

The Future of DoD Test and Evaluation Resources

Fred Myers

Test Resource Management Center, Arlington, Virginia

This issue, the theme for the ITEA Journal is The Future of Test Facilities. This is certainly a worthwhile topic for consideration and discussion. However, test facilities alone do not fully embrace the full scope of the capabilities and resources needed to meet future demands for weapon system test and evaluation (T&E). This article is intended to provide a broader perspective on T&E resources—one that encompasses not only the future of T&E facilities, but also addresses the other essential elements of test and evaluation, the T&E workforce, and T&E funding needed for both operations and investment. This article presents the perspective of the Department of Defense (DoD) Test Resource Management Center, the origins, mission, and goals of which are outlined in the article.

Key words: Strategic planning; infrastructure; workforce shaping; T&E processes; T&E funding; critical capabilities; capacity; divesture; downsizing; focused testing.

In response to title 10, United States Code, section 196, Department of Defense (DoD) Directive 5105.71 established the Test Resource Management Center (TRMC) as a DoD field activity under the authority, direction, and control of the Under Secretary of Defense for Acquisition, Technology and Logistics (USD [AT&L]) to:

- Plan for and assess the adequacy of the Major Range and Test Facility Base (MRTFB) to provide adequate testing in support of development, acquisition, fielding, and sustainment of defense systems.
- Maintain awareness of other test and evaluation (T&E) facilities and resources, within and outside the department, and their impacts on DoD requirements.

The Test Resource Management Center's vision and goal

In performing this mission, the Director, TRMC, is responsible to (1) review and provide oversight of proposed DoD budgets and expenditures for T&E facilities and resources; (2) develop a biennial Strategic Plan reflecting the needs of the DoD with respect to T&E facilities and resources; (3) review the proposed T&E budgets of Military Departments and Defense Agencies with T&E responsibilities for adequacy, and certify that they are in compliance with the Strategic Plan; and (4) administer the Central Test and Evaluation Investment Program, and the Test and

Evaluation/Science and Technology program. Additionally, the TRMC “plans for and assesses the adequacy of the Major Range and Test Facility Base (MRTFB); to provide adequate testing in support of development, acquisition, fielding, and sustainment of defense systems; maintains awareness of other T&E facilities and resources, within and outside the department, and their impacts on DoD requirements.”

From the TRMC's missions, the Director established the following vision and goal:

- *Vision:* The Department of Defense T&E workforce, infrastructure, and funding will be fully capable of supporting the Department with quality products and services in a responsive and affordable manner.
- *Goal:* Robust and flexible T&E capabilities to support the warfighter.

The Major Range and Test Facility Base

The DoD directive that establishes MRTFB policy and responsibilities, defines it as:

“The designated core set of DoD Test and Evaluation (T&E) infrastructure and associated workforce that must be preserved as a national asset to provide T&E capabilities to support the DoD acquisition system.”

Included in the MRTFB aggregation are the T&E personnel that operate the DoD test facilities and open

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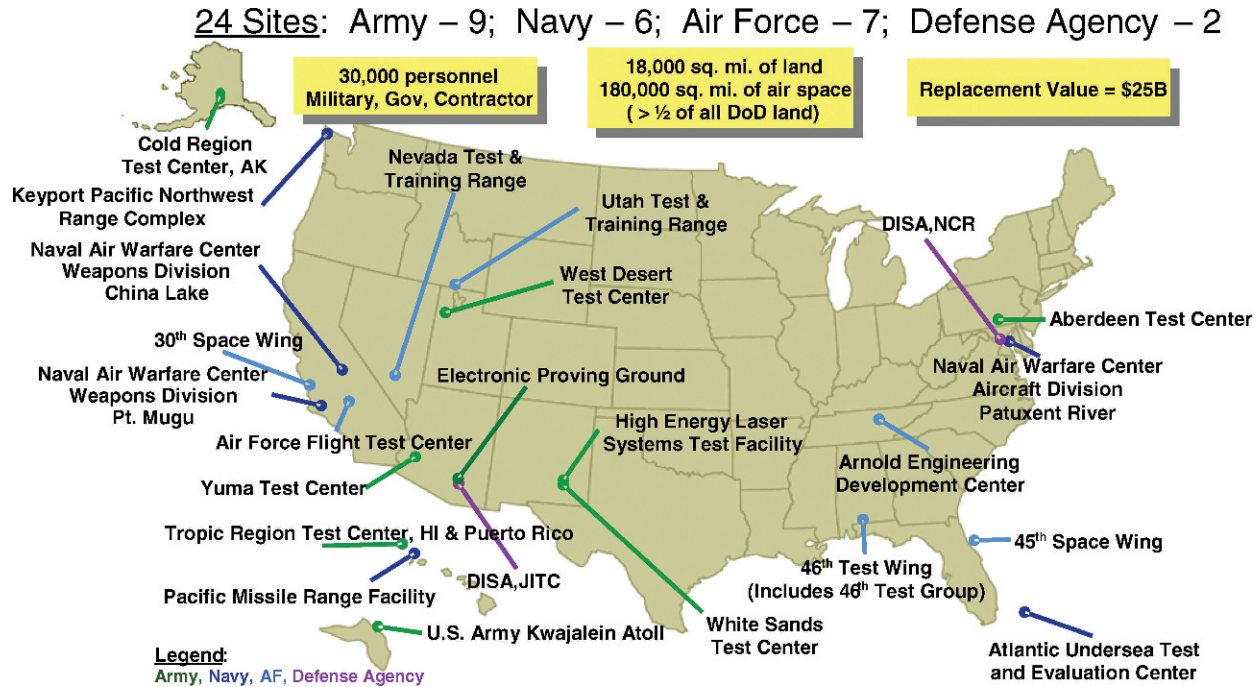


