles of the entire Army equipment inventory, ammunition, simulations, and more.

The equipment manufacturers, or "vendors," routinely solicit and compete for contracts from the PEOs and PMs to develop the required product. PEOs and PMs interface with Congress for funding and integrate contracting officers, engineers, budget analysts, ORSAs, and others to keep their programs on time and budget.

After a vendor manufactures a new material item, developmental testing must first demonstrate its reliability and safety before an OT puts it in the hands of Soldiers. DT is a complement of OT. For a new vehicle, such as the MRAP, DT entails driving thousands of hardball and cross-country miles at Aberdeen Test Track in Maryland as well as testing of live-fire survivability, extreme braking, maximum acceleration, speed, turning, and other performance factors.

DT subjects equipment like weapons and radios to extreme weather and operating conditions. DT is very objective and determines equipment performance parameters. DT occurs in specifically constructed environments; locations such as Aberdeen Proving Grounds, White Sands Missile Range (N.M.), and the Cold Regions Test Center (Alaska) offer dedicated resources for the controlled and repetitive conditions required. Together DT and OT account for well under one percent of a total product acquisition cost and life cycle.

OT is only required when new equipment will cause a significant change in Soldier interface versus existing systems. For example, the recently fielded lighter 240L and the improved M2 .50 caliber machine guns were both straightforward upgrades, so no additional OT was required.

TRADOC and PMs continuously work to upgrade the Army inventory as new technology becomes available or affordable. If you have ever questioned an antiquated piece of equipment on your modified table of organization and equipment (MTOE), trust that TRADOC (specifically for the Infantry: the Maneuver Center of Excellence) still considers it integral to the Infantry's infrastructure and/or there is not an alternative that is economical or feasible.

An estimated 12 Infantry companies and 1,000 11B Infantrymen (called player units) participated in OTs last calendar year. After one week into my first OT, I could assert that most Infantry Soldiers have no idea what to expect as a player unit during a test. However, all soon realize an OT is essentially just a company or battalion-level training event, depending on the size of the test.

The best units realize that an OT is an extraordinary training opportunity. The test team begins planning and resourcing months in advance. Intermittent progress reviews and test concepts are developed in conjunction with the PM, TRADOC, Army Evaluation Center, and other stakeholders; and briefed to OTC leadership for approval.

An OT is meticulously designed using the player unit's MTOE and mission essential task list (METL) against a robust and realistic threat, validated by TRADOC G2. The player unit also typically provides Soldiers to serve as opposing forces. At the start of an OT, the player unit walks into and executes thoroughly planned and intentionally challenging training scenarios. Upon completion of a good OT, the player unit will depart exhausted yet satisfied.

At my last test, the player unit's battalion commander positively described the scenarios as grueling and equivalent to back-to-back Joint Readiness Training Center (JRTC) rotations. In fact, senior leaders from player units routinely praise OT events as phenomenal experiences and training opportunities. Another favorable perk: OTC provides all required funding.

If you are identified as a player unit, fence off all the required Soldiers (plus a few reserve) for the test time frame and leave the week before and after the test open for preparation and recovery, respectively. Approach the upcoming test just as you would a gunnery or situational training exercise.

The test team is responsible for most of the resourcing, planning, and calendar; the player unit typically provides MTOE equipment, helps with range facility reservations, and parallel plans for live fires and range execution. The player unit also remains responsible for their Soldiers' safety assessment and composite risk management; the test team provides a safety release regarding the equipment under test. Two-way communications between the test team and unit are key. It not only facilitates a smooth test but decreases turbulence on a unit's schedule as well.

Before the test, an advance element from the test team deploys to the test site and establishes the team's footprint. During my last test, the team occupied more than 20 buildings, though sometimes a test required only a single trailer. There is typically a test headquarters, logistics cell, data management cell, and operations cell; the site is similar to a battalion or company tactical operations center (TOC) and fully furnished by OTC. The operations cell is complete with maps, radios, desks, projectors, and work/meeting spaces.

