

## CHANGING NORMS: KEEPING ARMY TEST AND EVALUATION FLEXIBLE AND ADAPTABLE

BY

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# **PROPERTY OF U.S. ARMY**

USAWC STRATEGY RESEARCH PROJECT

## **CHANGING NORMS: KEEPING ARMY TEST AND EVALUATION FLEXIBLE AND ADAPTABLE**

by

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## **ABSTRACT**

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As the Army leadership continues to shape the Army Force Generation (ARFORGEN) concept to generate continuous readiness that supports strategic flexibility and depth to the US Army warfighters, the US Army Test and Evaluation Command (ATEC) leadership continues to embrace and implement strategic changes to facilitate the fielding of equipment to the warfighters. ATEC has demonstrated adaptability and flexibility in meeting the challenges associated with the traditional acquisition process and the necessities resulted from the deployment of troops to Iraq and Afghanistan. The fundamental purpose of Test and Evaluation (T&E) in the Department of Defense (DoD) and the Military Services remains the same as acquisition policies change. Four studies conducted by different groups between 1999 and 2006 consistently revealed similar concerns on the nature of the needed change. In a 22 December 2007 memorandum, Office of the Secretary of Defense (OSD) promulgated another round of new T&E policies. This paper examines how ATEC is adjusting its culture to implement principles from five of these latest T&E policies and

recommends some changes in norms to solidify practices of these policies throughout the community.

## CHANGING NORMS: KEEPING ARMY TEST AND EVALUATION FLEXIBLE AND ADAPTABLE

We will continue to examine and challenge our most basic institutional assumptions, organizational structure paradigms, policies, and procedures to better serve the Army

—Commanding General,  
Army Test and Evaluation Command,  
Commander's Priorities for FY 10-15

As the Army leadership continues to shape the Army Force Generation (ARFORGEN) concept to generate continuous readiness that supports strategic flexibility and depth to the US Army warfighters, the US Army Test and Evaluation Command (ATEC) leadership continues to embrace and implement strategic changes to facilitate the fielding of equipment to the war-fighters.<sup>1</sup> As an organization, ATEC has customarily demonstrated adaptability and flexibility in meeting the challenges associated with the traditional acquisition process and the necessities resulted from the deployment of troops to Iraq and Afghanistan. This paper highlights the organizational evolution of the Army test and evaluation (T&E) community, examines how ATEC is adjusting its culture to implement principles from five of the latest T&E policies throughout the Command, and recommends a path ahead for successful inclusion of these principles in the community's business practices.

### Overview

The fundamental purpose of Test and Evaluation in the Department of Defense (DoD) and the Military Services remains the same as acquisition policies change. The DoD acquisition directives and instructions provide guidelines that establish a flexible management framework consistent with statutory requirements. Four studies conducted by different groups between 1999 and 2006 consistently revealed similar

concerns on the nature of the needed change.<sup>2</sup> Are the policies inefficient or is it the workforce's interpretation of the policies that justifies change? One can argue that the answer is a combination of the two. The lenses through which the workforce interpret and implement these policies play a significant role. Edgar H. Schein, a founder of the field of organizational psychology, summarizes the essence of culture as "the learned, shared, tacit assumptions on which people base their daily behavior."<sup>3</sup> An expert on business leadership and professor at the Harvard Business School, John P. Kotter wrote, "Culture refers to norms of behavior and shared values among a group of people."<sup>4</sup> It is reasonable to say that the cultures within the DoD organizations are shaped by statutory requirements, policies, and regulations. However, the norms reflect persistent ways and beliefs adopted by employees and vary from differing agencies and sectors of these organizations.

Strategic communication, strategic and creative thinking, as well as consensus building are essential norms to be embraced by the T&E workforce. Embracing these norms add efficiency to the acquisition community to provide the needed equipment and weapon systems to the service members. This paper uses some of the concepts prescribed in the eight-stage change process presented by John P. Kotter in his book *Leading Change*.<sup>5</sup> First, this paper explores the historical roots of T&E in acquisition of military systems. It presents a synopsis of the various organizational changes implemented in the Army T&E domain beginning in 1998, to include the evolution of ATEC. It then summarizes the latest T&E policies originated in the requirements of Section 231 of the John Warner National Defense Authorization Act for Fiscal Year 2007.<sup>6</sup> This is followed by a highlight of changes engineered in ATEC's processes.

Subsequent paragraphs analyze the scope of five of the latest policies and their implementation in ATEC. Finally, the paper offers some changes in norms for consideration to solidify practices of these policies throughout the community. The intent in this paper is not to advocate for ATEC, as an Operational Test Agency (OTA), to relinquish its statutory obligations. To the contrary, the recommended path ahead is a series of considerations that will lead to more robust T&E strategy and facilitate the successful implementation of the latest policies.

