



*U.S. Army Operational
Testing and Evaluation: Laying
the Foundation for the Army of 2020*



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The strength of the U.S. Army has always been its Soldiers—loyal, selfless, courageous men and women of integrity. But in the 21st century our people are confronting adversaries who also exhibit audacity, resilience and creativity, employing hybrid strategies to confound the technological and industrial dominance that has until recently been reserved for nation-states. These hybrid threats create a strategic dilemma—a grand “security paradox” with implications neatly summarized a few months ago by Chairman of the Joint Chiefs of Staff General Martin E. Dempsey:

*[L]ethal and destructive technologies are proliferating in two directions. They’re proliferating horizontally across advanced militaries in the world, and they’re proliferating vertically, down to nonstate actors, especially insurgents, terrorist groups and even transnational organized crime. As a result, **more people have the ability to harm us or deny us the ability to act than at any point in my life.***¹

Fortunately, we are a nation—and an Army—whose senior leaders are visionary and are quick studies. We have a national asset—integrated operational testing and evaluation—that allows us to translate vision into realities. The Agile Capabilities Life Cycle, its associated Network Integration Evaluation process and the Capability Set Management construct are those realities. They allow the Army to modernize its information systems (those technologies that enable our Soldiers to continue to be more resilient and adaptable than our adversaries) far more rapidly and at far better total value than ever before. This is the future of modernization and acquisition.

In this latest installment of AUSA’s signature Torchbearer series, we analyze the Army’s refined approach to operational testing and evaluation. We explore the Army’s new unified approach to testing, acquisition and deployment, consider how this synergy has already benefited the nation and the Army and discuss the possibility of using this mechanism to transform joint training and doctrine. We hope you find this report a useful and informative resource and that you will continue to look to AUSA for insightful and credible analysis of contemporary national security issues.

GORDON R. SULLIVAN
General, USA Retired
President, AUSA

¹ General Martin E. Dempsey, remarks at the John F. Kennedy, Jr. Forum, Harvard University, Boston, Massachusetts, 12 April 2012, <http://www.jcs.mil/speech.aspx?id=1690>.

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Executive Summary

It's critical that we continue to modernize and give our soldiers the best possible equipment, the best possible platforms with which they can do the hard work of freedom into the future. Key to that is doing it effectively, yes, but also doing it efficiently.

The Honorable John M. McHugh
Secretary of the Army
9 May 2012²

As the Army looks to the future, the uncertainty and complexity of the global security environment demand constant vigilance. The Department of Defense's 2012 strategic guidance envisions an Army that is globally engaged and regionally responsive. In this security environment, the Army plays a central role in a joint force that is smaller and leaner but more agile, flexible, globally deployable and responsive to any contingency. Operational testing and evaluation is not a new concept for the Army. It has dedicated significant resources to this integral function for many decades—a function led today by U.S. Army Test and Evaluation Command (ATEC), which has the distinct advantage among the service operational test agencies of having developmental testers, operational testers and system evaluators organized under one command. Constant testing and evaluation has shown that the force must have a reliable, interoperable and broadly capable network to meet these demands. Further, it must be able to adjust, adapt and rapidly field new technologies—and develop and implement corresponding training and doctrine—to keep ahead of creative adversaries.

The Army's time-honored methods of evaluation demonstrate that it would be a tremendous advantage—particularly at the small-unit level and particularly against the hybrid threats that have become commonplace on today's battlefield—for every Soldier to have the capability to plug into the tactical network and have the means to access and distribute information as necessary. Such capability, pushed all the way to the tactical edge, would enable the execution of truly unified land operations, help maintain and develop new opportunities for overmatch against adversaries at the tactical and operational levels and yield tremendous new possibilities for commanders to execute mission command. In 2011, the Army began a series of tests called Network Integration Evaluations (NIEs) designed to integrate and mature the network holistically.

The NIE is a crucible, a melting pot of experimentation and evaluation, through which the Army can quickly assess promising new technologies by boiling them down under realistic pressure to perform. By synchronizing the Army's requirements, resources and acquisition communities at the front end of the technology development process, the NIE minimizes developmental risk, reduces the frequency and scale of cost and schedule overruns and yields better technology solutions for Soldiers more rapidly than was previously possible. The Army also employs many other methods, such as forward operational assessment (FOA) teams who deploy to combat zones, to gain instant feedback and incorporate battlefield experience in its testing, evaluation and acquisition processes.

The NIE process has proved to be a most valuable tool in its own right, partly because it has forced the Army to look critically at its historic requirements and acquisition methods. Among the most introspective lessons that the Army has absorbed and institutionalized by undertaking the development of the NIE process is that it is now better able to understand and value the perspective of its industry partners, large and small, on whom it depends—shared perspective that combines to drive down costs for both parties while saving time and developing more appropriate solutions. The Army has taken many steps to listen to its industry partners, understand their costs and concerns and provide agreeable returns for industry's substantial investments.

² As quoted by Claire Schwerin, "Leaders Say Network Integration Evaluation Improving Army Acquisition," U.S. Army, 14 May 2012, <http://www.army.mil/article/79815>.



The ways in which the NIE process has increased the Army's effectiveness are numerous. The participation of the Soldier at every turn of the process—evaluating realistically the requirements first generated in the schoolhouse—continues to pay tremendous dividends. Even though the scope of the NIE exercises continues to expand with each iteration, the cost of testing continues to decrease. Overall, since its inception, the NIE construct has saved the Army approximately \$6 billion—a return on investment of ten times the actual cost. Soldiers now have the opportunity to gain practical experience with new technologies before they deploy, wringing out new gear and guaranteeing system compatibility and reliability ahead of time. The new gear itself is better in nearly every respect; for example, the Nett Warrior program (a smartphone-like data device) employed Soldier feedback from one NIE and ultimately generated 65 percent cost savings, 70 percent weight reduction and more rapid fielding to more formations—all validated at a subsequent NIE. As a result, Nett Warrior is being fielded to the force today.

