Landpower Essay

No. 10-2
September 2010

An Institute of Land Warfare Publication

Looking Forward: People First

by

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Narrative: Combat Patrol, 2025

"Beep! . . . A message for you, sir."

Captain Ender looks up and to the left, adjusting his eyes to the portion of his visor that connects to the grid. His "assistant" has identified and connected multiple data points suggesting that the house Ender was about to enter had been used by the Faction.

"Faces," Ender says.

The left side of his visor fills with images and text with the link analysis. He is familiar with the view in front of him, because he designed it . . . with the help of his "assistant," an intelligent computer agent that has learned how to present information Ender wants and needs in a manner that adapts to Ender's cognitive abilities. The "assistant" remains connected to the global grid, often suggesting new ways of displaying data based on other "Enders" out there.

Ender kneels behind the balustrade, reaching into his pocket and unfolding his map. The map is, of course, not the static, clumsy, paper-based map that his father used in Operation Iraqi Freedom; rather, it is a synthetic visualization device that displays a collection of spatial imagery provided by his "assistant."

"Mark: three-one," Ender says.

His map screen blips, adding markers for the members of Third Platoon, First Squad.

"Send: MARIE."

MARIE is a Mini Android Robotic Intelligence Emitter, a tiny contrivance that can be sent through a small opening into a room to gauge the number of occupants in the room and quickly send back a schematic to all parties subscribed to her feeds.

"Video: three-one-one."

Ender's visor shows a live video feed from the Third Platoon, First Squad leader. He also has access to data "sparks" that indicate what assets his unit has available, and a color-coded live data stream indicating that the squad is set, ready to enter the building.

With an eye gesture, Captain Ender sends a notification to his higher and adjacent headquarters letting them know the operation is about to commence. His team already has access to the data in his view; it does not take long for them to comprehend the cues—they have trained this for years and they have "assistants" of their own. Then Ender sends an indication to Lieutenant Infanti to open the door of the house. As the team presses forward in the stack to clear the room, the translator application begins to issue directives to the people in the room. "Get on the floor. Hands up." The Soldiers already know these translations by now, but the machine is also able to provide translated text of the occupants' verbal responses.

MARIE has already ascended the steps, sending back additional data for the squad. Ender's trained eye recognizes when his "assistant" tags one of the images as "present" using facial recognition, placing a virtual icon above the marked man's head in the visors of all of Ender's men.

A gunshot rings out, followed by return fire. Medics are dispatched immediately as their sensors indicate that Lieutenant Infanti has received a serious wound to his left thigh. MARIE confirms that the assailant who shot Infanti is already dead. Processing has already begun to determine why the perpetrator was not identified before the shot, immediately indicating a new kind of weapon devised by the enemy. The specifications of the event and weapon are dispatched through the network to all systems, along with indicators that will identify their signature for future operations.

All of the intelligence is immediately passed through the mesh network to the headquarters, which begin processing a link analysis based on the facial images sent as soon as they are captured. Each Soldier's visor is reproducing the information with data provided and analyzed by the network of computers and analysts, yet presented in accordance with the Soldier's presets. ***Common Operating Picture: Common data, customized views****. Yet, even with the merging of data and the network, Soldiers still face an element of uncertainty in every engagement.*

Discussion: Classroom, 2010

Even in 2025, the discussion will still be about the network, but the network looks markedly different compared with the network that supported the invasion of Iraq in 2003. The network is no longer about centralized switching and routing at the data transportation layer; instead, it is the intersection between people and the devices. The network allows people to get the data they want, in a presentation that fits their style of information processing, at precisely the point that they need it.

Buzzwords of old—*adaptable, customizable, flexible, robust*—are now reality.

The network is constantly connected, always on and able to reach any Soldier who is within 60 miles of any other Soldier or network-capable device. With more Soldiers and devices in contact, the network's strength, speed and power grow.