Figure 1. MRTFB activities.

air ranges. Oversight of the MRTFB is assigned to the Test Resource Management Center, albeit the individual Services and Agencies have primary responsibility for funding, staffing, and management of the facilities. Figure 1 portrays the current DoD activities that manage MRTFB facilities and ranges in accordance with DoD Directive 3200.11, dated December 27, 2007.

The TRMC considers T&E Resources from a holistic view of T&E, not just T&E facilities and ranges. In that context, TRMC identifies shortfalls for each of the T&E resource components necessary to provide T&E capabilities. Figure 2 depicts the key

components of these T&E resources and how they are used to produce T&E capabilities.

The key T&E resource components are:

1. T&E workforce: military, civilian, and contractor personnel who provide the expertise and skills necessary to operate, maintain, sustain, and improve the T&E infrastructure. The personnel also execute and expend funding, and implement processes for providing T&E capabilities.
2. T&E infrastructure: the facilities, ranges, and all other physical assets such as buildings, instrumentation, networks, range space, and frequency spectrum used to conduct DoD T&E.
3. T&E funding: the combination of investment and operating funding required to support and execute the DoD T&E mission.
4. T&E processes: the methods and procedures used by the T&E workforce to provide T&E capabilities and associated data products.
5. T&E capabilities: an ability to conduct test and evaluation using T&E resources and processes to achieve T&E objectives. "T&E capabilities" represents the aggregate of people (workforce), infrastructure (facilities and ranges), and funding—enabled by T&E processes (Figure 2).

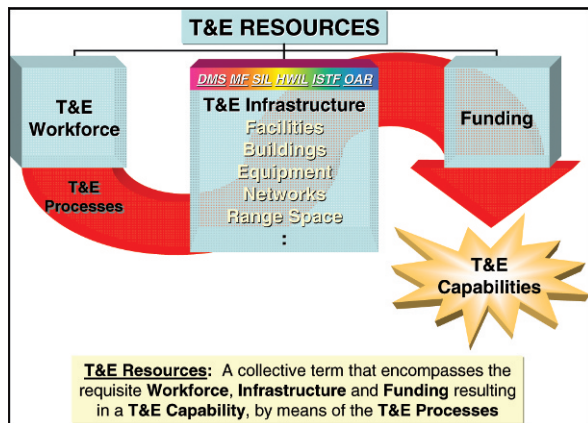


Figure 2. T&E resources.

DoD T&E workforce composition

TRMC is also responsible to provide "an assessment of the current state of the test and evaluation facilities

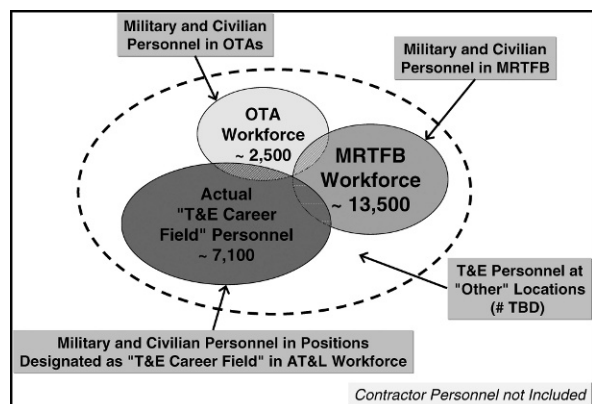


Figure 3. Composition of the DoD T&E workforce.

and resources of the Department.” The focus of this section is the workforce component of the Department’s test resources.