The most recent NIE (NIE 12.2, conducted during spring 2012) represented a most significant milestone in the evolution of Army operational testing. What was especially noteworthy was that it defined an entire system of network hardware and software that has since become available for fielding to the force as a whole capability package (Capability Set 13). Going forward, when Army formations enter the early phases of the force generation cycle, they will receive an entire set of fully integrated network systems as a package. Already, the 10th Mountain Division has begun training with Capability Set 13 systems and will deploy with them in early 2013; ultimately, eight brigade combat teams (BCTs) expect to deploy with this network package. The successful performance of the technology in its final operational test validated several important lessons for the Army's future:

- The network can push critical technological tools to the edge—to small tactical units.
- Platforms that enable mission command on the move still need to be refined further, but they offer commanders tremendous capability at multiple echelons to gain initiative and attack threats from multiple vantage points through a distributed network.
- The network now demonstrates reliability over great distances, is relatively stable and can support a high operational tempo under realistic pressure.
- The network consistently provides commanders with actionable intelligence and other information via redundant pathways.

NIE 13.1, set to begin in late fall 2012, will constitute another giant step forward. Network infrastructure will be evaluated throughout heavy and Stryker BCTs simultaneously for the first time. Testing will be conducted at a total of seven sites at the same time. Candidate systems under test will include some that could field mission-command-on-the-move technology as part of Capability Set 14 in early 2013. In addition, it will be the most joint NIE to date, including greater U.S. Marine Corps and U.S. Air Force participation.

There is even greater potential yet to be realized in the NIE construct. It has already demonstrated its ability to link distributed Army units for infrastructure testing purposes. But it also makes possible the ability to conduct joint training and develop joint doctrine across vast geographic areas—a particularly relevant opportunity, given the services' rebalance toward the Pacific region. The lessons learned from network integration also have much wider application toward the development, integration and fielding of other modernization efforts.

The Army's operational testing and evaluation initiatives are critical not only for the Army but for the entire joint force. Its creative and imaginative efforts have met and are meeting urgent battlefield requirements from combatant commanders during the current fight and are laying the foundation for an effective future force. To sustain these efforts, timely and predictable funding is a must.



U.S. Army Operational Testing and Evaluation: Laying the Foundation for the Army of 2020

There is little downside to quickly putting promising capabilities in Soldiers' hands.

Major General Genaro J. Dellarocco
Commanding General, U.S. Army Test and Evaluation Command
1 February 2012³

Introduction

Over more than ten years of continuous combat, the United States Army has proven itself in some of the toughest environments it has ever faced. It has been an army in transition, carefully balancing the pillars of manpower, readiness and modernization to keep ahead of its adversaries in the field while guaranteeing strategic flexibility as the nation's force of decisive action on a global scale. Despite every challenge, it has transformed into the most seasoned, deployable and spirited land force in the world today.

The experience of more than a decade at war has taught the Army that it faces hybrid threats around the world. Hybrid threats—those that combine capabilities of state and nonstate actors, traditional and emerging military technology, conventional and electronic domains—define what has come to be known as the security paradox of our time. Even though much of the world is at peace on a macro scale, it has become possible in this century for a far greater number of potentially hostile actors to challenge American security and American interests in an infinitely greater number of ways. As the national security establishment rebalances toward the Pacific region and continues to prepare to meet complex operational challenges globally, the Army's role has never been more fundamental in actively preventing the outbreak of conflict via its ready posture, shaping the complex operational environment through its partners and allies and preparing to win decisively whenever the nation might call.

Central to the preservation of American security in this complex environment are the actions that the Army has undertaken to be able to conduct truly unified land operations—the ability to gain and maintain operational



advantages to create the conditions for favorable conflict resolution. Operational testing and evaluation is not a new concept for the Army; it has dedicated significant resources to this integral function for many decades. Among the most crucial lessons of war was that the Army needed an institutional mechanism for developing, evaluating and acquiring modern technology rapidly to keep pace with agile enemies' capabilities. That mechanism resides in the Network Integration Evaluation (NIE) and the larger Agile Capabilities Life Cycle Process (the Agile Process), a holistic approach that efficiently identifies commanders' requirements, integrates Soldiers with industry to develop rapid solutions to urgent challenges and provides new equipment to Soldiers in the field swiftly enough to be useful in the current fight. Traditionally, the Army had to identify units through the Test Schedule and Review Committee process to test systems one by one. But this new unified approach that combines rapid operational testing, acquisition and deployment has already proved to be a significant step forward for the Army in terms of both expanded responsiveness to security challenges and cost savings.

³ As quoted by the Army News Service, "Network Modernization Business Practices Allow Army to Trim Costs," 1 February 2012, <http://www.army.mil/article/72962>.



Led by U.S. Army Test and Evaluation Command (ATEC)—which has the distinct advantage among the service operational test agencies of having developmental testers, operational testers and system evaluators organized under one command—the Army is now on the cusp of leveraging this success into an even broader evolution in capability by expanding the NIE concept farther. All over the world, ATEC independently tests, assesses and evaluates equipment, systems and technology in laboratories and realistic operational environments using typical Soldiers to determine effectiveness, suitability and survivability.