On the surface, the devices that display and compute the data appear too simple to be a part of the technological future, but that simplicity is their key. In the past, complex systems were introduced, but the human capacity for information processing, while evolving, has limitations. The powerful device is smaller than a credit card (which, by the way, the generation of Soldiers in 2025 know nothing about, since they do not exist anymore), contains a powerful microprocessor, a router that provides ability to acquiesce in the mesh network, a virtual machine host and a display adapter. The display is adaptable, feeding to the visor and map, as well as to a tablet or projector, depending on its need. The display can receive and send feeds to others based on publish, subscribe and push notification systems.

The new network will be built upon a combination of tree-based and mesh-based solutions that have existed since the early part of the century. Using Ad hoc Multicast Routing (AMRoute) protocols, Core Assisted Mesh Protocols (CAMP), On-Demand Multicast Routing Protocol (ODMRP), Congestion-controlled Adaptive Lightweight Multicast (CALM), Reliable Adaptive Lightweight Multicast (RALM) and extensions of Multicast Ad hoc On-Demand Distance Vector (MAODV) routing, the network is adaptable, creating multiple routes for traffic that eliminate the single points of failure that beset the computer networks from the last century. These technologies allow us to create adaptable, scalable, faster networks, not networks that are more controlled, congested and vulnerable. The speed, coupled with availability, makes more information reliably available to the warfighter through failure-resilient, low-cost networks.

The military has grappled with the security of a mesh system, but the answer is, again, simple. The devices use a combination of processing on the server and at the device, while all applications run in virtual machine environment, creating an ironic coupling with the old-fashioned term "dumb terminals." Authentication comes from a combination of iris scanning, voice identification and fingerprinting, which together generate the keys required to unlock the virtual machine interface. When the absence of these authentication keys arises, the machine shuts down—essentially rendering the device useless.

The intelligent agent—or "assistant"—in the vignette is not a new concept. In addition to its roots in artificial intelligence and intelligent tutoring systems, the concept has a foundation in business applications in the form of an Electronic Performance Support System (EPSS). Barry Raybould, writing for *Performance Improvement Quarterly* in 1995, defined EPSS as "an electronic system that provides integrated access to information, advice, learning experiences, and tools to help someone perform a task with the minimum of support by other people."[1] The theories that support concepts like EPSS are rooted in instructional theory dating over a half century before Raybould, ultimately focusing on determining how computer processing can assist human performance.

While fantasy might abound for technologies that can monitor individual Soldier proprioception and kinesthesia, the cornerstone of the future operating environment is not the flash and buzz of the technologies; it is the education, training and experience of the people. As we look toward the future, we must ask what kind of Soldier is ideal for operating in this environment.

It starts with education. For Soldiers, foundations in technology must exist, allowing for customization of learning styles and information processing techniques. For the officers, cases

[1] Barry Raybould, "Performance support engineering: An emerging development methodology for enabling organizational learning," *Performance Improvement Quarterly*, 8(1), 1995, pp. 7–22.

can be made for degrees in English, communications and other liberal arts, since they teach forms of creativity that might be required as the Soldier constantly examines new situations. Moreover, future officers studying advanced math or computer science squarely place themselves in a better position to understand how the technologies that will surround them can be mastered. The Soldier best suited for the future environment is the one who has a Renaissance-like approach to the combination of arts and sciences. The one who takes advantage of the crispness of the 1 and 0 and then couples it with abstract processing is the officer best suited to deal with the complexity and uncertainty of future battlefields. This is the "art and science" approach that has been discussed for years, yet never formalized.

The future Soldier must also have an appreciation for history and sociology, firmly understanding the nature of battle throughout the millennia while maintaining a firm respect for the culture of the enemy and the civilian population of the areas of operation. While technology might ultimately provide adequate language skills, the value of a Soldier who can speak the local language cannot be overestimated. This does not suggest that the military of the future is a military of polyglots; rather, it is grounded in traditional skills augmented by technology.

