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Testing and Training 2020: From Stovepipes to Collaborative Enterprises

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This article presents approaches for overcoming the obstacles in the path to integrating Department of Defense (DoD) test and evaluation (T&E) and training communities to better support the modern-day warfighter and to enable new opportunities for shared investment, development, and process improvement. Testing and training, now managed under separate fiscal and managerial constructs, are hindered from establishing shared capabilities by distinctly different goals and funding. Each community must synchronize its priorities and funding with those of the other community to secure joint investments. A two-community perspective of the future path was expressed at the International Test and Evaluation Association (ITEA) Open Forum on Testing and Training. The proposed path to achieving integration of testing and training includes the establishment of a singular management backbone that encourages joint investment to eliminate duplication of effort and thus, systemically bring about cost reduction and enhance effectiveness across both communities. Such a shared backbone would enhance testing, training, interoperability, and warfighting through the increased commonality and realism of warfighting systems prior to fielding.

Key words: acquisition; combat readiness; cost reduction; interoperability; joint investment; testing and training.

Faced with a 30-year history of efforts to integrate defense testing and training, the International Test and Evaluation Association (ITEA) determined to bring forth the leaders of these two communities to address a path forward focused on success and documented findings. The result was the ITEA National Open Forum on Testing and Training hosted by the ITEA George Washington Chapter on October 3–4, 2007. Creative approaches, lessons learned, and community insights were also solicited for input. This article represents the collective findings from that effort, and stands ready to serve as the first touchstone on future efforts.

A major issue for the Department of Defense (DoD) is, "How does the DoD improve readiness and capability while cutting costs for training and test and evaluation (T&E) within the context of an overarching defense enterprise"? A corollary to this is, "How does DoD accomplish cost cutting while improving synergies in the areas of test and training based on principles that will survive from one set of leadership in DoD to another over time"?

It is the purpose of this article to assess where we have been, where we are, and where we should be in the year 2020. The authors aim to present approaches to overcome the issues blocking the path to synergize T&E and training for a greater good than that which can be achieved by each community acting alone and to empower defense leadership with enduring solutions for the defense enterprise.

Challenges

On the surface, the DoD has numerous capabilities and substantial funding to upgrade those assets. However, peeling back the onion reveals the challenges

that exist within that structure. Combat readiness and technical evolutions present immediate demands upon the test and training infrastructures. DoD testing and training must therefore remain ready to execute any instruction at any time, recognizing that a lengthy planning, programming, budget, and execution process is the only path to new investment. This is the current sense by those communities. Therefore, each test or training facility within each Service must retain as much of its assets as possible to prepare for the next requirement, even as the costs required for maintenance rise with inflation and equipment age and the financial support for such maintenance diminishes. This paradigm must change. Examples of these challenges for change include:

- The Strategic Missile Defense test capabilities at Kwajalein Atoll have large-scale radar systems which exceed 35 years of age and operate using vacuum tubes no longer in production. Maintenance of these systems mandates the customized manufacture of these tubes or piecemeal replacement technologies at great expense, but at lesser expense than the wholesale replacement of the radar systems. Also, the Roi Namur large-scale radars at Kwajalein serve Army Space Command.
- Directed energy weapon systems add new technological challenges to the DoD. Speed-of-light weaponry requires specialized targets, instrumentation, and ranges to handle the direct effects of the weapon beam, recognizing that any error (even something as simple as a coffee cup in the path of the test beam) can lead to disastrous consequences as the weapon changes trajectory.
- Hypersonic and large footprint weapons have additional challenges to find sufficient airspace and range capacity for testing and training operations.
- Improvised explosive device (IED) defeat mechanisms have mandated the use of high power jammers in an environment encroached heavily by commercial spectrum use.
- Recognition of the individual warfighter as a key element of technology has led to new instrumentation requirements, which forces the addition of more weight and bulk onto overburdened training mission participants. As technology capability grows, so does the fielding to the individual warfighter, adding to the combat load even as the technology diminishes in size and weight.
- Incorporation of new aviation platforms mandates reexamination of airspace usage and monitoring. The F-22 is flying at higher altitudes than most combat aircraft, while unmanned aerial vehicles are flying lower. Thus, the definition of airspace is now requiring more accurate monitoring of simultaneous activities across the airspace.
- IED usage and world population shifts have led to a change in the warfighting spectrum. Urban canyons, multistory buildings, and close-in combat operations now must supplement the conventional force-on-force combat mechanisms in training and testing, without adding to the training or testing time horizons for completion. Peacekeeping and nation building efforts have also mandated new duties for military personnel that had not been part of the original training designs.