In the broadest context, the aggregation known as the T&E workforce encompasses several distinct components, as reflected in *Figure 3*.

TRMC’s primary T&E workforce focus has thus far been on the MRTFB component. During the past decade, there has been a steady decline in the number of military, civilian, and contractor personnel in the workforce expressed in work years. However, as evidenced by the demographic analysis of the government workforce that TRMC has conducted over the past several years (FY 2005–FY 2007), it appears that the downward trend has been arrested. *Figure 4* depicts the MRTFB military and civilian workforce totals for those years. As seen in this figure, the total government MRTFB workforce is essentially unchanged over this period. Contractor personnel are not tracked separately by organization, rather only by work years.

These annual demographic analyses have also provided a wealth of information about the age, occupational composition, education, and experience

levels of the MRTFB workforce. The one question that the demographic analysis does not adequately address is the competency of the workforce. Do we have the right people with the right skill sets to meet both the current and future testing challenges? Later in the article, we address an approach to this important area. TRMC will continue to undertake these analyses to add to the personnel database and in so doing provide the data needed to support long-term workforce trend analysis.

Operational Test Agencies (OTAs)

The OTA component of the T&E workforce is represented by personnel assigned to the Service or Agency units that are responsible for operational T&E—including Live Fire T&E—of the DoD weapon systems in development. The Director, Operational Test & Evaluation (DOT&E) has oversight responsibility for this component of the T&E workforce. Demographic analyses extending back to FY 1990 have provided DOT&E and the Services with considerable insight into workforce trends over that period. As is the case with the MRTFB, the OTA military and civilian workforce has also stabilized in recent years.

Acquisition, Technology and Logistics (AT&L) workforce

The composition of the AT&L workforce is specified by legislation. Within the AT&L workforce aggregation, which currently numbers about 110,000 individuals, personnel are designated into various “career fields” per assignment of the Service or Agency Defense Acquisition Career Management (DACM) offices. As noted in *Figure 3*, approximately 7,100 personnel are assigned to this career field and staff billets that have been designated by DACM as T&E. The majority of T&E career field personnel in this

	2005			2006			2007		
Military Dept	Military Strength	Civilian Strength	Total	Military Strength	Civilian Strength	Total	Military Strength	Civilian Strength	Total
U.S. Army	48	2,637	2,685	51	2,838	2,889	57	2,831	2,888
U.S. Navy	1,316	2,163	3,479	1,255	2,124	3,379	880	2,247	3,127
U.S. Air Force	3,245	3,777	7,022	3,103	4,126	7,229	2,689	4,457	7,146
Agency (JITC)	0	198	198	0	213	213	0	268	268
TOTAL	4,609	8,775	13,384	4,409	9,301	13,701	3,626	9,803	13,429

Figure 4. MRTFB workforce trend (FY 2005–FY 2007).

workforce aggregation is assigned to Program Offices and Acquisition Command headquarters organizations, and is primarily responsible for T&E planning, including developing test plans, coordination with OTAs, and allocation of program funding to the T&E mission. There are, however, some AT&L workforce personnel resident in both MRTFB and OTA units, as can be noted from the overlapping circles in *Figure 3*. Oversight of this element of the T&E workforce is the responsibility of USD (AT&L).

“Other” T&E workforce personnel

In addition to the T&E personnel comprising the well-defined aggregations summarized previously, there are possibly hundreds of DoD locations where T&E functions are being performed either as a primary or collateral mission. The extent and demographic composition of the T&E personnel at these locations remain to be accurately determined, albeit the TRMC has initiated an effort to identify and characterize those activities where the T&E mission is substantive enough to warrant additional effort to quantify and profile the resident T&E workforce.