One example of an augmented technology is a program that can be developed to place a filter over the current situation: Imagine a Napoleon filter that can look at a current problem and apply Napoleonic reasoning to it. Then imagine changing out that filter and examining the same problem with Che Guevara's filter. As interesting as this may sound, though, neither of those two men is going to have to bang down the next door—the Soldiers still have to make the decisions against the filters of their own experience. Therefore, the Soldiers' needs must dominate the conscious of future technology development.

Additionally, without respect for history, the Soldier might not gain any knowledge from Napoleonic insights. As the mass proliferation of Internet data befell the world, we saw a generation raised in a promiscuous learning environment. Information came fast and frequently from all corners of the world, forcing us to teach ourselves how to evaluate sources of information. The scout of the past believed what he saw. With the globalization of information, we started to see more, through more varied lenses. Algorithms were developed to assist in filtering the information, but they opened the door for insular thinking—ignoring opposing views by seeing only through palatable filters. Additional processing allows us to see light against the chiaroscuro contrast of darkness: information from reliable sources stands on firm ground when the opposing views are realized.

If the Army is to be a true learning organization (a topic widely debated at the Command and General Staff College), the culture has to be based on reflective inquiry, allowing Soldiers to question authority when decisions (or processes) deviate from the path of schematic expectation. Soldiers will learn how and when to question and confirm information. Social foundations rooted in master-apprentice methodologies have provided the foundation of training and understanding of warfare through generations. Now imagine that these relationships are augmented with intelligent agents that can increasingly see through the repository of data to present arguments for and against the data. This gives the opportunity for open debate on the presented courses of action, ultimately indoctrinating a generation of officers who can better predict the results of their actions. Critical thinking jumps from buzzword to reality once it becomes clear that it does not equal dissent. Professionals encourage argument; professionals also know how to follow orders.

As our Soldiers progress through their careers, it will be important that we provide the right mixture of training to harness the technology and the experience. Increasingly, younger Soldiers will be accustomed to receiving training through computerized means, but hands-on training—particularly within the context of the unit's missions with an experienced mentor—must remain a very prominent part of training. The age of the fully automated instructor will soon be upon us, but it is not here yet. The platoon leader learning from his company commander (who is in turn always learning from the battalion commander) is a model that will stay in the military for many years in the future. It is those masters who will extend their valuable experience to the younger officers and build the next generation of leaders. The technology, and how to use it, will also be passed along, yet organizations must look to the younger generations to harness the technologies of their time, with fresher eyes.

The leader of the future must have a wide grasp of human performance within a technologically advanced society. Understanding the tenets of information processing—from the purely technical to the distinctly human—is the most important challenge of our time. The battlefield of 2025 will be littered with sensors, not the least of which are the Soldiers themselves. As we look to the future, the time-tested tactics of the cavalryman will continue to provide a valuable foundation. As "strategic corporals" continue to patrol the streets, the tenets of area reconnaissance are clearly present. Soldiers must be able to evaluate the situation, decide whether to act and then act. Leaders must also appreciate the distinct balance between strategic and tactical; they must understand their role in the "big picture."

Careers must be built from the ground up. We must continue to find leadership opportunities in combat units for as many of our Soldiers as we can. Although the nature of conflict is expanding, allowing involvement in combat to Soldiers who might otherwise be "out of range," the importance of leadership in the smallest combat units cannot be overestimated. There was a time when just about all lieutenants and captains could expect platoon leader and company command opportunities, but recent years have seen these positions either eliminated or shortened. Even for those officers who eventually find themselves in a functional area, the experience of command is invaluable when trying to understand the environment of the fighting men and women. As recently noted by the U.S. Joint Forces Command commander, we are not looking for "a strategist who's never had to put body bags on a helicopter."[2]

The roles and jobs that Soldiers and officers have early in their careers must prepare them to operate within the network of sensors. What are the five things every Soldier must know about the network? In the spirit of alliteration, five "Ps" illuminate it.