### Historical Roots of T&E in Acquisition of Military Systems

The genesis of the current T&E policies resides in the Blue Ribbon Commission on Defense Management report, and was due to the waste and lack of trust that pervaded the acquisition process in the 1980's. President Reagan established the commission in 1986 "in part because public confidence in the effectiveness of the defense acquisition system has been shaken by a spate of "horror stories"-overpriced spare parts, test deficiencies, and cost and schedule overruns."<sup>7</sup> The fundamental purpose of T&E, which is to inform the decision makers, in the Department of Defense (DoD) system acquisition process remains the same as the acquisition policies change. Describing how the successful commercial programs go about identifying and managing risks, the Commission reported, "Prototyping, early operational testing, and red teaming are used in concert for the timely identification and correction of problems unforeseen at a program's start."<sup>8</sup> However, one can argue that T&E policies have not been implemented consistently throughout the T&E community. The professionals in the operational T&E community who find their mandate in the Title 10 had always been reluctant to accept data generated in differing events and environments or with immature prototypes. This reluctance has been based on interpretation of Title 10 USC

Section 139 which states “Operational test and evaluation means the field test, under realistic combat conditions, of any item of (or key component of) weapons, equipment, or munitions for use in combat by typical military users; and the evaluation of the results of such test.”<sup>9</sup>

### History of Change and Adaptability in ATEC

Changes to its structure to meet strategic challenges are not new to ATEC. The Army T&E community went through a major reorganization starting with the Vice Chief of Staff’s approval on 18 November 1998 to consolidate developmental and operational testing.<sup>10</sup> This resulted in the redesignation of the agency known as Operational Test and Evaluation Command (OPTEC) to ATEC on 1 October 1999.<sup>11</sup> This new Command was chartered to be the Army’s test and evaluation integrator by combining both developmental and operational testing as well as the evaluation functions under its umbrella.<sup>12</sup> ATEC uses an integrated multi-disciplinary team, designated ATEC System Team (AST), which consists of representatives from each subordinate command activity to perform the T&E functions for each system.<sup>13</sup>

The leadership throughout the command sensed the need for deeper adjustment in their command’s business practices. MG John Marcello, CG ATEC, referring to the transformation undertaken by the Army to meet the challenges of 21<sup>st</sup> century and the T&E community’s role in system procurement, wrote “To do its part, T&E, “the conscience of acquisition,” must adjust the way it does business, or risk denying the Army’s grand initiative its needed momentum.”<sup>14</sup> Mr. Brian M. Simmons, then Deputy Commander and Technical Director at the U.S. Army DTC wrote in an editorial for the International T&E Association magazine “The Office of the Secretary of Defense (OSD) will provide the necessary policy framework, budget numbers and requisite support; but

the onus is on the leaders in the field to transform now to a more flexible, responsive and efficient T&E capability to support the warfighter-today's and tomorrow's."<sup>15</sup> This tradition continued with ATEC adapting its business practices to better serve the Nation after the 11 September 2001 attacks.

To respond to the urgent and rapid demand for weapons to support the deployment in Iraq and Afghanistan, ATEC institutionalized a new reporting process that stressed the identification and documentation of the equipment capabilities and limitations for the decision makers and the users prior to fielding to theater. Since November 2003, ATEC has been deploying the Forward Operational Assessment (FOA) team, on six-month rotations, to Iraq, Kuwait, and Afghanistan "to collect information on the systems, to identify shortfalls and fix issues dealing with everything from filling gaps in communication to conveying what Soldiers are actually requesting in new equipment and capabilities."<sup>16</sup> However, the most profound change in ATEC's culture has been in a significant campaign to embrace and implement guidance published in a December 2007 memorandum and later incorporated in the revised Department of Defense Instruction (DoDI) 5000.02, *Operation of the Defense Acquisition System*, 8 December 2008.<sup>17</sup>

#### New T&E Policies

This memorandum stated, "The fundamental purpose of T&E is to provide knowledge to assist in managing the risks involved in developing, producing, operating, and sustaining systems and capabilities. The goal is early identification of technical, operational, and system deficiencies, so that appropriate and timely corrective actions can be developed prior to fielding the system."<sup>18</sup> To meet this goal the Director and the Under Secretary decided to immediately implement several policies listed in the

December 2007 memorandum awaiting the publication of the revised 5000.02 instructions. However, the philosophy espoused in these policies is not totally new. As far back as 1986, the Blue Ribbon Commission on Defense Management established by President Reagan made remarks that advanced some of these thoughts. A summary of these policies is as follows:

- Developmental and operational test activities shall be integrated and seamless throughout the system life cycle
- Evaluations shall include a comparison with current mission capabilities using existing data, so that measurable improvements can be determined.
- T&E should assess improvements to mission capability and operational support based on user needs and should be reported in terms of operational significance to the user.
- To maximize the efficiency of the T&E process and more effectively integrate developmental and operational T&E, evaluations shall take into account all available and relevant data and information from contractor and government sources.
- Operational evaluators will continue to fulfill their statutory roles in providing assessments of operational effectiveness, operational suitability, and survivability to the Milestone Decision Authority. This paper does not address ATEC's implementation of this principle because it falls in line with the mandated mission of the Army Evaluation Center (AEC) which is one of the Subordinate Command Activities (SCA).

- To realize the benefits of modeling and simulation (M&S), T&E will be conducted in a continuum of live, virtual, and constructive system and operational environments.<sup>19</sup>

### ATEC's Interpretation of New Policies and Posture

Aware of the acquisition challenges which include procurement timeline, development of software intensive systems, and lack of adequate time to conduct comprehensive T&E, the ATEC leadership fully embraced the OSD policies. They espoused aspects of a philosophy desired in Army T&E since 1999 with the establishment of the ATEC organization which integrated DT and OT and championed the methodology of continuous evaluation. Early in January 2008, the leadership started an aggressive campaign to implement the policies and published the following guidelines to be used by the ASTs for all traditional T&E efforts as applicable:

- Include a comparison with current mission capabilities;
- Assess improvements to mission capability and operational support based on user needs
- Report in terms of operational significance to the user;
- Conduct T&E in the mission context expected at time of fielding
- Take into account all available and relevant data and information
- Continue to assess operational effectiveness, operational suitability, and survivability
- Identify strengths and weaknesses in meeting Warfighters' needs
- Realize the benefits of M&S.<sup>20</sup>