Background

The Army consolidated its operational testing and evaluation commands during the 1990s. ATEC assumed overall responsibility for all independent Army developmental and operational testing. U.S. Army Test and Experimentation Command, formerly a component of U.S. Army Training and Doctrine Command, was redesignated as U.S. Army Operational Test Command and became a major subordinate command of ATEC. Other ATEC subordinate commands—Operational Evaluation Command and the Evaluation Analysis Center—were combined into the U.S. Army Evaluation Center. Under the consolidation, ATEC also took command of Aberdeen Proving Ground, Maryland; White Sands Missile Range, New Mexico; Dugway Proving Ground, Utah; Yuma Proving Ground, Arizona; Aviation Technical Test Center, Fort Rucker, Alabama; Redstone Technical Test Center, Redstone Arsenal, Alabama; Electronic Proving

Ground, Fort Huachuca, Arizona; Cold Regions Test Center, Fort Greely, Alaska; and the Tropic Regions Test Center, Yuma Proving Ground, Arizona.

In 2008, the Army made the development of the network its top modernization priority. The Army realized that it would be a tremendous advantage—particularly at the small-unit level and particularly against the hybrid threats that have become commonplace on today’s battlefield—for every Soldier to have the capability to plug into the tactical network and have the means to access and distribute information as necessary. Spearheaded by the Vice Chief of Staff of the Army, the Army brought the test, acquisition and doctrine communities together in 2011 and began a series of tests called Network Integration Evaluations designed to integrate and mature the network. Held semi-annually at White Sands Missile Range, New Mexico, and nearby Fort Bliss, Texas, each NIE is a six-week effort to evaluate the Army’s tactical network holistically.

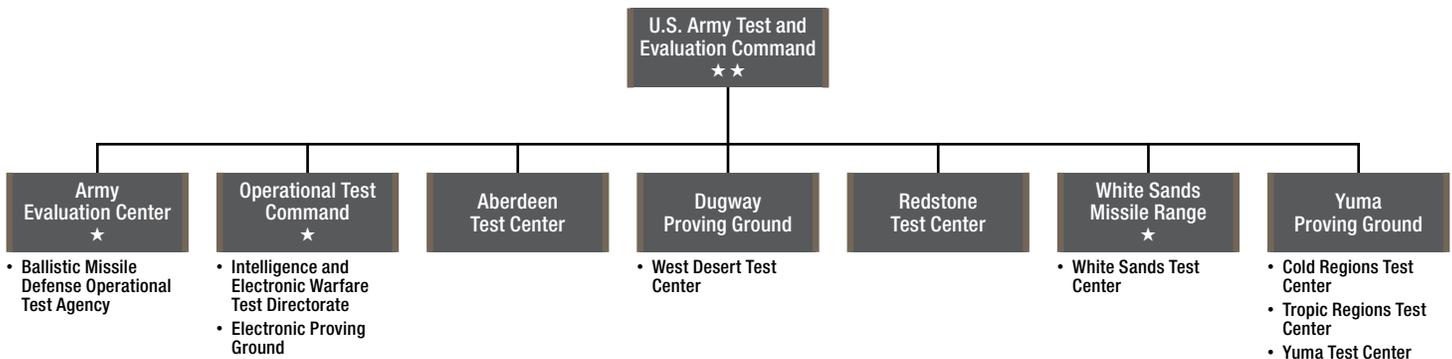
Of at least equal significance was the simultaneous creation of an institutional triad of the Army’s organizational resources. Comprising ATEC, Brigade Modernization Command and the Assistant Secretary of the Army for Acquisition, Logistics and Technology’s System of Systems Integration Directorate, this triad exists to assess network and non-network capabilities and determine their implications across doctrine, organization, training, materiel, leadership and education, personnel and facilities (DOTMLPF) avenues.

The primary purpose of the NIE, conducted under the auspices of the triad, is to conduct required tests and evaluations in support of program of record acquisition milestones and simultaneously increase industry participation in the evaluation cycle. The NIE is a crucible—a melting pot of testing, evaluation and experimentation—through which the Army can quickly assess promising new technologies by boiling them down under realistic pressure to perform. By synchronizing the Army’s requirements, resources and acquisition communities at the front end of the technology development process, the NIE minimizes developmental risk, reduces the frequency and scale of cost and schedule overruns and yields better technology solutions for Soldiers more rapidly than was previously possible.⁴

⁴ See AUSA Torchbearer National Security Report “A New Equipping Strategy: Modernizing the U.S. Army of 2020,” June 2012, http://www.ausa.org/publications/torchbearercampaign/tnsr/Documents/TB_Modernization_web.pdf.



U.S. Army Test and Evaluation Command



Source: U.S. Army Test and Evaluation Command

The Army recently completed the third iteration of the NIE process, and the fourth is scheduled to begin in fall 2012. Experiences to date with the NIE and the larger Agile Process have been revealing. With each exercise, the Army has been refining the ways in which it balances the competing needs to be simultaneously speedy and thorough in its evaluations. Additional benefits include significant success in employing the NIE as a major cost-saving measure and realizing ever greater efficiencies at a time in which the Army is working hard to become more streamlined. Further, it is leveraging operational testing and evaluation results into real technology acquisition more efficiently and effectively each time.

Early Lessons Learned

The Army is very aware of the significant level of investment that small and large industry partners have been making for the NIE process. It has taken several steps already to adapt its new operational testing construct and all of its associated procedures to become more streamlined, less risky and a better value, even as it continues to incorporate feedback and listen to suggestions as the process evolves.

Perhaps the single most noteworthy lesson that the Army has incorporated so far during the lifespan of the Agile Process is to look critically at historical and cultural requirements and acquisition processes. Insights include industry's perspective of the many increments in the development process and understanding of the unique risks, challenges and opportunities inherent in the new Agile Process and NIE structure. For instance, the Army recognizes that participation in the NIE exercises requires a substantial investment in upfront development

costs by each vendor, and it realizes that industry partners will not be willing to pay these costs without some expectation of real purchases based on the tests' results.