Discussion: The Network, 2025

The first is the **purpose**. Every Soldier must understand his or her purpose within the network, as well as the purposes of the technologies at their fingertips. Sun Tzu's "Know thyself" tenet is at the heart of this. We all serve a purpose—some gather information, some process it and some act upon it (and some do all three). The systems of the future must also serve a purpose, and all must fit together. We must prepare each new system to interact with

[2] General James N. Mattis, Commander, U.S. Joint Forces Command, in remarks before an audience gathered in Washington for a discussion of "Keeping the Edge: Revitalizing America's Officer Corps," a report from the Center for a New American Security; quoted in William H. McMichael, "Report Calls for New System for Officer Development," *Army Times*, 23 February 2010, http://www.cnas.org/node/4145.

the others. The heart of this has to be data normalization and search. The inability of systems to see the data of their peer systems, coupled with the unavailability of a federated search capability across each of the networks, is insulting to 21st century technology; one of the military's primary goals must be to open the boundaries of search to allow interested Soldiers and systems access to the information they seek.

Significant barriers must be overcome to make search universally "smart." Ten years after data systems that did not share data contributed to organizational blind spots on 11 September 2001, search is still fragmented. Information systems on classified networks do not have access to vast amounts of data that litter the unclassified networks. For those systems that do have access, the data on the unclassified network is so muddied that it does not matter. Everybody wants Google—but data resting in Army Knowledge Online cannot be seen from within the Center for Army Lessons Learned, and Google-like results seem far away. Not until the Army Chief of Staff demands an open community of data within the organization will we start to see the bigger picture. Some data will still need to be protected within certain pockets of culture, but closed data ought not to be the norm.

Achieving equilibrium where data can be trusted as authoritative can come only when the searcher has confidence that all relevant data sources have been queried and that the results presented reflect expected results. The search for *search* begins simply enough. Those in command of the information should be reminded of the late 1990s when commercial search engines were more likely to return irrelevant results than they were to return the authoritative results. Then something happened: Google got better. While the history of search is a topic for another paper (and the degree to which Google gets credit is an interesting conversation), essentially search engines have gotten better at returning the information users want. Yet, when this happens today, military search still returns poorly filtered links.

Today, a lecturer can ask any group of military members, "When was the last time you searched for something on [name a military site]"—Army Knowledge Online (AKO) and Center for Army Lessons Learned (CALL) come to mind, but that is because that is where Soldiers expect to find this data—"and found a result you felt best fit your expectations?" The sad answer is in the knowing smirks of the respondents, who found failure in the majority of their queries. Call it a knowledge management failure or call it an information systems failure; no matter who shoulders the blame, it is the warfighter who suffers. Today, when smart people write smart papers, they sometimes ask where they should publish or post them. The real answer to that question is remarkably simple: We do not have to create one repository of data—one central spot for information to reside; rather, we just have to make the communities of information truly searchable. Then a Soldier can write about a new technique for using a particular kind of software and that information can be found by an Airman investigating the same software half a continent away.

This connects with the second thing every Soldier must know about the network: the **picture**. Once all Soldiers have access to the same data, we will start to see a true common operating picture. The picture of the future is not a two-dimensional, cropped, flattened image that rests on slide 25 of a PowerPoint™ presentation, or even one that can be displayed on quad screens in the tactical operating center, but one that presents itself in three dimensions, with the ability to toggle between multiple points of view. It is a fluid representation of the current available data,

fully customizable for proponents of varying organizations to project and manipulate information relevant to their position in the battlespace.