As an organization, ATEC had already underscored the principles expressed in the new policies. Its mission statement, which aligns very well with the policies, is “ATEC plans, conducts, and integrates developmental testing, independent operational testing, independent evaluations, assessments, and experiments in order to provide essential information to decision makers.”<sup>21</sup> Both the OSD memorandum and the DoDI 5000.02 echo that “Evaluations shall take into account all available and relevant data and information from contractor and government sources.”<sup>22</sup> The command’s vision highlights “An ATEC that is the premier test and evaluation organization within DoD-valued by customers and decision makers for providing essential information that ensures warfighters have the right capabilities for success across the entire spectrum of operations.”<sup>23</sup> ATEC leadership takes the appropriate steps at the appropriate time to place the command in the strategic position to fulfill this vision as explained earlier about the support to the rapid acquisition initiatives. Keeping with this tradition, the leadership espouses and enacts various business practices and meaningful strategic initiatives, in addition to the systematic application of the mentioned guidelines, to posture the ASTs in meeting the DoD 5000.02 intent. These include: a strong and renewed early focus on suitability assessment, application of experimental design in T&E planning, coordination on all T&E documents and products with the program manager (PM) to avoid any surprises and mitigate high T&E costs, and most importantly the implementation of the mission-based T&E (MBT&E).<sup>24</sup>

#### Scope of MBT&E

MBT&E is the most significant initiative being implemented by ATEC and provides the foundation for the implementation of the policies published in the OSD memorandum and captured in the DoDI 5000.02. It is the pillar that represents “ways”

in ATEC's strategy to implement the elements of these policies. "Mission-based T&E focuses on the identification and alignment system components and functions with the tactical missions and warfighting functions/tasks that the system supports."<sup>25</sup> The practice of MBT&E shifts the focus of the T&E effort from the materiel attributes expressed in the capabilities documents and the Army Training and Doctrine Command's (TRADOC) critical operational issues and criteria to the operational capabilities necessary for the warfighters to perform their mission. It requires coordination and buy-in from all key stakeholders. The success of this process depends on the AST members' knowledge and understanding of the tactics and procedures as well as a general operational understanding of the units' generic mission. What additional norms can the command and its workforce adopt to continue its contributions to the acquisition process in light of the following five policy updates?

#### T&E Policies Scope and Applicability in ATEC

*Policy 1 -- Developmental and Operational Test Activities Shall be Integrated And Seamless Throughout the System Life Cycle.* This policy aids in the management of the acquisition programs to control cost and schedule. It requires a break from the pervasive parochial cultures entrenched in the acquisition and T&E communities. The Defense Science Board Task Force identified, "There has been reluctance to involve the test and evaluation community early by some program offices hoping to maintain control of early test results. There has also been reluctance in some testing organizations to be involved early out of fear of losing their independence."<sup>26</sup> Leadership throughout ATEC and at every level in the SCA must challenge AST to develop comprehensive T&E strategy that is coordinated and vetted with the T&E Working-level Integrated Product Team (WIPT) to fully exercise this policy.

Some of the Warfighting Functions in ATEC embraced this concept already and used this method in the past due to the system complexity as well as program costs and schedule challenges. For instance, the Air and Missile Defense (AMD) community has supported the implementation of T&E strategy that fully integrated developmental and operational tests since the mid 1990's for the PATRIOT missile system. ATEC had also developed similar strategy for the Theater High Altitude Area Defense (THAAD) and National Missile Defense systems. Early on OPTEC/ATEC and program office personnel as well as DOT&E representatives realized the scope and associated T&E costs for the AMD systems will be broad and expensive. The stakeholders embraced ATEC's strategy and agreed to coordinate test objectives and decided jointly on a test configuration that meets each agency requirements through consensus.

Consensus building is required for ATEC to formalize the practice throughout the command for every traditional acquisition program. Mr. Christopher DiPetto, Acting Director, Developmental Test and Evaluation, Office of the Secretary of Defense, wrote in September 2009, "I believe the real obstacles to fully implementing integrated testing are mostly cultural and can be overcome with appropriate action by acquisition leaders."<sup>27</sup> As witnessed with the AMD programs it will require leadership, vision, and creativity from the AST Chairs as well as support through strategic communication from the Directorates, SCA leadership through the ATEC Command Group.

Each stakeholder may seek to apply this policy for various reasons. It is plausible that the T&E (WIPT) may interpret this policy as a reason for abbreviated OT events due to resource scarcity, potential for extended procurement time, and challenges to get available test units.<sup>28</sup> Real world obligations limit the availability of

Army units to participate in test events. This fact is illustrated in the Army Forces Command having difficulty supplying units to support six operational tests scheduled to take place in 2010.<sup>29</sup> However, the AST has the responsibility to explain to the T&E WIPT that the essence of this policy is not to substitute developmental test for operational test. Rather, the key idea is that this policy allows for a strategy that supports the continuous evaluation of the system by generating data to: 1) facilitate and assess technology maturity, 2) feed a reliability growth curve program for comprehensive suitability assessment, and 3) rehearse for Initial Operational Test and Evaluation (IOT&E).<sup>30</sup> It will take trust, will, and great negotiation skills from all the stakeholders to build consensus to implement this policy. Simply put, it is recommended that this policy be implemented in a manner that allows compliance with the intent of Title 10 United States Code (USC) Section 139 which dictates weapons must be tested thoroughly and realistically.