Even now, with the approach of NIE 13.1, the Army is just beginning to understand the effects of the NIE on total value and total lifecycle costs for various technologies and systems. Broadly speaking, two major cornerstones of the NIE process have been rapidly institutionalized to capture the philosophy of development and acquisition at best total value. The first is that **the participation of the Soldier at every turn of the process continues to pay tremendous dividends.** By allowing Soldiers to evaluate requirements in a realistic operational setting, the NIE is doing a great service by informing not only acquisition decisions at the end of technology development but also the very course of the development itself. Bringing together the operational test, acquisition and requirements communities and synchronizing evaluation with rapid feedback among those communities is unprecedented and far more efficient than any previous approach. The second is that **the Army has greatly improved communications with its industry partners regarding its specific network needs and technical standards to help focus their efforts.** The Army now has laboratory facilities available to industry as well as the NIE's operational venues to help partners demonstrate and integrate innovations or emerging solutions, acquire immediate operational feedback and gain entry into the acquisition process more readily.

Further, the Army has listened to industry and has taken early steps to improve its ability to transform successful operational tests into successful acquisitions. Some of these steps include beginning to purchase industry's



prototypes in instances when multiple systems are needed for proper evaluation; instituting methods to offset labor and field service representative costs; and working with the Army's own science and technology community to explore small business grants and development agreements to better offset industry partners' business costs at the front end.

But the real progress lies in the imminent fielding of Capability Set 13. Capability sets are relatively small packages of tested systems fielded to portions of the force that are in the train/reset phase of the Army Force Generation (ARFORGEN) cycle. In September 2011, the Army awarded a contract worth \$66 million for vehicle-mounted data radios to be fielded in October 2012, and this is only the beginning. It is also selecting a source to procure a single-channel vehicle-mounted radio capable of importing the Soldier Radio Waveform frequency range; this competitive procurement (which resulted directly from the outcome of NIE 12.1 in fall 2011) is a contract award for up to 5,000 radios to support concurrent fielding of Capability Set 13 to formations preparing to deploy. As the NIE process continues to identify commercial off-the-shelf solutions to capability gaps as they arise, the Army will award additional contracts for systems that work well. In short, the Army has turned a major corner by concluding the development and beginning the procurement of this capability set even as it prepares to develop and procure the next.

Realizing Efficiencies, Creating Effectiveness

One crucial metric for gauging the usefulness of Army operational testing procedures is the cost of the testing itself. Especially in a time of fiscal restraint, it is imperative for the Army to get the best possible value for every dollar it spends on development, acquisition and modernization. The very comprehensiveness of the NIE process that makes it so ideal a tool for synchronizing the Army's modernization methods necessarily yields questions about monetary cost. In addition, an entire Army brigade combat team (BCT) is dedicated to preparing for and executing consecutive iterations of the NIE process; there is an opportunity cost to the Army as it employs these personnel in operational testing instead of employing them somewhere else.

Capabilities Integration Agile Process

Continuous cycle in phases 0-1	Phase 0	Define near-term requirements Supported: U.S. Army Training and Doctrine Command	• Prioritized list
	Phase 1	Solicit potential solutions Supported: ASA(ALT)	• Viable candidate list
	Phase 2	Candidate Assessment Supported: ASA(ALT)	• List of solutions that meet gaps • Laboratory testing
Six Months	Phase 3	Evaluation preparation Supported: Brigade Modernization Command	• Finalize test plans for training, material and combat developers
	Phase 4	Network Integration Readiness Supported: ASA(ALT)	• Finalize assessment plan and collection plans
	Phase 5	Network Integration Evaluation Supported: Brigade Modernization Command	• Execute evaluations • Integrate systems
	Phase 6	Network Implementation Plan Supported: Army Staff	• Determine capability set • Determine basis of issue, funding and implementation

ASA(ALT) – Assistant Secretary of the Army for Acquisition, Logistics and Technology

Source: U.S. Army Test and Evaluation Command

However, several trends demonstrate that the NIE process is generating real cost savings that more than make up for its upfront costs. Perhaps the most enlightening is that the overall cost of executing each iteration of the NIE is being driven down every time. In fact, by the time the Army executes NIE 13.2 and NIE 14.1 in 2013, it will have cut the execution cost by nearly a third since the first NIEs were conducted only two years previous—from a total of about \$299 million in Fiscal Year (FY) 2011 to about \$214 million in FY 2013.⁵ Projections for 2014 suggest that the combined costs of NIE 14.2 and NIE 15.1 will be even lower—between \$160 million and \$200 million. That means that **even though the scope and scale of the NIE process has been steadily increasing, the cost of testing has been steadily decreasing.**

⁵ U.S. Army LandWarNet/Battle Command Directorate, "CSA Congressional Testimony Prep," 20 January 2012.



The execution costs of the first four NIEs (including the soon-to-be-completed NIE 13.1 in fall 2012) will total somewhat less than \$600 million over two years. But the return on this investment—just in terms of actual dollars saved—has already been many times the physical cost. Decisions to restructure or modify existing modernization programs that were made as a direct result of NIE testing have yielded approximately \$6 billion in savings over the same period. Among these were the reorganizations of such network devices as the Ground Mobile Radio and Nett Warrior. That comes to a return on investment of ten times the original cost.