While the DoD attempts to keep costs as low as possible for its testing and training operations, such cost savings mandate retaining equipment and facilities that are unaffordable to replace, but also expensive to retain and maintain. Each Service, each community, and each functional capability must provide the resources and staffing to keep these capabilities available to support an ever-changing DoD mission profile. While an enterprise-wide approach would integrate these solutions for cost effective benefits, the current business model places defense test and training ranges under various management structures and financial oversight processes. Stovepiped approaches to these issues thus become institutionalized across the DoD to meet individualized requirements.

While these approaches provide near-term solutions (without waiting for the execution of the full budget process), they serve as a lightning rod for criticism from various analyses of the Department. Congress, the Base Realignment and Closure (BRAC) Commission, the Quadrennial Defense Review, and periodic audits pursue opportunities to save funding and reduce perceived excess capacity. Meanwhile, the Department has historically struggled to secure additional funding and lands to be used for test and training in preparation for the inevitable next war. Today, those efforts are validated as the Department fights the Global War on Terror, also known as "the long war."

In the training world, funding is focused on operations and maintenance (O&M), procurement, and military construction (MILCON) with a lesser amount on R&D. The reverse is true for testing. It is a question of proper balance, which neither community optimizes for the overall defense enterprise. *Table 1* shows distinctions between the testing and training missions and roles.

Today's testing community grew out of an acquisition environment that had fielded systems with substantial problems while acquiring new weapon systems to provide the warfighter an increased

Table 1. Comparison of testing and training cultures

Objective	Testing	Training
Community of interest	Acquisition	Operator (readiness)
Key concerns	Warfighter equipment	Warfighter operations
Key products	Materiel safety release	Warfighter readiness
	Material acceptance	Unit readiness
	Reliability certification	New equipment training
	Operational effectiveness	Increased warfighter effectiveness
	Suitability	
	Survivability	
Milestones	Production decisions	Combat requirements
	Fielding decisions	Unit readiness
Funding	Limited operations and maintenance (O&M)	O&M
	Limited procurement	Procurement
	Limited MILCON	MILCON
	Research and development (R&D)	Limited R&D

capability. Test and evaluation serves as what Secretary of Defense Perry called, "The conscience of acquisition" by providing a focused approach integrated into weapon system acquisition. The weapon system acquisition business model and its language sustain the testing community. Reimbursable range operations fund the T&E community workload with minimal institutional investment.

At the same time, the current training community construct arose from the readiness world, serving to prepare warfighters for combat. The warfighter focused approach, business model, and language keep the training community operating. Institutional funds provide the key support assets needed to keep warfighters in a state of readiness while expanding their capabilities to face combat challenges.

Thus, the two communities began as separate entities, and grew into distinct missions and cultures, united only by their support to the warfighter and few shared resources. Cost models, business enterprises, end objectives, and even the language of daily operations differ between them. All of these factors serve as obstacles to the Department's efforts to share resources to the benefit of the warfighter and the taxpayer.

Current situation

Currently, the test and training communities primarily attempt to resolve their individual challenges using community specific investments. This reinvestment approach generates community-wide savings but costs the DoD substantial resources when T&E systems typically are not applied to training applications, and vice-versa. Ultimately, the two communities established today's infrastructures which inherently inhibit the shared use of ranges, technologies, and mission space.

These policies and practices suffer from a lack of a strategic vision binding both communities and are divided by individual mission statements which are focused on acquisition or training thrusts rather than a unified thrust of victory in war. The emphasis needs to be focused on the warfighter as the ultimate customer rather than the missions of the two communities individually serving the warfighter.

Last year a policy letter was signed by the Under Secretary of Defense for Acquisition, Technology, and Logistics (AT&L), the Under Secretary of Defense Personnel and Readiness, and the Director of Operational Test and Evaluation (DOT&E) at the Office of the Secretary of Defense (OSD). This letter was sent to the three Service secretaries requesting their responses on how they would implement collaborative efforts between the two communities for activities requiring similar capabilities.

The BRAC Commission, viewing national assets to make more synergies for cost reduction, struggled to make simple definitions. Very little came out of its effort to drive the testing and training communities together.

There exists a demand for training as combat forces redeploy back to their home bases. However, limited site locations to conduct training (as well as test) exist. The demand on training is going to exceed that which is available.

Efforts to unify leadership (e.g., the Defense Test and Training Steering Group) have been thwarted by efforts to improve the two individual communities. The separate focus has led to an imbalance and diminished the stability of the shared testing and training environment. One of the problems is that warfighters view T&E as an encroachment into their critical domain, as T&E may force changes based on failures or safety risks within the inventory of military equipment. Sometimes this has been the case. By comparison, the training community sustains readiness.

Since T&E involvement in the training realm has defined ends and data requirements based on weapon systems, the warfighter perceives little benefit because the test functions are typically accomplished before the weapon system is widely distributed to the field, and is often perceived as delaying the receipt of the latest equipment into the field. Delays in receipt are tangible to the warfighter. Improvements in safety and effectiveness of an undelivered system are intangible. Thus, the warfighter perception is validated within his realm of awareness.