*Policy 2 -- Evaluations Shall Include a Comparison with Current Mission Capabilities Using Existing Data, So That Measurable Improvements Can Be Determined.* This policy is about comparing evaluations, not the test events, to discern measurable improvements. It does not advocate the need for additional test events if the relevant data is available. As a matter of fact, it embraces the use of existing data and requires the AST to look for opportunities outside the traditional sources to support the evaluation activities. It also challenges the AST members understanding of the military unit's mission scope to facilitate the development of meaningful evaluation objectives. The continuous evaluation method professed by AEC and the practice of MBT&E provide the infrastructure to fully implement this policy.

It is the AST's obligation to use creative and strategic thinking to identify venues that facilitate comparison of mission capabilities. As practiced in some instances in the AMD community, the T&E WIPT leverages systems' test events as long as the objectives could be integrated on a non-interfering basis. Other venues, although extremely difficult to leverage, can be training or military exercises. Using systems that are in development but mature, ready to enter IOT&E and for which TRADOC has developed the tactics, techniques, and procedures (TTPs), the ARFORGEN training cycle should provide an excellent realistic venue to observe and collect data from the units in their operational configurations. In describing the ARFORGEN as the Drive Train, "The Army focuses units against future missions early and task organizes modular expeditionary forces tailored to mission requirements. ...operational requirements drive the ARFORGEN training and readiness process."<sup>31</sup> This leverage of the ARFORGEN can also alleviate the challenge in the lack of military unit's availability due to real world obligations to execute the tests. However, particular coordination and planning must take place prior to allow ATEC's participation in these activities.<sup>32</sup> Approval will require Army's senior leaders' involvement to include ATEC's and participating Operating Force's.

In the meantime, the deployment of the Army units to Iraq and Afghanistan provide the best opportunity to evaluate mission capabilities in the most realistic environment for systems deployed in these theaters. ATEC has been in the forefront to support and to take advantage of this operational environment through the FOA team. This new paradigm differs greatly from the traditional operational testing performed at the test ranges to support the acquisition efforts. The team is embedded with various

selected units in theater to observe and collect real-time information, in a non-intrusive fashion, as the conflict takes place. “Through much coordination with U.S. forces, coalition partners, and multiple civilian organizations, ATEC’s FOA teams have provided the eyes, ears, and knowledge to Army senior leaders with often the only current and relevant information with which to make decisions.”<sup>33</sup> Ultimately the AEC personnel can use this data to perform the evaluation and document the systems’ existing capabilities demonstrated in an operational environment. This evaluation will constitute the mission capabilities baseline against which future system improvements or systems with similar capabilities procured for similar units can be compared. Having established this baseline, the AST must remain aware that the tactics and procedures used in Iraq and Afghanistan are tailored for this specific environment to fight the specific enemy. Therefore, as the user adjusts the tactics and the concept of operations, the AST must adapt their strategy and take these changes into consideration to properly conduct the comparable evaluation.

*Policy 3 -- T&E Should Assess Improvements to Mission Capability and Operational Support Based On User Needs and Should Be Reported in Terms of Operational Significance to the User – Evaluation Conducted in the Mission Context.*

The first observation is this policy statement focuses on “mission capabilities.” This focus represents a key shift from previous policies where the T&E emphasis was on verifying if the equipment could perform the user requirements to include the key performance parameters. This policy statement is long overdue and, to quote Mr. Steve Daly, “Mission success is not about the specifications – not about the “shalls.” The units, not the equipment, perform the mission.”<sup>34</sup> This entails evaluation, as the

equipment mature and the various support packages become available, that is to be based on data generated from events where the equipment is manned with trained military personnel, to include operators and maintainers, performing a representative mission in accordance with approved TTPs. Second, this policy also mandates assessment of “operational support based on user needs.” This requires an assessment of operational suitability to include the whole logistics trail, wartime usage rates, reliability, and maintainability. The community has to question how realistic is this policy; and has to be willing to exercise common sense to ensure the associated cost and necessary schedule allotment do not outweigh the benefits. There are some significant challenges and limitations for any Service OTA to fully implement this policy.

The intentions expressed in this policy are fully met in ATEC’s MBT&E which enables evaluation in the mission context. One key advantage offered by the MBT&E methodology is the use of the Army Universal Task List which is a comprehensive, but not all-inclusive, listing of Army tasks, missions, and operations for the various warfighting functions.<sup>35</sup> The use of the task list facilitates a doctrinal reference and helps establish measures and standards used in the evaluation.<sup>36</sup> In addition, the AST should work very closely with the Directorate, Combat Development representatives to clarify and set boundaries for a typical mission. Cooperation and consensus must be reached among the participants to identify the appropriate objectives, based on software and materiel maturity, for each phase of testing and evaluation.

Another challenge to fully implement this policy is that the US military usually prosecutes wars as a joint team or even part of a multinational force.<sup>37</sup> It is unrealistic to develop a T&E strategy to capture comprehensive missions to be performed by a single

military unit. Test events are experiments that can never replicate the fog and friction of war as postulated by Clausewitz.<sup>38</sup> T&E professionals need to accept this limitation. The leadership throughout the chain of command must recognize these challenges and limitations, and be willing to live with them. Realistic expectations must be established by the AST and the T&E WIPT. The ATEC leadership will continue to communicate these expectations to the Army and OSD Staff.