Conversely, before the NIE process existed, Soldiers had far less opportunity to gain practical experience with new technology before they deployed with it; in effect, Soldiers were doing their own operational testing of rapidly fielded solutions and integrating the latest technology on the job—hardly the ideal time for Soldiers to discover reliability and compatibility challenges with their gear. The NIE allows government and industry to integrate, train and prove the utility of new technologies prior to deployment. As a commercially driven model, the NIE moves many certifications and testing costs back to the vendors instead of continuing to rely on the Army as the billpayer for systems' entire research and development or testing and evaluation costs. Further, procuring commercial off-the-shelf technologies when available often means that systems are warranted by their manufacturers—potentially reducing maintenance and repair obligations that cut into Army operations budgets.

Consider the Agile Process through a different prism—from the perspective of a particular program of record. NIE 11.2 identified major opportunities to make the Nett Warrior program more efficient—a good example of the value that the NIE process offers. The Army used the lessons learned in the realistic test environment to modify the program requirements in time for new solutions to be tested only a few months later during NIE 12.1. The end result was a new product that cost 65 percent less, weighed 70 percent less, provided more capability and was fielded to more formations more quickly (fully three years ahead of the previous plan) at a savings of \$822 million. In contrast, the execution cost of the entire NIE 12.1 (which tested several other programs in addition to Nett Warrior) totaled approximately \$151 million.⁶

⁶ *Ibid.*



But the full cost savings realized by integrating systems in the continental United States rather than in operational theaters are immeasurable. The lessons learned not only from conducting the NIE exercises themselves but also from the rapidly evolving process by which industry partners are recruited to participate in the Agile Process and respond to urgent battlefield requirements constitute a truly innovative capability. The Army has increased its ability to procure better, more up-to-date and appropriate equipment—more rapidly *and* off the battlefield. Formations deploying to the current fight in Afghanistan are equipped with a generation of communications systems—linking dismounted Soldiers to command posts and beyond—that simply would not exist without the NIE evaluations and the new Agile Process for rapid acquisition of network technology. It is almost impossible to calculate the total costs saved in dollars and time by deploying with fully integrated, fully synchronized network systems; it is entirely impossible to place a dollar figure on the necessity of sending Soldiers to war against a modern hybrid threat with the most appropriate, best developed, fully tested equipment that money can buy. Lives are being saved because American Soldiers are more capable today than they were with yesterday's operational testing procedures.

Other Army operational testing procedure changes in recent years (outside the NIE process) have also proved to be cost-efficient. So far, the NIE process has been used primarily to evaluate network-related equipment, but ATEC has been employing similar lessons as well in its testing of much larger platforms. The collaborative



approaches used recently by ATEC to evaluate systems such as the Mine Resistant Ambush Protected (MRAP) vehicle, the M915A5 semi-tractor and several ballistic missile defense systems have also yielded major cost savings. Greater ATEC use of modeling and simulation resources has also resulted in cost and time savings and permitted some testing to be conducted more safely. To date, 211 projects totaling more than \$355 million in cost avoidance or savings have been realized via such methods. Employing the Lean Six Sigma process improvement tool embraced by the Army, ATEC has focused on eliminating waste and reducing variation, effectively saving time and money and improving customer satisfaction. Integrated testing and collaborative efforts are central to continuing to meet the needs of the warfighter today and building the Army of 2020.

ATEC also employs many more methods to shorten the time it takes to make the best equipment available to the warfighter. In 2003, ATEC began maintaining a permanent presence in theaters of conflict abroad, deploying forward operational assessment (FOA) teams into combat to independently evaluate the effectiveness of a wide array of systems and equipment.

FOA teams comprise Soldiers, Department of the Army civilians and contractors. Combining their roles as testers and as liaison between combat Soldiers and the institutional Army, FOA teams collect data via interviews and written feedback. This operational feedback has led directly to weapon system improvements; changes in tactics, techniques and procedures; and adjustments to test and evaluation procedures at various ATEC test facilities and ranges. The teams are able to identify emerging issues and help Soldiers understand how best to employ

and maintain their equipment. Among the systems, technology and equipment assessed by FOA teams today are mini-robots for clearing explosive ordnance, enhanced armor for heavy vehicles, several unmanned aerial systems and other Soldier support and protection technology. Through its time-honored methods as well as its new initiatives, ATEC has met the challenge to speed up the Army's test and evaluation and acquisition processes and deliver urgently needed new capabilities.

Greater Operational Capability

Each NIE has helped the Army make greater gains in operational network capability. NIE 12.2, the most recently completed iteration (which concluded in June 2012), was the largest iteration accomplished to date and was the first full brigade-level validation of network infrastructure in a hybrid threat environment. It achieved three program tests for record and assessed 35 government and industry systems under evaluation. Most important, it allowed the Army to take a major step forward by completing the integration of the Capability Set 13 baseline. NIE 12.2 was especially groundbreaking because it effectively defined an entire system of network hardware (such as radios, satellite systems, smartphone-like Nett Warrior devices, etc.) and software that is presently available for fielding to the force as a whole capability package (Capability Set 13).

During operational testing at the NIE, the systems that now comprise Capability Set 13 permitted the test personnel (members of the 2d Heavy Brigade Combat Team, 1st Armored Division) to rapidly pass information within and across echelons. The performance of this capability package validated numerous lessons of considerable future value for the Army:

- The network can push critical technological tools to the edge—to small tactical units.
- Platforms that enable mission command on the move still need to be refined further, but they offer commanders tremendous capability at multiple echelons to gain initiative and attack threats from multiple vantage points through a distributed network.
- The network now demonstrates reliability over great distances, is relatively stable and can support a high operational tempo under realistic pressure.
- The network consistently provides commanders with actionable intelligence and other information via redundant pathways.