The heart of the information-processing problem is the ability to increase situation awareness across individuals and groups who are required to make complex decisions in a messy environment. In 1988, M. R. Endsley formally defined situation awareness (SA) as "the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning and the projection of their status in the near future."[3] Though the term SA is relatively new, Napoleon recognized it in his day. His 115th maxim provides an insight into the mind of the commander, lending a 19th century description of situation awareness:

> The art of war on land is an art of genius . . . the general needs all, or a talent equal to all, that of profiting by all experience and all knowledge . . . the general never knows anything with certainty, never sees his enemy clearly and never knows positively where he is. When armies meet, the least accident of the terrain, the smallest wood, hides a portion of the army. The most experienced eye cannot state whether he sees the entire enemy army or only three quarters of it. It is by the eyes of the mind, by reasoning over the whole, by a species of inspiration that the general *sees, knows and judges*. (emphasis added)[4]

Napoleon's idea of seeing, knowing and judging can now be defined as the three levels of situation awareness (Endsley's perception, comprehension and projection). On the surface, the levels of SA appear to be building blocks. An individual perceives bits of information and puts them together to form a level of comprehension from which he or she can accurately predict how those bits of information will shape future events. A further examination, though, reveals a much more complex environment in which the process of preparation and planning for an operation shapes how sensors attempt to discover data (level 1 components of SA). As members of a unit prepare and rehearse for a mission, they are already creating a model that represents a projection of how they think the mission will take place. Then, as the mission events occur, the participants begin to search for the level 1 components that they believe will prove their projections (level 3) to be correct.

Group situation awareness is also an interesting topic for consideration. Group SA combines multiple viewpoints across the spatial and temporal axes. A tank platoon leader engaging a combat force on the immediate horizon is better prepared for combat when he is also presented with information about the enemy on the other side of the intervisibility line. It is through the combination of sensors and reports that the tanker can see a hidden enemy. The common picture is achieved through a combination of technology and experience. While it is tantalizing to believe that intelligent agents will bridge the gap from information overload to situation awareness, it will still take a well-trained mind to understand the complex nature of the battlespace to grasp the three-dimensional picture of combat.

With this model in mind, designers of military systems must continually look toward developing ways to present the data. In many cases, Soldiers will still want access to the granular

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[3] M. R. Endsley, "Design and evaluation for situation awareness enhancement," *Proceedings of the Human Factors Society 32nd Annual Meeting*, Santa Monica, CA, 1988, pp. 93–101.

[4] Brigadier General T. R. Phillips, Ed., *Roots of Strategy: The Five Greatest Military Classics of All Time* (London: John Lane, 1943).

bits of data so they can understand the situation on their own terms. To some, blind trust in automated systems may steer them along the correct path the majority of time, but the intelligent systems are still several generations away from considerations of human-out-of-the-loop scenarios as a normal operating environment. The degree to which intelligent computer agents can assist is certainly growing, and every effort should be made to develop mechanisms to allow these systems access to information for filtering, so the individual can make the best decision.

While levels of trust in second-hand information from reliable sources have increased over the years, the "seeing is believing" culture is hard to wrestle away from the human psyche. Years ago, as the scout reported information back to his leaders, the leaders had to filter this information against a variety of variables, including the experience, intelligence and location of the scout sending the report. If their variables suggested that the report might somehow be inaccurate, the temptation to confirm the information—perhaps with their own eyes—was prevalent. The modern era of computing technologies might be able to create intelligent filters that can mathematically determine whether the report can be trusted, but the human condition still argues for confirmation. Again, technology provides the assistance. When a leader can view an accompanying video feed that verifies the information—or the scout has access to views of the location from multiple sources—the synergistic effects of the combined package of information lead to better military intelligence.

The third thing is to understand the path the data will take. Just knowing they are connected to a global grid is not sufficient. Even with a full mesh network, data processing centers at echelon will still provide for an optimized computing environment. Soldiers and leaders must know the mechanisms that allow them to connect to the information in order to understand the best techniques for filtering and prioritizing their data. As data speeds increase, the hunger for larger packages of data will continue to test the limits of the transportation layers. The isolated Soldier who is connected to the mesh through only a handful of outlets must recognize that access to greater-fidelity information comes at a cost. Leaders who are in position to support that Soldier must then know the impact of information delay—as well as the absence of parts of the picture due to data constraints—on the Soldier's mission. The technology will continue to improve, eventually allowing Soldiers to drop nano-"breadcrumbs" in their sector, creating proximity that acts as a lifeline to the mesh.