*Policy 4 -- To Maximize the Efficiency of the T&E Process and More Effectively Integrate Developmental And Operational T&E, Evaluations Shall Take Into Account All Available and Relevant Data and Information From Contractor and Government Sources.* The approval to use available and relevant contractor data has never been stated with such clarity in any policies from DOT&E or as stated in this version of the DoDI 5000.02. This policy represents the biggest departure from previous T&E policies. This statement appeared in two different locations in the instruction. The Defense Science Board reported in 1999 that “The vast majority of test objectives (80%) provide developmental insights as well as operationally relevant information.”<sup>39</sup> The operating word in the policy is relevant. There usually are plenty of data from all the sources; however, the questions have to be are they reliable, were they generated in the right context, and were they properly collected and reduced? This policy provides tremendous flexibility for the Service OTA to work early with the PMs to shape the contractor tests by documenting their needs and requests for the contractor data. The AST early involvement required by ATEC leadership is essential in implementing this policy.

A catalyst in this process is a Test and Evaluation Master Plan (TEMP) coordinated, vetted, and approved by a T&E WIPT to document all stakeholders' requirements.<sup>40</sup> However, in a 2 September 2008 memorandum, Department of Army representatives wrote "Our 30-day standard for a HQDA approved TEMP is still not always being achieved."<sup>41</sup> They recommend empowerment of the T&E WIPT members, involvement of management from all levels, open and honest working relationships, and early initiation of the formal approval process to improve the TEMP approval timeline.<sup>42</sup> As the proponent of the TEMP, the Materiel Developer is responsible to ensure this overarching strategic plan is approved early and should be incentivized to use military subject matter experts, to include operators and maintainers, during their DT to provide feedback regarding the design's potential military usefulness.

Additionally, the current instruction states "The lead OTA shall brief the DOT&E on concepts for an OT&E 120 days prior to start. They shall submit the OT&E plan 60 days prior, and shall report major revisions as they occur."<sup>43</sup> To successfully create an environment to generate data that are relevant to differing stakeholders there must be a prerequisite step much earlier than these timelines. Coupled with ensuring the TEMP is forwarded for approval in a timely manner, a path-ahead should be to require the T&E WIPT, not just the Lead OTA, to brief key stakeholders, to include OSD for oversight programs, 180 days after a system becomes a program of record on their T&E strategy. This briefing should focus mainly on the test events to be conducted through IOT&E to include contractor tests, government DT, and OT. This will provide an opportunity to get early feedback and buy-in from the senior stakeholders. Although each T&E WIPT member has the responsibility to inform his leadership of the issues, this forum will allow

a collective or holistic presentation of the test events and how each stakeholder will be getting the data needed to comply with this principle. This approach will force the T&E WIPT members to get involved early in identifying their requirements and therefore bring all the contemptuous issues and challenges up early for resolution.

*Policy 5 -- To Realize the Benefits of Modeling and Simulation (M&S), T&E Will Be Conducted In a Continuum of Live, Virtual, and Constructive System and Operational Environments.* It is well documented that M&S provides a series of advantages. However, one must appreciate the fact that M&S are just a representation of capabilities or functionalities. They should not be used just for convenience. The Defense Science Task Board highlighted, "Substantial early investment is often needed to capitalize on the potential M&S benefits in the T&E process."<sup>44</sup> The development and use of these tools can be time consuming and expensive. It requires expertise and knowledge of the system as well as the TTPs to build an accurate representation. The fidelity of an M&S tool impacts the cost associated with the development of that tool. The verification, validation, and accreditation of a model rely on the quality and the reliability of the data used to perform these functions. Describing the need to understand how M&S contribute to T&E the Task Force reported, "Require the users of M&S in their evaluations to state model assumptions, limitations, and uncertainties explicitly, as well as sources for input data in the presentations of results to decision makers."<sup>45</sup> Therefore, here are three recommended critical takeaways the AST must follow when implementing this policy: 1) determine if the benefits outweigh the costs; 2) ensure the accreditation of the tool is focused on the fidelity of the functionalities modeled to facilitate an accurate assessment regarding the mission context, operational

realism, as well as relevance; 3) understand the what, why, where, and when associated with the system requirements to be tested and evaluated using the tool.

The ATEC community uses M&S when appropriate routinely. M&S events and hardware in the loop tests (HWILT) are necessary phases in every ATEC T&E strategy for the AMD systems. The reality and the complexity associated with these systems do not allow the AST to escape this axiom. ATEC conducted the first HWILT with a joint architecture at the Joint National Test Facility in 2002 to test interoperability during the Patriot Advanced Capability 3 IOT&E. The event was sponsored by the Missile Defense Agency and included capabilities that represented key major theater missile defense systems to include early warning sensors and command and control nodes. The Patriot AST also uses the flight mission simulator, among other modeling and simulation tools, routinely to support their continuous evaluation activities.<sup>46</sup> The plan is for Raytheon Corporation to develop a HWIL facility conceived after the one used in the Patriot program for the Surface Launched Advanced Medium Range Air-to-Air Missile IOT&E.<sup>47</sup> The AST for the Army Integrated Air and Missile Defense, a pre-major defense acquisition program effort, is working with the PM on a T&E strategy that will take full advantage of their M&S tools and facilities.<sup>48</sup>