Test infrastructure

There has been much debate, dating back more than 20 years, about test infrastructure. The debate has focused largely on trying to answer two questions. One, do we have the right facilities and ranges to meet current and future testing needs, and two, do we have the right amount of capacity? The efforts on the part of the Office of the Secretary of Defense and the Services to answer these questions have met with varying degrees of success. To date, there are still no definitive answers. The mandate given to the TRMC in DoD Directive 5105.71 has brought these two questions into focus once again. There is further evidence of the need to address these questions given the recent pressures on the budgets of the Military departments and motivations to either downsize or divest existing capabilities to meet these budget demands.

I will attempt to outline an approach for addressing these questions. While there will be continuing debate over “how much is enough,” there can be no debate on the need to address these questions. I would offer the following way forward as one approach as to how we may finally make some progress in answering these important questions.

Understand what we have

Each of the Services and Defense Agencies that own test infrastructure has an understanding of their facilities and ranges to include the associated test

capabilities. What is less well known is a cross Service or Agency understanding of what is available to support testing. One mandate for the TRMC is to identify the range and facility capabilities that exist within not only the MRTFB and the DoD, but to have cognizance of all the test resources “within and outside of the DoD.” To that end, the TRMC has initiated the development of a Range Capabilities Directory that will initially focus on capturing technical and financial information for MRTFB facilities and ranges that are governed by DoD Directive 3200.11. Later phases of this effort will include: DoD facilities and ranges outside of the MRTFB, other government test activities, prime contractor assets, laboratories, academic institutions, and international facilities available to the DoD.

Group similar capabilities into domains

The traditional method of examining test infrastructure has been to group physical assets into test resource categories. These were generally grouped (*see Figure 2*) as digital models and simulations; measurement facilities; system integration labs; hardware-in-the loop facilities; installed system test facilities; and open-air ranges. Another way to group infrastructure is from an acquisition perspective. For example, if the requirement were to build and deploy the next generation of fighter aircraft, identify what test assets the program would need from start to finish to determine how well that aircraft would perform. The fighter program would need wind tunnels; anechoic chambers; and an open-air range. From that perspective, it would be helpful to know what assets within each of those domains were available to execute the test program. This is a different way of viewing test assets, as functional areas or domains.

Assess domain adequacy

Budget pressures are forcing the Services and Agencies to review test infrastructure and make decisions regarding downsizing or divestiture. Often these decisions are Service-owner centric and based on a “return on budget” concept to the owning entity. While these types of decisions may serve the owning Services’ parochial interests, they are often shortsighted when considering other important factors such as the overall DoD customer base and the uniqueness of the test facilities.

Over the past 2 years, the TRMC has led several studies to assess proposed reductions in test infrastructure at various sites. A significant consideration in assessing these reductions is the availability of other, similar facilities, and whether those facilities can meet the displaced customers’ demands. The corollary to

reducing test infrastructure is also being able to assess capacity. In its simplest terms, capacity is the ability to deliver a product in a specified time. The TRMC initiated a working group led by the Air Force to examine performance metrics to facilitate assessing the test infrastructure. This is an on-going effort that attempts to provide a select few measures that are useful at the range, headquarters, and enterprise levels.

Reengineer as needed

The composition of the test infrastructure is dynamic in nature. As stated in DoD Directive 3200.11, "As a national asset, the MRTFB shall be sized, operated, and maintained to provide T&E information to DoD Component T&E users in support of the DoD Research, Development, Test and Evaluation and acquisition process set out in DoD Directive 5000.1." Many factors drive composition decisions: insufficient or excess capacity or capability; customer base; workload; available investment and operating funds, etc. From a Departmental perspective, it is imperative that we understand the current infrastructure baseline and make informed decisions about changes to that baseline in cooperation with the components that require, or may require in the future, MRTFB T&E capabilities. TRMC looks forward to continuing our work with the Services and Agencies to improve and sustain test infrastructure to meet both current and future test and evaluation requirements.

T&E funding

With the exception of a slight increase in user funding correlating to the post-9/11 era initiation, the overall MRTFB investment funding has changed little over the course of the past several years (*Figure 5*). The most notable event, the shift in the source of MRTFB funding from users' accounts to institutional T&E operations accounts because of NDAA 2003 (which the Department implemented in FY2006), is clearly evident. Even though T&E funding has increased slightly, it has not experienced an increase, which corresponds with the overall increase in DoD research, development, & acquisition funding. In addition, given the significant increase in emerging, expedited requirements due to U.S. participation in two simultaneous wars, and the resultant increase in T&E workload, the MRTFB buying power has lost ground.