Capability Set 13 gives Soldiers a significant advantage over adversaries by enhancing situational awareness, improving maneuverability, speeding the decision cycle and connecting Soldiers at the lowest level with one another and with their higher headquarters. This capability package is anchored by two major upgrades that distinguish it from previous sets: it includes mission command on the move, allowing commanders to take the network with them in their vehicles, and it brings dismounted Soldiers into the network as well, providing them a new level of real-time information. Key to this effort was the Army's completion of the Initial Operational Test and Evaluation during NIE 12.2 for Warfighter Information Network-Tactical (WIN-T) Increment 2, the network backbone that permits mission command on the move and extends satellite communications down to the company level. For the first time, NIE 12.2 marked significant vehicle integration across the BCT, with more than 350 vehicles—including infantry, Stryker and armored BCT platforms—integrated with Capability Set 13 baseline systems.

These gains allowed the Army to deliver the Capability Set 13 network—all hardware and software necessary to operate at this level of sophistication—to the 10th Mountain Division, whose Soldiers began training with the new equipment in August 2012. Significantly, they received the capability set early in their ARFORGEN cycle, permitting them to train with the new equipment and become accustomed to it before deploying with it in early 2013. Two BCTs expect to receive and begin training with their own Capability Set 13 gear in October 2012; ultimately, eight BCTs will deploy with the Capability Set 13 network package.

Yet another critical achievement realized in NIE 12.2 further demonstrates how the Agile Process is coming to maturity. For the first time, the Army was able to employ all of the early, pretest phases of the Agile Process at their full capacity prior to the execution of the NIE itself.

The first NIEs received scrutiny because they were executed with a large number of candidate technologies under test simultaneously. Some of these candidate systems proved to be insufficiently reliable to stand up to the pressure of realistic field testing. But in NIE 12.2, all of the Army's planned mechanisms to reduce the rate of such situations were fully operational. In particular, new laboratories at Aberdeen Proving Ground, Maryland, and

other Army facilities participated in rigorous pretests of many candidate systems. These extra steps helped immensely to work through the kinds of small technical issues with new systems that are crippling in the field (and waste time and money) but are more easily resolved in the test lab before the full NIE. For example, fully integrating the Lab-Based Risk Reduction phase of the Agile Process into NIE 12.2 permitted candidate systems to rehearse entire test events in laboratory conditions, mount and install hardware ahead of the full test phase, integrate instrumentation and more. These extra steps drive down the ultimate costs of the NIE itself, save time and frustration for both the Army and its industry partners and combine to make the outcomes of the operational tests more meaningful.

In short, NIE 12.2 (completed in spring 2012) represented the turning of a substantial corner in the evolution of Army operational testing. The diverse successes realized during this exercise demonstrate that the Army has learned how to balance the comprehensiveness and scope of testing (i.e., the number of systems under evaluation and the rigor of the test procedures) against the operational and tactical imperative for rapid development of solutions that meet urgent battlefield requirements. In fact, of the 35 systems under evaluation in NIE 12.2, 15 were ultimately judged to have a high potential for fielding to the force and 15 more were judged to have a medium potential for fielding; only five were considered to have low potential. The Army has learned how to identify and prioritize its immediate network modernization requirements, create realistic test environments, prepare reliable candidate systems and field new capability sets to Soldiers on a large scale.

A Bright Future

Even as the NIE process continues to grow in an evolutionary way, steadily expanding in scope, it is also beginning to take steps that will help match the Army's testing and evaluation practices with distributed, networked joint training.

The initial stages of NIE 13.1 (which will take place in late 2012) are already well underway. The Army has chosen 24 candidate technologies that address the capability gaps defined in late 2011 and early 2012 to be considered as systems under evaluation. These systems are now going through the preparatory phases of the Agile Process, including especially the fully operational



Lab-Based Risk Reduction opportunities prior to the NIE exercise itself. The Army will conduct four program tests of record at White Sands Missile Range and three more at other distributed sites for an unprecedented total of seven. There will be numerous testing priorities and focus areas that support the capability gaps and Army objectives identified by U.S. Army Training and Doctrine Command (TRADOC). These priorities include:

- establishing a Capability Set 14 integrated baseline;
- continuing network operations convergence;
- converging operations/intelligence application;
- supporting a common operating environment;
- refining mission command on the move for both mounted and dismounted command posts;
- integrating mission command capabilities in garrison; and
- conducting training of mission command system-of-systems.

Even as these proceed, the Army's doctrine and requirements communities are establishing near-term priorities and defining capability gaps that will drive iteration 13.2 (which will take place in late spring 2013). It is therefore still too early to speculate about what new baseline capabilities and systems might comprise Capability Sets 14, 15 or 16—due to be fielded to the force during FY 2015—but it seems likely that the Army will focus increasingly on the applications (particularly information access and retrieval) made possible by the achievements realized thus far in network performance. However, the Army is well positioned to take the current concept of the NIE to a broader level by widening its scope to include the testing and fielding of other capabilities as well. NIE 13.1 will be a moment of transition, continuing the evolution of building a new capabilities set but also expanding upon the limitations of previous NIEs.

NIE 13.1 will be the first time in which an Army operational test will be conducted with network infrastructure across different types of BCTs simultaneously. Candidate systems will be tested across heavy BCT and Stryker BCT vehicles and equipment as never before. For example, one of the most promising candidate technologies chosen to be evaluated during NIE 13.1 is Global Network On-the-Move Active Distribution (GNOMAD). GNOMAD is a modular, scalable broadband

satellite-based network device that provides high-speed IP connectivity and supports secure voice, data and video capability in vehicles traveling at up to 75 mph. It was approved by TRADOC, ATEC and Headquarters, Department of the Army in NIE 12.1 for continued assessment in future NIEs and will now participate in NIE 13.1 as a potential solution to be considered for inclusion in Capability Set 14 for mission-command-on-the-move requirements in heavy BCTs and Stryker BCTs. Also to be tested in NIE 13.1 will be several potential Mid-tier Networking Vehicular Radio solutions. The experience of Soldiers in NIE 11.2 demonstrated that the Army's planned Joint Tactical Radio System Ground Mobile Radio required revision; now, in NIE 13.1 (only about 18 months later), the Army has several candidate systems ready to be evaluated against appropriate program requirements and possibly included as part of Capability Set 14, scheduled to be fielded to the force next year.