Immediately preceding an OT, the PM will host new equipment training (NET) for the player unit, delivered by the equipment vendor. Soldiers receive classroom and hands-on training on the piece of new equipment straight from the

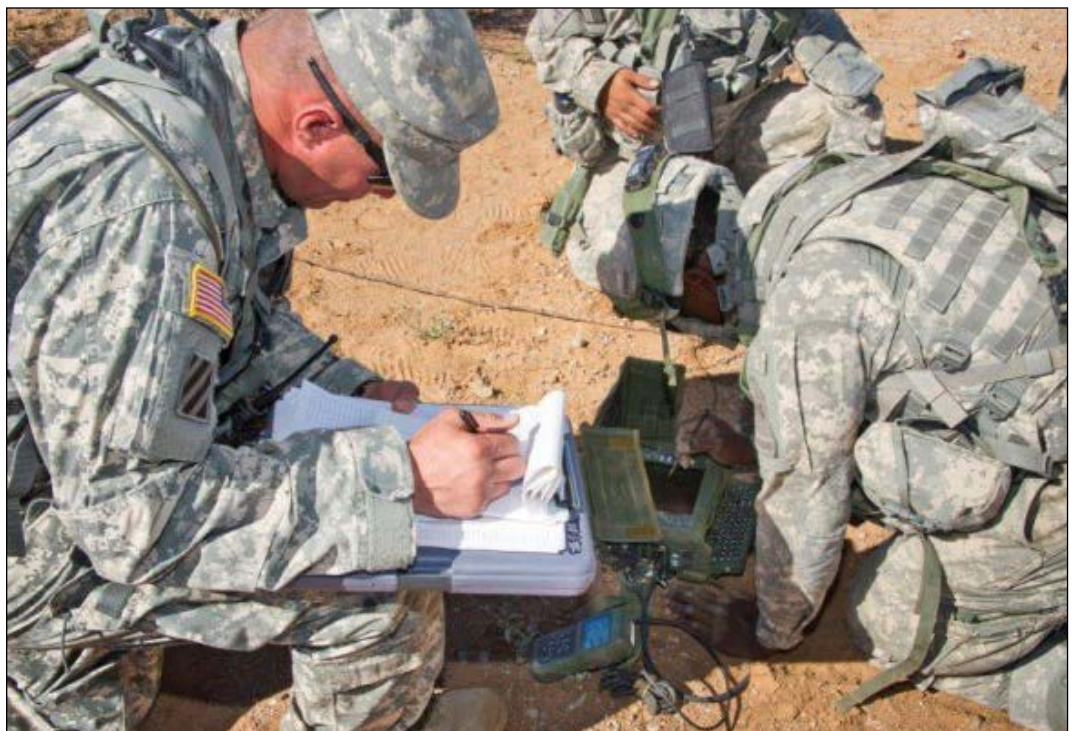


Photo by Dennis McElveen

Soldiers from the 2nd Brigade, 1st Armored Division set up a Spider networked munitions system for an operational test while data collectors record test data at White Sands Missile Range, N.M., in November 2012.

individuals who built it from the ground up. Soldiers regularly report that NET is a first class event.

After NET, the player unit will conduct a pilot test (PT). The PT is a dress rehearsal for the OT, lasting anywhere from two hours to two days. It allows the unit and other key stakeholders to gain experience and become familiar with all aspects of the test concept, particularly the aspect of data collection.

On the day before the OT with all concerned parties present, OTC conducts a final review of test readiness, referred to as the "record test." There are occasional circumstances, uncommon and irregular, where a major deficiency still exists with the equipment under test at the time of this review. This final check provides a means to postpone the test if needed or to make modifications to the test plan.

Data collection is what every Soldier will remember long after an OT is over. Data collection starts with a "hooah brief" at the beginning of every test to excite and inform Soldiers about their critical role in the test: providing candid feedback regarding equipment capabilities. Throughout the test, there are frequent periods of administrative time when Soldiers complete survey questions and provide their opinions. The chore is meticulous, challenging, and sometimes unexciting; test leadership frequently engages Soldiers to provide motivation. Soldiers receive, complete, and turn in their surveys to their assigned data collector.

Data collectors (DCs) are individuals that shadow the Soldiers and equipment, recording various aspects of Soldier and equipment interaction. DCs are typically experienced civilian contractors provided by the test team. They report to the test's lead ORSA and provide 24-hour coverage whenever Soldiers are operating the equipment under test, working

in 12-hour shifts if needed. They will occasionally reengage Soldiers to clarify feedback that is incomplete or unclear.