In addition to the physical path, the 21st century leader must also understand the capabilities and limitations of the systems at his or her fingertips. Purpose, direction and motivation cannot be provided without a firm understanding of the technologies that increasingly power our military. It is understood that the tank commander is the best gunner, driver and loader on the tank—because he has the experience of having been in those positions. In an Army dependent on technology, it is inexcusable to have leaders with little to no knowledge of the technologies that fuel the force. It is inconceivable to imagine a rifle platoon leader who does not know basic facts such as the maximum effective range of his crew-served weapons, tracer burnout of those weapons or even how many of the weapons he has. Yet, as technology expands in the military, the understanding of the systems (the crew-served weapons) is ignored by a significant population of the Army, resulting in a force that does not know how to best use those weapons.

It is known that changes can come to this posture only through education and simplification of the systems, while still opening the path for new technologies. Application developers are

demanding a common programming interface to allow them to better present data based on new systems. With accessible search capabilities, programmers can develop "cutting edge" software and systems with the ability to connect to the data. The open software standards will create a new generation of hardware, such as the heads-up display that connects to appropriate data repositories as described in the opening vignette.

This is a struggle for the military culture to overcome. Some organizations will initially take intransigent positions, refusing to relinquish total control over their data for fear that their jobs will be lost. Others are afraid that their data could be managed only by their administrators. Still others will take the position of harbingers of bad tidings, asking such pedestrian questions as, "What if al Qaeda gets access to this database?" Again, it will likely take a demand from the Army Chief of Staff that the data become normalized and that credentialed, secure access be granted to developers and users. Advanced biometric credentialing will prove to be the frontier of data security access.

The change in culture also puts a premium on research and development in the Army. Talent and education must be rewarded through innovative organizations that set out to discover new technologies and put the military—not just the wealthiest consumers—on the leading edge of technology. Years of conflict and poor personnel management have forced many of the brightest officers to find financially rewarding careers in the civilian sector, since the opportunity did not exist to use their talents in the military. Imagine the officer with a master's degree in computer science being placed in an assignment where her primary duty is to write policy for computer systems that supports logistics operations. While she surely performs that job well, in a different environment she could have been creating the next generation of networking protocols—or working on a team writing the application that works inside the mythical Captain Ender's visor. But the Army has no way of identifying her talent, and less interest in rewarding it. How should we reward those with acumen for technology? Place them in jobs commensurate with their talents and pay them more money for those talents. Pilots get flight pay. Ought we not find the technologists among us who have the talent to protect the network and reward them as well?

With increased efforts in growing, recruiting and maintaining talent, mobile applications are becoming a cornerstone of military operations. They will allow innovative developers to rapidly design custom interfaces for specific mission sets. Systems need to be put in place to create an environment where the brightest computer scientists of our time can build applications in support of their countrymen. As applications proliferate through the force, the system will afford opportunities to promote them up the chain and nominate them for Army-wide consideration. At the heart of all of these applications must be the ability for the users to customize the appearance, quality and quantity of the data presented. Some applications will become popular among Infantrymen, others among civil affairs officers, often showing summaries of the exact same data but in different meaningful ways. The rapid fielding of applications must be encouraged, accompanied by automated and human processes to verify the quality of the code presented for distribution.

This leads to the fourth and fifth components of network understanding, which are unfortunate but often stupefying realities of the early 21st century military: policy and procurement. The leap from 2010 technologies to those of 2025 is not because of the policy and procurement procedures but in spite of them. Progress comes only after introspection: "How did the military go from the leading edge of technology to trailing commercial progress?" "How did we get from the Advanced

Research Projects Agency's 'inventing' the Internet to a multiyear process to approve a new, commercially available operating system"? A system built on the cumbersome bureaucracy that the United States military has become is likely to implode upon itself if course corrections are not made. Even before the turn of the century, leaders had to spend too much time navigating the monstrous leviathan of policy and procurement, often put in place to prevent massive cases of fraud, waste and abuse. The irony is that the price they paid for legitimate purchases was hours upon hours of wasted manpower.