In the future, an even greater capability might be realized if the NIE process evaluates and trains Soldiers on more than just network-related capabilities. Already in NIE 12.2, the U.S. Marine Corps participated in what was the first-ever joint NIE. Simultaneously, the Army incorporated the role of a higher headquarters—the 101st Airborne Division (Air Assault)—into what had previously been only a brigade-level evaluation. NIE 12.2 demonstrated a distributed network across *seven* sites in the continental United States, linking a division headquarters (directing the scenario from Fort Campbell, Kentucky) with the 2d Brigade, 1st Armored Division at White Sands Missile Range; the 1st Sustainment Brigade at Fort Riley, Kansas; U.S. Marines at Camp Pendleton, California; and a *virtual* “simulation brigade” that was notionally fighting alongside its sister units to provide added realism and more robustly test the network systems via increased electronic traffic. In addition, the operational testing triad anticipates U.S. Air Force involvement in NIE 13.1 during fall 2012. With these joint service partners, the Army will have the opportunity to lead increasingly complex joint exercises.

As the Army continues to expand the geographic reach of the NIE across its installations, there will be opportunities for more distributed testing (for example, at the National Training Center at Fort Irwin, California). Recent NIEs have already begun integrating battalion- and brigade-level mission command roles, but there will



soon be opportunities for not only division but also corps headquarters to participate in realistic mission command roles. Network capability and connectivity will permit unprecedented training scenarios: the Army could locally deploy brigades, divisions and corps headquarters in joint environments as joint task forces—not unlike what occurred on a smaller scale in NIE 12.2. Beginning with NIE 13.2, the Army hopes to integrate all of its warfighting functions such as mission command, fires and intelligence into initial operational tests that create capability set baselines. The possibilities—in terms of genuinely new capability, better training opportunities and budget savings—are numerous.

What Is Needed

Bringing industry partners together with the Army and the joint services is the only way to quickly develop and field effective, suitable and survivable systems to Soldiers. There is significant potential to continue to fill existing and future capability gaps with commercial off-the-shelf equipment. The Army needs to continue harnessing the capability of industry to meet the requirements of the combatant commanders around the globe.

Industry interest in participating in the Agile Process continues to grow with each iteration of the NIE. In fall 2011, 43 businesses sought to contribute to NIE 12.1; by spring 2012, that number had grown to 105 businesses for NIE 12.2; in fall 2012, the number was up to 146 businesses hoping to partake in NIE 13.1. Part of the influx in industry support has been due to the rapid implementation by the Army of lessons learned and experience gained in the first iterations of the process—particularly in terms of articulating precise requirements for training and shared understanding about how a given technology or solution will fit into the BCT conducting the evaluation. Essential to this two-way communication are the industry information events that the Army has held in conjunction with the NIEs to discuss upcoming opportunities for collaboration and provide updates on the status of Capability Set Management. The Army needs to maintain the vital relationships that it has developed during the first few years of the Agile Process and continue to develop new ones with new partners.

Internally, the Army is continuing to implement lessons learned and to leverage the opportunities that now exist. In particular, there is occasion to establish a more DOTMLPF-centric level of the NIE for the Army of



2020—one in which commanders and staff would train and evolve task force and joint task force doctrine at the battalion, brigade combat team, division and corps levels. In addition, planning is underway within the Army to synchronize the NIE process with other infrastructure and established training events—for example, TRADOC schoolhouses, other ATEC test ranges and III Corps Warfighter and National Training Center/Joint Readiness Training Center (Fort Polk, Louisiana) rotations when opportunities align with the ARFORGEN cycle.

There is vast potential for the NIE evaluations and the Agile Process to enhance the way the joint forces equip, train and fight. A myriad of successful technology developments and the beginning of major acquisitions based on the Agile Process have illuminated the acquisition process of the future—one that has implications for the development of all new military technology and suggesting the potential usefulness of a future Capabilities Integration Evaluation process. Hybrid threats in this century will not wait around for the many years it still takes to develop major weapon systems and vehicles. The NIE process has already demonstrated its potential for the development of distributed training (linked virtually but conducted among formations physically distant from one another—especially useful as the Army rebalances toward the vast Pacific region) as well as joint training, development and acquisition of common network systems among multiple services, and better creation of joint doctrine—all based on the real-world experience of real Soldiers performing real tests. The NIE construct presents the chance for all American forces to improve at training the way they fight and fighting the way they train.



What Must Be Done

The Army's operational testing and evaluation initiatives are critical not only for the Army but for the entire joint force. The Army's creative and imaginative efforts have met and are meeting urgent battlefield requirements from combatant commanders during the current fight and are laying the foundation for an effective future force.

