



Network Integration Evaluations: Developing Technologies with the Army's Industry Partners

Introduction

Placing the highest possible premium on delivering the best available equipment and technology to Soldiers in combat and recognizing the budget constraints of today's increasingly pressured fiscal environment, the U.S. Army is vigorously immersed in a series of Network Integration Evaluations (NIEs) designed to work more closely with industry and best expedite the development of new capabilities for Soldiers.

The thrust of this effort hinges on a new methodology for acquiring and developing technologies, an approach grounded in efforts to work with industry to synchronize requirements, resources and acquisition practices at the front end of the process so as to minimize developmental risk, reduce cost and schedule overruns and harness the most promising emerging technologies for the benefit of forces in combat.

The Army's ongoing NIEs are semiannual exercises at White Sands Missile Range (WSMR), New Mexico, that place emerging technologies in the hands of Soldiers able to evaluate them in realistic, combat-like scenarios. The NIEs represent the Army's effort to develop and integrate new systems and capabilities before they are sent to theater by working with industry to successfully align requirements, resources and emerging technologies.

The NIE construct is set up to conduct an exercise involving a fully equipped brigade combat team of 3,800 Soldiers at Fort Bliss, Texas, every six months. The developmental concept is aimed at taking the integration requirement off of the combat commander and instead putting it on the BCT specifically designed to evaluate new technologies. With this model, new systems and promising

emerging technologies will not be sent to combat until they are fully evaluated and integrated with existing systems. This approach also allows the Army to better incorporate Soldier feedback into the developmental cycle. New technologies developed or acquired through the Operational Needs Statement or Joint Urgent Operational Needs Statement process will go through NIE testing procedures as well.

For years the Army has leveraged commercial industry to achieve significant modernization of network capabilities through the wars in Iraq and Afghanistan using the flexibility of contingency funding and operational necessity. The Army is establishing a similar operational environment at Fort Bliss/WSMR, supported by laboratory analysis at Aberdeen Proving Ground, Maryland, to institute a process of introducing and evaluating commercial offerings in a controlled setting as part of a broader effort to procure critical capabilities more rapidly. This is known as the "Agile Process," with the NIE as a key supporting event.

The purpose of the Agile Process is to procure and align systems that meet a predefined operational need or gap identified for the force. These needs are identified within the Training and Doctrine Command (TRADOC) community and fed to the acquisition community, which then solicits potential solutions. TRADOC and the Army acquisition community must ensure those solutions are aligned to a newly developed or preexisting requirement in order to conduct procurement activities within the rules of the Defense Acquisition System (Department of Defense Instruction 5000.01/.02).

During the NIE process, the 2d Brigade Combat Team, 1st Armored Division (2/1 AD) tested the technologies in realistic conditions replicating the current operating environment. The scenarios were based on lessons learned



from combat operations in Iraq and Afghanistan. Scenarios encompassed both combined-arms maneuver (CAM) and wide-area security (WAS) operations in the high desert plains and mountains of WSMR and Fort Bliss. The “threat” was a composite of irregular and regular forces. NIE findings and recommendations are emerging from 2/1 AD Soldier and external observer feedback. Conclusions on a given solution’s operational benefits are based on a balance of system strengths, limitations, maintainability and reliability considered in both CAM and WAS contexts. In short, the Army’s goal is to answer the question, “If you had to deploy tomorrow, do you want this capability solution in your full-spectrum tool box?”

As part of the exercise, Blue (friendly) forces stationed at a “mountain village” outpost at White Sands performed the typical range of combat missions: route-clearance, reconnaissance, scout missions, interdiction, time-sensitive raids on the enemy and counter-improvised explosive device efforts, among other missions. At the same time, mock enemies or OPFOR (opposing forces) were dispersed around the countryside and placed in caves, “villages” and other strategic locations with the mission to challenge, attack and disrupt the Blue forces set up at various locations across White Sands.

Partnering with industry to identify and develop new technologies able to fill key network capability gaps is a critical part of the NIE process. For instance, plans for the upcoming NIE, which include the evaluation of as many as 50 emerging technologies, were formed in large part due to responses to Army “Sources Sought” notifications asking industry to propose technical solutions designed to address or fill specific network-related capability gaps identified by the Army. The next NIE is slated to begin at the end of October 2011. Essentially, if an industry partner has developed or is developing a technical solution able to, for example, deliver information using the Army’s nonproprietary wideband networking waveforms, the Army wants to hear about it. In fact, along these lines, the Army received as many as 73 white papers from industry in response to the “Sources Sought” notifications.