#### ATEC Current State for New Policies

Some sectors in ATEC have been guided by some of the principles espoused in these new policies before OSD published them. Dr. James Streilein and Ms Luna pointed out that “the Ballistic Missile Defense System T&E strategy features some of these policies in ATEC and they also highlighted the M915A5, a commercial purchase of a line haul semi-tractor, and the Mine Resistant Ambush Protected vehicle programs as other examples where AST is using integrated DT and OT.”<sup>49</sup> Where is ATEC in fully

implementing these principles throughout the Command? Upon publication of the OSD memorandum, ATEC conducted an initial assessment which revealed that one of the five principles examined in this paper, measuring improvement to mission capability, had been fully embedded in ATEC's processes; and the other principles were either partially embedded or not embedded in the ATEC's processes.<sup>50</sup> The leadership has since reported twice on the state of implementation of these principles in the Command's business practices. It needs to be noted that the second policy was broken into two categories to facilitate tracking improvements to capability and operational support as well as tracking comparisons of separate current mission capabilities. The first review reflected activities captured for nine systems. It showed that one policy -- use of all available information -- was fully addressed in all nine T&E efforts. The other policies were either addressed partially or not at all. The second review for twelve different systems revealed that measuring improvement to capability and operational support and integration of DT and OT still lags the implementation of the other policies.<sup>51</sup> How can ATEC bridge this gap?

### Path Ahead

Although the nature of the working relationship in the T&E IPT can be one of collaboration, it is plausible to argue there is need for improvement in removing parochialism and cultural barriers. The ATEC leadership has been fostering a more cooperative environment. The AEC Director mandated that the AST invite the PM to attend and participate in T&E strategy presented to ATEC. It is CG ATEC's policy that the AST coordinates all T&E documents and products with the PM to avoid any surprises and mitigate high T&E costs.

A common obstacle to effective management and building consensus in many organizations is the reluctance of personnel to elevate issues to the supervisors and senior leaders for resolution. This can result in wasting valuable time while attempting to solve problems that: 1) are beyond the control of action officers, and 2) within senior leaders' ability to resolve easily based on relationship or having a broader view of the multitude of challenges the organizations and the Army are facing. ATEC regulation prescribes established timelines and milestones for various reviews to be conducted throughout the T&E program. These milestones are also listed in the Section IV of each event Test Resource Plan.<sup>52</sup> It is up to the staff and Directorate leadership to take advantage of these forums and ensure that issues preventing or impacting a full implementation of these policies are identified and presented with appropriate courses of action to the Senior Leaders during these reviews. Decision to approve a course of action by the leadership empowers the AST to negotiate with the T&E WIPT. Knowing the path the ATEC leadership supports places the AST in a better position to engage in consensus building with their counterparts.

A consistent message from speakers to the Army War College Academic Year 2010 class is to think "Army Enterprise and Army goals".<sup>53</sup> The Army Enterprise "encourages Civilian and Military leaders to take a holistic view of Army objectives and resources, and empowers them to integrate related functions to effectively and efficiently generate trained and ready forces for Combatant Commanders and sustain the All-Volunteer Force."<sup>54</sup> The path ahead for ATEC leadership throughout the Command is to continue to train and demand that the AST members think strategically. Parochialism can be a handicap, not a facilitator. The message needs to be one team

and one mission, the Army team. The infusion of new employees in the AEC due to retirement and the ongoing geographical relocation presents an excellent opportunity to plant this seed in the workforce. However, it will take more than willingness from ATEC to lead and petition for the need of consensus.

The various organizations represented in the T&E WIPT must be willing to join ATEC in reaching consensus toward the best possible means to implement the five T&E policies discussed. The purpose is to target not only unity of command but also unity of effort to become more efficient in delivering the most effective, suitable, and survivable capabilities to the units to conduct their mission. The Materiel Developer community has to face the reality that many of the systems being developed are complex and software intensive. These systems require adequate and possibly extensive testing to identify and mitigate the inherent risks associated with pursuing these developments. The community has to embrace the concept that “test “failures”, especially in the early phases of system development, should be received as important learning opportunities and chances to solve problems as they are uncovered.”<sup>55</sup> Therefore, a path ahead should be for the Combat Developer to: 1) establish realistic requirements and 2) be willing to accept less than the 100 percent solution at the first fielding. Dr. James J. Streilein, Technical Director for ATEC, concluded “success in fielding equipment to our warfighters will continue to require total commitment, coordination, and cooperation of all members of the acquisition communities. I have seen the T&E community continually improve over the years since 1974, and I look forward to our efforts and innovations to handle the increases in complexity of systems to be tested and evaluated

in the future.”<sup>56</sup> This is the mindset that is influencing positively the posture of the ATEC organization.

### Conclusion

As OSD establishes new acquisition and T&E policies, the main purpose of T&E remains to provide unbiased and relevant information to the decision makers to manage risks. Anticipating the need for integrated T&E, the Army approved the consolidation of DT and OT in 1998. The ATEC leadership has consistently shown flexibility and adaptability in approving T&E strategy that calls for use of M&S as well as all available, relevant, and credible data to support the evaluation of the missile defense systems. The ATEC leadership has embraced the principles espoused in the T&E policies published by OSD and has implemented various initiatives to facilitate their full implementation. ATEC’s key strategic initiative is the MBT&E. Success in fulfilling these policies is a factor of trust and the community’s will to build consensus. Consensus among all stakeholders in accepting the limitations associated with the development and testing of complex systems are necessities of the time. The T&E WIPT members must be bold and show the desire to break their agencies’ cultural barriers. These members must challenge their leadership and adopt norms such as critical and creative thinking and collaboration for unity of effort. The first critical step is for all stakeholders to embrace the thought that although their agency has specific mission and functions that contribute in the overall acquisition process, the objective is not about them. The agencies are facilitators and contributors; the objective is to equip the Warfighters.