Today's growing financial and manpower constraints exacerbate the rice bowl syndrome. Program managers are being forced to concentrate their available resources on immediate requirements as opposed to contributing to long-term investments in the broad defense enterprise solution which will lead to more nearly global optimization. Consequently, today's existing incentives are often counterproductive to enterprise-wide solutions.

In the current environment, there have been numerous attempts to tie together test and training investments. Unfortunately, little has been achievable to translate early agreements and initiatives into meaningful long-term progress. One recent example was an initiative undertaken as a result of the OSD AT&L/P&R/DOT&E "Interdependency" memo. CRIIS, the "Common Range Integrated Instrumentation System," produced mixed results. After several months of negotiations, the closest the test and training communities could come to an interdependent agreement was to develop the hooks in CRIIS for "an open architecture system capable of supporting both missions." These hooks provide an "ability to grow the system over the next 5-10 years to meet training needs" as well as providing for the ability to "develop a radio capable of running Training's Range Instrumentation Waveform." Fiscal, mission requirements, and timing concerns of each community overshadowed the benefits recognized for the long term and thus sacrificed the future benefit for the current fiscal and business focus realities.

The objective situation for 2020

The ITEA Open Forum concluded with the participants bringing about a two-community perspective of the future path needed to establish an integrated testing and training operational basis. The following first two key points surfaced repeatedly:

Singular management. Testing and training cannot effectively merge common requirements and operations under the current management construct. A new paradigm needs to be created to establish a singular management approach across testing and training while securing the responsibilities of both the T&E and training communities. At the same time it is critical to take into consideration the Title X responsibilities of the Services. In OSD, T&E is divided into offices primarily covering operational test and evaluation (Director, Operational Test and Evaluation), resources (Test Resource Management Center), and developmental test and evaluation (Deputy Director, Developmental Test and Evaluation). By comparison, training falls under a single structure within the Under Secretary of Defense for Personnel and Readiness (USD P&R). These separate structures divide test and training objectives, plans, and funding, and further dissect the test community into operational and developmental focuses.

A singular management approach at OSD would swiftly enable the progress demanded for savings by the overall defense enterprise. This senior staff member should be at the DEPSECDEF or USD level to properly integrate the communities. An alternate is to have the director, Operational Test and Evaluation serve as the focal point. Whichever of these three options would be chosen, that individual needs the authority and resources — funding and manpower — required to properly execute the mission, an independent reporting system to the Secretary of Defense which promotes objectivity, and an enforcement system which promotes defense enterprise wide long-term solutions. As an interim step, the re-establishment of the Defense Test and Training Steering Group would help unite near-term coordination efforts between the communities.

This straightforward approach for change at OSD must take into consideration the multidimensional degrees of complexity involving the Services, joint commands, and program managers. Whatever recommendation is implemented at the OSD level must be mirrored swiftly within the Services and COCOMs to ensure that the streamlining and focus are made Defense-wide.

Incentives for shared investment. Singular management cannot succeed without the proper incentives to make it work. Testing and training, now managed under separate fiscal and managerial constructs, are hindered from establishing shared capabilities by distinctly different goals and timing. Each community must synchronize its priorities and funding with those of the other community to secure joint investments. Rarely do these priorities and funding opportunities completely intersect, leading to duplicative and stovepiped investments. Attempts to overcome these challenges lead to a situation where one community's high priority hinges on the other community's low priority, and thus unravel during the planning, programming, budget, and execution process. An incentive process rewarding efforts to link capabilities

across testing and training is vital to future success. Within T&E, joint investments are encouraged by the use of the Central Test and Evaluation Investment Program (CTEIP). CTEIP provides funding for joint investments to encourage the Services to consider the needs of their sister Services and to share their future visions across the Department in building new test capabilities. This model, applied to joint test and training investments, would encourage similar sharing across these two communities. Further, this model would bridge today's two-community structure by encouraging the sharing of investments and requirements to develop singular solutions and capabilities.

Restructuring of investment processes into enterprise and service-based processes. Similar enterprise-level distributed capabilities like Real Time Casualty Assessment systems, backbone networks, fiber optic installations and maintenance, and standardized instrumentation systems, would enable additional savings on a Department level if provided by the DoD rather than left to be implemented according to individual Service requirements, schedules, and budgetary constraints. By contrast, individual instrumentation like sky screens, toxic fume detection, optical plume detection, and pressure sensors are best left to the current procurement construct. Individual requirement and budgetary processes are ill suited to the establishment of a corporate enterprise level capability within the DoD. Similarly, corporate enterprise investment cannot proactively address the requirements of near-term and Service-specific demands on testing and training. Corporate and individual investment need separate processes to achieve maximum benefit to the DoD, particularly if managed under a single oversight structure. Standardizing a backbone architecture will provide new and vital requirements at the Service level to invest in common and connective capabilities.