The future of test resources

The DoD is at a critical crossroad with respect to planning for its future T&E resources. Competing national priorities, and the current economic situation, will put additional strain on DoD RDT&E and procurement budgets. We should also expect to see

reductions in support budgets that will affect infrastructure. Yet the Department is faced with the need to invest in and modernize our current T&E infrastructure to support the upcoming generation of weapon systems that will introduce new and complex technology areas that our current infrastructure cannot support.

With respect to the MRTFB workforce, we have seen a leveling out of manpower across the MRTFB over the last 3 years after more than 10 years of steady decline. While it appears that we continue to meet our test requirements with our current workforce (military, civilian, and contractor), we need to shape the future workforce to meet new technology challenges such as directed energy, hypersonics, unmanned systems, and information operations. In addition to continuing issues with recruitment and retention, we will need to make a concerted effort to provide the workforce with new skill sets and abilities to meet these new technology challenges. The Department should examine new and innovative ways to improve recruitment, hiring, and retention of the T&E workforce. TRMC is exploring workforce-shaping initiatives to meet these future needs.

T&E processes will also need to change significantly. Many systems operating in Iraq and Afghanistan today did not go through any formal testing process. Rather, they were assessed "on the fly" or evaluated from real field data. We need to streamline the way we test and focus our test processes so that we can see the biggest payback. I view that as "focused testing," where we identify extremes of the envelope or the highest risk areas and test those rather than testing "center of the envelope" scenarios.

One particular test process example where the Department has made significant progress is the development of distributed live-virtual-constructive (LVC) capabilities and exploiting information technology solutions that have allowed the community to utilize our T&E infrastructure in a more efficient and flexible networked family of capabilities.

While we have made significant progress in developing and sustaining LVC capabilities, we must also ensure that the nodes of our T&E network, the individual ranges and facilities that comprise our T&E infrastructure, reflect the critical T&E capabilities required by the programs and customers that we expect in the next 5 to 10 years. I believe that the best approach to maintain the viability of these assets is to continue to support the MRTFB philosophy; that is, to sustain a core set of T&E capabilities of such importance to the Department and the nation that we fund them irrespective of the frequency of customer demand. The TRMC's long-term goal continues to be