## Endnotes

<sup>1</sup>DCS G-3/5/7 Army Transformation Office DAMO-ZT, "Army Force Generation," briefing slides, Continuous Education for Senior Leaders 084, Army Management Staff College, U.S. Army Fort Belvoir, VA, May 16, 2008.

<sup>2</sup>Deputy Under Secretary of Defense (Acquisition, Technology, and Logistics), Department of Defense Report to Congress on Policies and Practices for Test and Evaluation (July 2007), 6.

<sup>3</sup>Edgar H. Schein, *The Corporate Culture Survival Guide* (San Francisco, CA: Jossey-Bass, 1999), 24.

<sup>4</sup>John P. Kotter, *Leading Change* (Library of Congress Cataloging-in-Publication Data: John P. Kotter, 1996), 148.

<sup>5</sup>*Ibid.*, 20.

<sup>6</sup>Introduction to DOT&E FY07 Annual Report: "Section 231 of the National Defense Authorization Act for Fiscal Year 2007, Public Law 109-364, directed a review and amendment, if appropriate, of DoD policies and practices on test and evaluation. An initial report (July 17, 2007) responding to this task identified policy initiatives under active consideration with respect to both traditional and emerging acquisition approaches."

<sup>7</sup>A Formula for Action, A Report to the President on Defense Acquisition by the President's Blue Ribbon Commission on Defense Management, April 1986, page 1.

<sup>8</sup>*Ibid.*, page 13.

<sup>9</sup>Title 10 of the United States Code, Subtitle A General Military Law, Part I Organization and General Military Powers, Chapter 4 Office of the Secretary of Defense, Section 139.

<sup>10</sup>A TEC Magazine Trusted Agent of America's Soldiers, 2001-1002 Transformation's Critical Enabler, page 5.

<sup>11</sup> *Ibid.*

<sup>12</sup>*Ibid.*, "The test and Evaluation Command (TECOM) became a major subordinate command of ATEC and was redesignated the U.S. Army Developmental Test Command (DTC), with DTC headquarters remaining at Aberdeen Proving Ground, Maryland. Also, the Test and Experimentation Command (TEXCOM) was redesignated the U.S. Army Operational Test Command (OTC), with OTC headquarters remaining at Fort Hood, Texas. The third ATEC subordinate command that was redesignated encompassed both the Operational Evaluation Command and the Evaluation Analysis Center, which were combined to form the new U.S. Army Evaluation Center (AEC)."

<sup>13</sup>A TEC Regulation 73-1, *System and Policy Evaluation*, 16 March 2006, AST is a multi-disciplinary team which consists of representatives from each Subordinate Command Activity (SCA). The AST plans, manages, and coordinates the T&E activities for assigned systems. The AST Chair, who is designated jointly by the SCAs, reports to and represents the ATEC Commanding General on AST matters.

<sup>14</sup>Ibid., ATEC Magazine Trusted Agent of America's Soldiers, 1.

<sup>15</sup>Brian M. Simmons, "Imperatives for T&E Change Must Come From Within," International Test and Evaluation Association Journal 27, no. 2 (June/July 2006): 6

<sup>16</sup>Operational Test Command Home Page, <http://www.otc.army.mil/Deployable%20Teams/FOA.htm>, (accessed December 20, 2009).

<sup>17</sup>Director Operational Test and Evaluation Office of the Secretary of Defense Dr. Charles E. McQueary and Undersecretary of Defense for Acquisition Technology and Logistics Mr. John J. Young Jr., "Test and Evaluation Policy Revisions," memorandum for Secretaries of the Military Departments, Chairman of the Joint Chiefs of Staff, Washington, DC, December 22, 2007.

<sup>18</sup>Ibid., McQueary and Young Jr.

<sup>19</sup>Ibid.

<sup>20</sup>ATEC Current State: McQueary 8 Initiatives, briefing slide, 8 January 2008.

<sup>21</sup>Army Test and Evaluation Command Home Page, <http://www.atec.army.mil/>, (accessed February 14, 2010).

<sup>22</sup>Department of Defense Instruction 5000.02, Operation of the Defense Acquisition System, December 8, 2008, Enclosure 2, page 24.

<sup>23</sup>Ibid., Army Test and Evaluation Command Home Page.

<sup>24</sup>Guidance issued at AEC Net Fires Evaluation Directorate Staff meeting on or about January 2008.

<sup>25</sup>Frank J. Apicella, Kerry W. Wyant, and Christopher M. Wilcox, "ATEC Initiatives in Response to the Office of the Secretary of Defense Policy Guidelines for Test and Evaluation," International Test and Evaluation Association Journal Vol 30, no. 3 (September 2009): 361.

<sup>26</sup>Office of the Under Secretary of Defense for Acquisition and Technology, *Report of the Defense Science Board Task Force on Test and Evaluation*, (Washington, DC: U.S. Department of Defense, September 1999), 1.

<sup>27</sup>Christopher DiPetto, "Implementing Integrated Testing," International Test and Evaluation Association Journal Vol 30, no. 3 (September 2009): 331.

<sup>28</sup>Army Regulation 73-1, Test and Evaluation Policy, 1 August 2006. The T&E WIPT, formed and chaired by the Materiel Developer, is composed of representatives from all involved organizations. "A T&E WIPT must be established for every program to ensure that test and evaluation integration is accomplished. The primary purpose of the T&E WIPT is to optimize the use of appropriate T&E expertise, instrumentation, facilities, simulations, and models to achieve test integration, thereby reducing costs to the Army and decreasing acquisition cycle time."

<sup>29</sup>ATEC “Test Schedule and Review Committee Council of Colonels” briefing slides, January 7, 2010.