In addition to observing and making notes about Soldiers and the equipment, DCs also video AARs, take measurements, monitor special technology incorporated into the equipment under test, record objective measures of performance, and perform a variety of other actions. The size of the test and type of equipment being tested dictate the number of DCs required to fulfill this important data collection function.

Every DC action, measurement, and survey question is nested within the data source matrix (DSM). The DSM drives the design and conduct of the test, and occasionally requires the test officer to tweak concepts mid-test.

DCs pass all the raw data along to a special section of the test team for sorting, translating, and processing. Heaps of paper surveys, open-ended comment cards, and stacks of DC information are combined and organized in one location. The result is an unambiguous database that quantifies the ability of the equipment to support the Soldier's mission and opinion.

An OT's rigorous training scenario makes the player unit the guinea pig for the rest of the Army. A product spends most of its development time in a laboratory. Engineers inside a cubicle analyze 3-D designs and run simulations. DT examines an equipment's reliability, survivability under live fire, and safe operating parameters, but it is nearly impossible to prepare equipment for Soldiers.

The feedback is substantial. Soldiers expose equipment weaknesses and figure out new employment methods. Soldiers occasionally unintentionally induce and highlight major deficiencies. They can identify faults beyond the grasp of the developing engineers behind a computer screen. This experience is typical in an OT and significantly benefits the program and the Army.

Lessons learned during an OT improve equipment quality, Soldier interface, and effectiveness. Efficiencies learned from one small unit's experience are now available for implementation before the program scales. The small increases in reliability and quality will spread over enormous quantities and long life cycles, resulting in astronomical savings of cost and maintenance time for the entire Army.

An OT is also a chance for the individual Soldier to weigh in on new equipment. While every member of the product development team is deeply concerned with equipment performance, equipment performance is the sole focus of player unit Soldiers during an OT.

PMs must consider the program cost and timeline in addition to performance. TRADOC must consider how new equipment integrates into doctrine, training, and force structure. Congress must consider national agendas (recent ban on the Russian RD-180: a reliable rocket engine valued by the Air Force), their constituents (government contracts relate to jobs and other benefits), and can attach strings to funding.

Soldiers in an OT are the only entity free to focus solely on equipment performance in real-world conditions. The Soldier's voice is heard through the OT process. Operational

testers design every test to maximize a Soldier's chance for feedback, continuously urging Soldiers to be open and frank. Every survey or questionnaire comment from an OT — even if negative, profane, or seemingly nonsensical — is permanently recorded and stored in the program. OTC, by design, even reports up an entirely separate chain of command to avoid any disincentives to candid feedback.

Soldiers, even the newest privates, routinely provide insightful comments. The feedback from Soldiers is not only used on the existing equipment under test, it is also incorporated into the program design for future equipment. It is not unusual for a single comment to spur an evolution of equipment design or to steer the life cycle of a piece of equipment in a new direction.

One MRAP vendor, for example, provided a prototype in 2007 with a large back ramp that opened like a Bradley or M113, though much slower. The fundamental engineering of the ramp was undeniably sound, but Soldiers criticized the design, commenting that they would be engaged before they could even get out of the vehicle. This feedback prompted an immediate adjustment to the equipment design.

Many programs leverage OT events for this benefit early in the equipment development process. However, proposed equipment changes are not automatic; they are considered in light of engineering and other considerations. An OT is a one-of-a-kind opportunity for junior officers and NCOs to share in the shaping of their future equipment.

Years ago, as a junior Infantry officer, in that moment inside the gated MRAP compound, the magnitude of what lay before me was incomprehensible. Yet now, I understand I was simply a participant in the MRAP program, a massive program supported by countless individuals that was designed to counter increasingly lethal IEDs, and expedited in enormous quantities to our Soldiers on the front lines. The feat was nothing short of monumental and doubtlessly saved lives.

I am proud of the very small role I played in this, and now I am equally fortunate to participate in many other programs as an operational tester. Although one portion of a total acquisition effort, OT is critical. Further, Soldiers and their feedback make every OT successful. Participation in an OT is an uncommon yet rewarding experience; it's a unique chance for Soldiers to conduct a solid training event and provide valued input for a program's future. To partake in an OT is not simple and is by nature challenging.

Every day operational testers — to the Soldier the face of the large and professional acquisition community — are hard at work to marry the new equipment and the Soldier to make these critical test events successful.

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