To orient industry partners with the NIE process, the Army hosted an Industry Day on 8 September 2011 in El Paso, Texas, and White Sands for industry partners interested in participating in future NIE exercises. More than 150 industry representatives—from both large defense corporations and small business entities—attended the event. Overall, more than 60 companies—40 percent of them small businesses—were represented.

These Industry Days are fundamental to the Army’s approach as they are designed to encourage and challenge industry to provide needed input and key feedback aimed at

achieving the Army’s goals of maximizing the delivery of new capability while also lowering costs in today’s budget environment.

Among the many topics taken up at the September 2011 Industry Day was an important discussion between Army members and their industry partners regarding how the NIE supports the overall network strategy, what constitutes entrance and exit criteria for capabilities within the NIE process and what test and evaluation conditions must be met.

The NIE represents a new way of doing business for the Army, a strategy that seeks to create a more “agile” acquisition process and capitalize on innovative talents within the Army and its industry partners. This strategy is designed to blend formal programs of record with promising, commercially available technologies able to bring new capability to the force. In effect, the NIE is geared toward delivering a range of new capability to Soldiers, from software-programmable radios able to move voice, video data and images across a terrestrial network, to satellites, sensors, software, unmanned aerial systems and hand-held devices such as smartphone technology for the dismounted Soldier. Connecting dismounted Soldiers to one another and to higher echelons of command with key, battle-relevant information is critical to this overall effort. In fact, the NIE is in part designed to ensure the Army keeps up with the fast pace of technological change by tracking and in some cases leveraging the latest in commercial technological innovation.

The aim is to find, harness, develop and deliver technologies able to integrate into a common operating environment a set of standards and Internet Protocol (IP) formats allowing for greater interoperability between systems. The Army is asking its industry partners to develop new technologies able to properly align with the clearly defined parameters of this computing environment to reduce or minimize the creation of separately configured, stove-piped software and computer systems that have difficulty connecting with one another and sharing information. The concept is to create a “plug-and-play” architecture wherein emerging technologies can integrate more easily for the larger purpose of better networking the force—allowing Soldiers to share more information such as voice, video, data and images faster, further and more efficiently across the force in real time.

A key part of this approach is squarely centered on the need for the Army to work closely with its industry partners to refine or adjust requirements early on in the process, in some cases trading off capability to lower costs. This also hinges on an ability to remove unnecessary requirements in some instances and fully align them with available, technologically mature resources and solutions. This effort involves a shift in the acquisition culture, encouraging program managers,

program executive officers and the TRADOC community to challenge and refine requirements with a well-placed emphasis on what is achievable and affordable.

Perhaps of greatest importance, success of this effort rests on the ability to successfully solicit feedback from industry partners and draw from their expertise how best to analyze requirements, make trade-offs and in some cases reduce costs. If there is a requirement that does not make sense for a given platform, the Army wants its expert industry partners to weigh in and explain how to improve the process or emerging platform. As a result, the Army's ongoing efforts to work closely with industry partners are also aimed at reforming the requirements process so as to emphasize technological maturity and focus on achievable, cost-conscious goals. At times, this process may include the need to make certain requirements trade-offs to reduce cost and maintain program schedule parameters.

Networking the Force

The first NIE, completed in July 2011, placed six Systems Under Test (SUTs) and as many as 29 emerging Systems Under Evaluation (SUEs) in specific, mock-combat exercises designed to replicate the nuances of combat. The effort was very successful in helping the Army shape requirements, identify resources and refine tactics, techniques and procedures needed bring new capability to fruition. This exercise was the first of this type of combined test and evaluation, which brought together the doctrine, acquisition and test communities as part of a new process to demonstrate the Army's holistic focus to integrate network components simultaneously in one operational venue.

While many of the systems, technologies and particular network systems used and evaluated in the first NIE may change in the future as the Army works toward an Objective Network Baseline, key lessons from the event are already being harvested. Along these lines, two broad network shortcomings emerged from the first NIE: the Army needs to improve Soldier-level connectivity and unit mission command capabilities. The development of these requirements will provide much-needed direction to the Army materiel enterprise and provide common criteria against which hand-held devices and other mission command solutions can be evaluated in future NIEs.