To realize the full potential of these initiatives, Congress and the Department of Defense must:

- stabilize funding at current levels to support the Network Integration Evaluation process (AUSA Resolution 12-16);
- fully fund Operation and Maintenance and Research, Development, Test and Evaluation accounts to sustain the Army's individual and unit readiness and modernization requirements (AUSA Resolution 12-07);
- fund continued Army participation in joint and combined exercises to expand interoperability of the network across the joint force (AUSA Resolution 12-10);
- fully fund the continued modernization of training areas, ranges and facilities, providing realistic threat environments that maximize the capabilities of modern, digital-capable weapons and systems (AUSA Resolution 12-10);
- provide stable and sufficient test and evaluation funding for Soldier and Soldier support modernization and enhancement programs (AUSA Resolution 12-15);
- expand public/private partnership initiatives to support and further encourage industry participation in the Agile Process (AUSA Resolution 12-18);
- continue to resource the dedication of a full brigade combat team to conducting operational testing in support of the Agile Process (AUSA Resolution 12-07);
- continue to identify and eliminate redundancies in the acquisition process (AUSA Resolution 12-18);
- build a versatile mix of mobile, networked brigade combat teams capable of conducting operations across the full spectrum of conflict and deployable

with the most modern capability set packages available (AUSA Resolution 12-16); and

- reset equipment forward by replenishing formations in the reset phase of the ARFORGEN cycle with the most up-to-date capability sets (AUSA Resolution 12-08).

America's adversaries are not going to stop innovating. Enemies will only continue to become more creative and adapt more rapidly, posing increasingly complicated strategic and tactical challenges for the Army to overcome. In the 21st century, the nation's security forces are engaged in a permanent struggle to adapt, develop, procure, equip and train more rapidly and more effectively than ever before—more rapidly than the capable adversaries they oppose. This basic condition will not change even after the current fight in Afghanistan and elsewhere draws down.

The Army's role has always been to out-learn, out-train and ultimately out-fight its adversaries—people. As it rebalances toward the Pacific region (the part of the world that the greatest proportion of people on Earth call home) even as it carries the fight to global people networks elsewhere, the Army has successfully created and institutionalized a mechanism to out-equip its adversaries—to develop and procure the information and communication systems that permit its own people to keep ahead of its adversaries in the complex operational environment. The Army's unified approach—combining rapid operational testing, acquisition and deployment—has already proved to be a significant step forward in terms of both expanded responsiveness to security challenges and cost savings, and it promises even more effective gains in the future.





Torchbearer Message

The Army, globally engaged and regionally responsive, continues to recognize network development and integration as its top modernization and acquisition priority. No greater potential exists to increase Soldiers' ability to defeat hybrid adversaries or for commanders to execute mission command. It takes a network to defeat networks, and the Army's approach to operational testing and evaluation is capitalizing on the opportunity to stay ahead of global threats.

The Agile Capabilities Life Cycle process, its associated Network Integration Evaluation process and the Capability Set Management construct all demonstrate that the Army is embracing the concepts of total value and total lifecycle program costs—even as it pursues the greater aim of increasing its ability to respond to urgent combatant commander requirements for technology. The Army has identified two major touchstones of these processes that have proved especially valuable. First, the participation of the Soldier throughout every level of the research, development and operational test phases continues to pay tremendous dividends. Second, the Army has vastly improved at communicating to its industry partners its specific network needs and technical standards to help focus their efforts.

Even as the Army has driven down the actual cost of the NIE exercises every time, it has been able to achieve ever greater results and execute more (and more robust) operational tests. Many testing costs have moved back to the vendors, permitting more work to be achieved at current budget levels. Soldiers are deploying today with a generation of communications and information systems that simply would not be available if the Agile Process did not exist, and unlike many previous instances, they are deploying with the confidence that their gear is ready in all respects—fully interoperable and able to meet their requirements. Because of this success, the Army has already incorporated the NIE into its vision for the Army of 2020 and is committed to funding it until at least FY 2015.

The Army has already been preparing for the next NIE (NIE 13.1) for many months and is set to begin the on-the-ground testing phase in fall 2012. More than 15 industry partners with candidate solutions for network and non-network requirements will participate. The Army expects the results of NIE 13.1 to answer key questions and provide invaluable Soldier feedback that will enable the force to begin fielding Capability Set 14 to as many as six BCTs next spring. And the Army is already prioritizing capability gaps identified by U.S. Army Training and Doctrine Command and establishing objectives for the NIEs to occur in 2013 and beyond.

The opportunities for future capability growth and further cost savings are numerous. Other Army modernization priorities such as combat vehicle development and new weapon programs have already been informed by the positive results of the NIE process; in fact, the next iteration of the NIE will include integration of network capabilities across hundreds of ground vehicles at the brigade level and above. Joint partners have already participated on a small scale and are looking forward to expanding their roles across an increasingly distributed exercise area—an effort of considerable value, given the rebalance of the joint force toward the vast Pacific region. What is needed now is continued support at current funding levels as the Army continues to refine and expand its test and evaluation processes.

Operational testing and evaluation is not a new concept for the Army; it has dedicated significant resources to this integral function for many decades. The Army's time-honored methods and its current initiatives have created an enduring foundation for Army acquisition and procurement efforts for today and tomorrow. The benefits they have already yielded—better informing requirements, aligning programs of record, allowing for integration of systems prior to deployment and providing an avenue for industry partners to approach the Army with mature solutions and original ideas—will only grow as the Army leads the way into the future. This foundation ensures that the Army will always have the networked communications, information superiority and interoperability necessary to continue to prevent conflict, deter aggressors and win decisively when needed against the hybrid threats of this century. They ensure that American Soldiers will have technological overmatch against any future competitor and should never have to fight a fair fight.

We have embarked upon a vigorous effort to improve our equipment modernization programs. An agile, incremental and warfighter-informed approach identifies, develops and acquires next-generation technological solutions while fully engaging and seeking input from our defense industry partners. This allows us to quickly evaluate and integrate new technologies and systems into our units in a timely manner to provide the best capabilities to our Soldiers.

General Raymond T. Odierno
Chief of Staff, Army
7 August 2012



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**Institute of Land Warfare
Association of the United States Army**

2425 Wilson Boulevard, Arlington, Virginia 22201-3385
800-336-4570 www.ausa.org