The Forum also identified the following major points:

- *Establish a shared, multilevel secure enterprise network for testing and training.* Currently, the training and testing communities struggle over when to use classified or unclassified versions of networks, instrumentation, and operations. These near-term savings are causing long-term detriment to the Department as individual solutions are being established, and integration opportunities are thus thwarted. A departmental decision to establish a singular standard for multi-level security across the communities would negate these problems while establishing a DoD standard for the virtual and live battlespaces. This would deliver long-term savings to the Services and to all joint operations involving the range infrastructure of the United States. This investment would also serve as the first corporate investment leading to a common electronic infrastructure across testing and training.
- *Shared, realistic joint battlespace.* Testers and trainers both seek to establish combat realism in their operations. Live, virtual, and constructive simulations have emerged as a vital tool to both communities, but continue to grow separately. Establishing a DoD initiative to provide a shared live, virtual, and constructive (LVC) architecture within the operating space of the multi-level security network above would immediately save resources and encourage shared investment across the communities. The Joint National Training Capability (JNTC) and Joint Mission Environment Test Capability (JMETC) both are taking key initial steps to make this effort a reality. But, they are chartered to perform other functions with the shared LVC environment as a byproduct of their efforts. A jointly managed capability, replete with networking standards and protocols, would ensure testers and trainers link to a common architecture. Ultimately, the communities would come together through their shared standards and investments in them.
- *Timing.* Today's national security environment mandates prompt attention to the issues above. Network Centric Warfare (NCW) is changing the test world to one in which the commander's decision making is a critical element of the test. Unlike past weapon systems, NCW systems enable the commander a multitude of choices in the solution to combat scenarios. No longer is the commander left to decide whether to fire a single gun, turn a single weapon system, or take other singular approaches. Instead, resources can be dedicated and rededicated in rapid succession. The commander's decision creates the ultimate pass-fail scenario for the weapon system. This enhanced capability has become inherent in the battlefield commander of the future as well as the warfighter commanding a singular weapon system such as the F-22 itself. Therefore, NCW is creating opportunities and critical needs pulling the training and the T&E communities together into a singular effort focused on supporting the warfighter.

Conclusion

T&E and training must converge to support the modern day warfighter to enable new opportunities for shared investment, development, and process improvement. Opportunities and models exist, such as the Defense Test and Training Steering Group and the CTEIP programs, which may be reapplied to this effort to secure immediate results. Longer term

opportunities abound, but require hard choices for change in the managerial and fiscal models. This cannot be accomplished without the proper incentives. The DoD's investment in a shared LVC and multilevel secure backbone for testing and training can also be implemented in the near future to tie the communities together in ways never before realized.

The establishment of a singular backbone, and encouraging joint investment through a CTEIP-style model, will eliminate unnecessary duplication of effort. It will systemically bring about cost reduction and enhance effectiveness between the two communities in a proactive fashion. It will encourage creative solutions to problems for the warfighter. Such approaches will establish a new model for T&E and training that makes realism and instrumentation common across communities and Services. Ultimately, this test and training enterprise approach will enable greater realism for both communities at reduced overall cost. Lessons learned in the creation of the singular backbone could then be reapplied to a series of corporate investments that establish a universal digital battlespace for testing and training to secure further savings. Such a shared backbone would enhance testing, training, interoperability, and warfighting through the increased commonality and realism of Service systems prior to fielding. This increased commonality will also enhance "Joint Service" processes, by institutionalizing part of this shared framework during the testing and training phases of combat preparations. ❑

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At the State Department, he provided assessments for the Comprehensive Nuclear Test Ban Treaty. As an adviser to the Thai government, his activities included writing and coordinating the Thai Operations Research Society charter for the Office of the Prime Minister and directing the definitive systems study for automation of logistics for the Thai Army. In Korea, he successfully led U.S. support to establish the Korean Institute of Defense Analysis as a world class think tank. In addition he was the contributing editor for the Korean Business Review of the Federation of Korean Industries, writing 80 percent of that journal. As military assistant to the NATO Adviser to the SECDEF, he initiated and led an international team to develop the methodology for munitions guidance for SHAPE.

As executive director for a joint office addressing the RDT&E of aircraft combat survivability, Sebolka's activities included selling the four Services to accept the OSD initiative for Joint Live Fire Testing and combining three different service program elements into one at OSD. He was one of the founders of the Survivability and Vulnerability Information and Analysis Center (SURVIAC). Subsequently, he provided support to the Live Fire Test and Evaluation (LFT&E) Office at OSD. He has also provided expert witness to Congress for changes to LFT&E legislation.

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