Early in the preparation for the first NIE, the Army determined that success would be measured by how much was learned by putting capability solutions into the hands of Soldiers in the field, supported by engineers, and combat, training and materiel developers. All but a few of the six SUTs and 29 SUEs were recommended either for immediate fielding or for additional evaluations based on their potential value to the Army.

For instance, using smartphone technology and Joint Tactical Radio System (JTRS)—software programmable radios—dismounted units were able to send combat-relevant information such as targeting and fires data back to tactical operations centers and higher headquarters miles away from their location. Soldiers' experiences in the NIE underscored the tremendous value of using hand-held, smartphone-type technologies to increase so-called "spot" reporting from the field and send valuable information such as intelligence or position-location information across the force. As a result, the Army is working diligently to harness this capability in a way that provides the information assurance needed to safeguard data on the battlefield while also leveraging this valuable capability for the benefit of deployed forces.

During the NIE, Soldiers were able to take pictures and send them back to headquarters and to speed up the pace of a medical evacuation by providing location information quickly. In addition, the Army has had success running situational awareness Battle Command applications on smartphones such as Joint Battle Command–Platform, a next-generation force-tracking program able to show locations of friendly forces. The Army is now conducting cost-benefit analysis of the use of various smartphones and applications.

Also, Aerostat blimps and Shadow Unmanned Aircraft Systems configured with JTRS radios flew above the desert terrain at WSMR during the NIE, extending a mobile, ad-hoc line-of-sight network able to pass voice, video, data and images as far as 60 kilometers in real time. The idea is to expand a terrestrial, JTRS-based communications network by adding aerial nodes designed to extend the ability to relay information across greater distances through line-of-sight connections.

Part of the rationale for JTRS technology is to afford battlefield communications in an austere environment where satellite technology might not always be available. JTRS radios, which can make use of encryption to safeguard information, are built to send IP packets of data, voice, video and images via multiple waveforms between static command centers, vehicles on the move and even dismounted Soldiers on patrol. Nonproprietary wideband networking waveforms such as Soldier Radio Waveform (SRW) and Wideband Networking Waveform (WNW)—which uses a larger portion of the available spectrum than legacy waveforms to transmit information—are key to the development of JTRS technology. JTRS radios can transmit information using these high-bandwidth waveforms such as WNW and SRW as well as numerous legacy waveforms such as the Single Channel Ground and Airborne Radio System, UHF, VHF and Enhanced Position Location Reporting Systems. This technology greatly enhances the ability of Soldiers in combat to relay crucial data across the force.

The NIE also tested Joint Capabilities Release (JCR)—a software upgrade to the force-tracking technology known as Force Battle Command Brigade-and-Below (FBCB2). The Army’s FBCB2, or Blue Force Tracking, shows units where they are in relation to one another and the surrounding terrain. JCR provides a series of enhanced mapping tools, databases and displays for Soldiers using FBCB2, giving them improved situational awareness while also connecting the Army and Marine Corps tracking systems to one another.

Although particular technologies and applications may change in the future as new capabilities become available

and new tactics, techniques and procedures are developed, the construct of the NIE as a platform to best facilitate the Agile Process is slated to continue well into the future.

Finally, by conducting more NIEs and valuable Industry Days and by effectively soliciting consistent input from its expert industry partners, the Army hopes to further this agile acquisition process to leverage and deliver the best emerging technologies available. This will allow the Army to capitalize and improve upon the successes from the first NIE, capture lessons learned moving forward and identify new systems needed for further development and exploration.

Key Points

- NIE represents a new way of doing business for the Army; it is designed to evaluate and integrate emerging technologies before they are sent downrange.
- The “Agile Process” is designed to keep pace with fast-moving technologies by blending Army programs of record with commercial off-the-shelf technologies.
- The first NIE is resulting in numerous key lessons learned regarding networking technologies.
- Particular technologies, capabilities and applications may change in the future as technologies evolve. Future NIEs, now being planned, will accommodate these changes and work to establish a network baseline.
- Networking the individual dismounted Soldier so as to ensure improved battlefield awareness is a key element of the ongoing NIE process.



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