<sup>30</sup>Director Operational Test and Evaluation Action Officer Training Course, September 15-18, 2008.

<sup>31</sup>Sharon L. Scott, “071 F132 Explain the Army ARFOGEN Cycle Lesson Plan,” April 2009, linked from Army Knowledge Online at <https://www.us.army.mil/suite/doc/19511643>, (accessed January 20, 2010).

<sup>32</sup>James J. Streilein, N. Dianne Luna, “ATEC’s Approach to Integrated Testing,” International Test and Evaluation Association 30, no. 3 (September 2009): 355.

<sup>33</sup>*Ibid.*, Operational Test Command Home Page.

<sup>34</sup>Deputy Director Land and Expeditionary Warfare Steve Daly, Developmental Assignment, July 2008 – January 2009.

<sup>35</sup>U.S. Department of the Army, The Army Universal Task List, Field Manual 7-15 (Washington, DC: U.S. Department of the Army, February 27, 2009), IX.

<sup>36</sup>Apicella, Wyant, Wilcox, “ATEC Initiatives,” 364.

<sup>37</sup>Joint Chiefs of Staff, Joint Operations, Joint Publication 3-0 (Washington, DC: U.S. Department of the Army, September 17, 2006, Incorporating change 1, February 13, 2008), XII. “The United States employs military capabilities at home and abroad in joint operations that vary in size, purpose, and combat intensity to shape the operational environment, protect US interests, prevent surprise attack, or prevail against an enemy.

<sup>38</sup>Carl Von Clausewitz, On War, “War is more than a true chameleon that slightly adapts its characteristics to the given case. The only situation a commander can know fully is his own; his opponents he can know only from unreliable intelligence. And through element of chance, guesswork and luck come to play a great part in war.”

<sup>39</sup>*Ibid.*, *Defense Science Board Task Force on Test and Evaluation*, page 4.

<sup>40</sup>*Ibid.*, Army Regulation 73-1, Test and Evaluation Policy, 1 August 2006, page 1. “The TEMP is the basic planning document for a system life-cycle T&E. The TEMP documents the T&E strategy and is developed and initially approved prior to program initiation. The TEMP is then updated prior to each subsequent milestone (MS) and full-rate production (FRP) decision review thereafter or for a major modification. It is the reference document used by the T&E community to generate detailed T&E plans and to ascertain schedule and resource requirements associated with a given system. The TEMP describes what testing is required, who will perform the testing, what resources will be needed, and what the requirements are for evaluation. The MATDEV has the overall responsibility to develop the TEMP. However, all T&E WIPT members contribute to TEMP development and maintenance. Upon approval by the appropriate authority, the TEMP serves as a contract between the MATDEV and the T&E community for executing the T&E strategy. The TEMP provides key management controls for T&E in support of the acquisition process.”

<sup>41</sup>Director Test and Evaluation Office Janet L. Garber, Principal Deputy Assistant Secretary of the Army (Acquisition, Logistics and Technology) Dean G. Popps, "Improving the Headquarters, Department of the Army (HQDA) Test and Evaluation Master Plan (TEMP) Approval Process," memorandum for Assistant Secretaries of the Army, Deputy Chiefs of Staff, Army Commands.

<sup>42</sup>Ibid.

<sup>43</sup>Ibid., DoDI 5000.02, page 53.

<sup>44</sup>Ibid, Defense Science Board Task Force on Test and Evaluation, page 5.

<sup>45</sup>Ibid.

<sup>46</sup>U.S. Army Test and Evaluation Command, *System Evaluation Plan Volume 1 for the Patriot/Medium Extended Air Defense System*, 11 October 2005, 2-2.

<sup>47</sup>Program Executive Office Missiles and Space Cruise Missile Defense Project Office, *Draft Test and Evaluation Master Plan for SLAMRAAM*, 5-7

<sup>48</sup>Integrated Air and Missile Defense Project Office Program Executive Office Missiles and Space, Acquisition Strategy for the Integrated Air and Missile Defense (IAMD) Program, 8 June 2009, 32. However, caution needs to be exercised when implementing this policy.

<sup>49</sup>Ibid., Streilein and Luna, page 357.

<sup>50</sup>Ibid., ATEC Current State: McQueary 8 Initiatives, briefing slide, January 2008.

<sup>51</sup>U.S. Army Test and Evaluation, "Implementing the Section 231 Report – An ATEC Perspective," briefing slides with scripted commentary for Director Systems and Software Engineering Deputy Under Secretary of Defense for Acquisition and Technology Mr. Gordon M. Kranz.

<sup>52</sup>ATEC Interim Policy Guidance 08- 1, "The Test Resource Plan is prepared for all tests that require Army or other Service personnel or resources that ATEC cannot provide. Examples include Soldier support, training ranges, instrumentation, flying hours, standard ammunition, or training devices." Page 5, 4 April 2008.

<sup>53</sup>Various past and present Army Senior Leaders, briefings on leadership topics and issues that impact the Army, Carlisle Barracks, PA, U.S. Army War College, Academic Year 2010.

<sup>54</sup>"Army Enterprise Website", linked from *Army Knowledge Online Page*, <https://www.armyenterprise.army.mil/Pages/default2.aspx> (accessed February 12, 2010)

<sup>55</sup>Ibid, Defense Science Board Task Force on Test and Evaluation, page 2.

<sup>56</sup>James J. Streilein, "Test and Evaluation of High Complex Systems," *International Test and Evaluation Association Journal* 30, no. 1 (March 2009): 3.