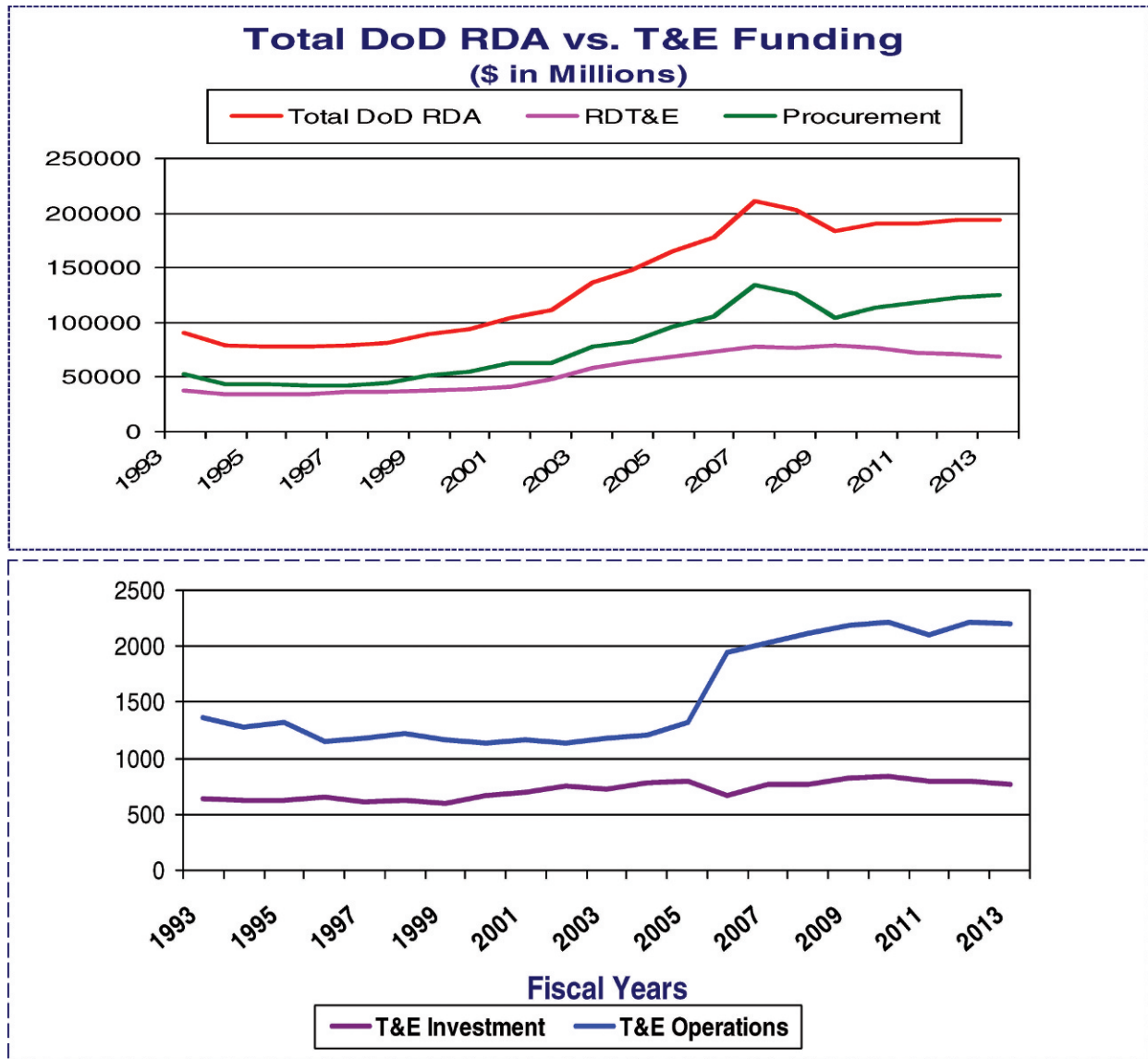


Figure 5. Total DoD research, development, and acquisition versus T&E funding.

to guide the development of the T&E infrastructure, not just the facilities and property, but also the processes, workforce, and needed skills to fulfill both our current and future missions.

TRMC views the MRTFB as a critical set of T&E assets for the weapon systems' customers. That is, the MRTFB should provide critical T&E capabilities sustained by the T&E institution, thus giving customers the confidence that they will be ready and available for use to support customer-testing needs. However, it may not be prudent for each of the MRTFB activities to keep these facilities fully operational at significant cost when they do not have a viable customer base. The MRTFB reengineering process must examine options for the facility or range owner to

reduce the operational status of the facility if reduced workload projections warrant it. It is important that we implement such a process in a uniform and disciplined manner.

As we continue to reevaluate and reengineer the MRTFB, it is more important than ever to take a hard look at our capabilities. We need to examine the lesser-capable assets that we could consider for downsizing or even divesture, freeing up funding for the new, required, critical capabilities. In years past, we could argue for sustainment of all existing capabilities while asking for, and getting, funding for the new capabilities. However, current budget realities are driving us to a position of self-financing our institutions. Therefore, we must take a harder look at options for

balancing the existing assets with future customer needs.

As part of the ongoing effort to reengineer the MRTFB, the TRMC continues to work with the Services to develop metrics to assess the overall “health” of the MRTFB and help determine which T&E capabilities should be included in the MRTFB. Additionally, it will also be necessary to look at the MRTFB resources that provide the least critical capabilities to identify opportunities for downsizing or divestiture, and offer those up as funding sources for the new critical capabilities identified by the components and reflected in the *DoD Strategic Plan for T&E Resources*.

The SecDef, commanders of all the combatant commands, as well as the Congress have consistently called for increasing the priority given to maintaining a robust T&E program, which requires healthy and vibrant test centers and ranges across the entire DoD enterprise. During FY2009, TRMC will continue to meet these challenges, championing the need for T&E resources, as well as developing initiatives to increase

T&E capabilities for DoD’s acquisition programs. Adequate investments in the T&E infrastructure will greatly enhance the ability of the acquisition process to deliver satisfactorily tested weapon systems to assure their effectiveness and suitability for our joint forces fighting in an increasingly complex environment. □

MR. FRED MYERS is the deputy director of the Test Infrastructure Division, Test Resource Management Center, Office of the Undersecretary of Defense for Acquisition, Technology, and Logistics, in Arlington, Virginia. Mr. Myers has over 35 years of experience in the Department of Defense with particular emphasis in the areas of research and development, systems engineering, test and evaluation, and integrated logistics support. He holds a master’s degree in engineering administration from George Washington University, Washington, D.C., and is an engineering graduate of Geneva College, Beaver Falls, Pennsylvania. E-mail: Fred.Myers@osd.mil