Therefore, with an understanding of the network, the task then is to determine the methods to train for modern conflict. For this, a progressive model must be developed and incoming technologies examined with cautious optimism. Army doctrine dating back a number of years suggests principles of lifelong learning, yet the tenets that guide military education have remained largely unchanged over the course of the past two generations. They include one to three U.S. Army Training and Doctrine Command (TRADOC) permanent change of station (PCS)/temporary duty (TDY) moves back to the home branch schoolhouse per Military Occupational Specialty. While the course lengths have changed over the years and a few additional teaching methods have been employed, the path to lifelong learning remains the sole responsibility of the Soldier (unchanged from the post-Vietnam era).

Promising distributed learning technologies have brought as much skepticism as optimism. Distance learning became an ugly term, associated with the "next, next, next" culture of many computer-based training modules. Troops with a traditional dislike of mandatory training classes (suicide prevention, safety, prevention of sexual harassment) are being driven to madness as these same classes are now ported to computer-based training modules under the guise of distributed standard training—but now the Soldiers are not given the time to accomplish the tasks. Some thought this method of instruction was an example to fly under the banner of lifelong learning, but it has had the opposite effect. Changes to this culture must be bold and monumental.

The model of consideration for real change in lifelong learning should be the "continuing education unit" model. Wholesale changes in TRADOC schooling must include the best techniques to bring Soldiers back to the classroom for two weeks every two years, as well as for a one-week distance learning class of their choice. Each Center of Excellence has the task of determining which classes they can offer as refreshers or new training to the servicemen and -women in their specialties. Then, the students should be offered a choice of training courses to attend in the form of electives. Military Policemen will begin going back to Fort Leonard Wood, Missouri, every 24 months to study new techniques and technologies that augment their careers. Infantrymen can come home to Fort Benning, Georgia, to examine and test new weapon systems or to learn more about next-generation command post technologies. Members of the Signal Corps can return to Fort Gordon, also in Georgia, to receive classes on updated technologies. Imagine the student who graduated 24 months ago without any training in virtualization and now finds himself getting ready to PCS to a post where he will manage scores of virtual servers. That Soldier would jump at the opportunity to return for training. The inclusion of distance learning—true classroom distance learning, with a live instructor at one end and 20 students in a classroom at the other—will also begin to create a culture where distance learning opportunities will be seen as viable. Some feel that it is impossible to learn in such a format, but when it is demonstrated correctly, many students will begin to adjust their preconceptions of learning models.

This goal can be achieved only through the inclusion of two words: mandatory and funding. The funding is obvious; the mandatory moniker is more difficult. Units are still deploying to Afghanistan and Iraq. No one wants to commit time away from home for learning, and leaders do not want their Soldiers taken away from unit training to attend classes. Ultimately, a few branches will need to take the lead before others will be able to see the benefits. Then, when the classes become mandatory, the problem will largely become a human resources issue but still manageable with support from the field.

Additionally, units need to continue to look toward using technology in training, using a careful balance of training *on* the equipment and training *with* the equipment. As innovative technologies begin to present themselves, commanders know they need Soldiers who can make optimal use of the technology, but they do not want "good old-fashioned" training to be supplanted by technology. "We need to be training MDMP [Military Decision-Making Process], not CPOF [Command Post of the Future]!" blasted one brigade commander. The truth is in the balance. In this case, MDMP can be trained alone; it can be trained preceding CPOF training; it can be trained after CPOF training; or it can be trained at the same time. Studies show that using current technology augments the relevance of traditional training, and vice versa. The younger generation of adult learners appreciates contextual training within realistic operating environments.

The Halo generation demands quality virtual gaming environments as replacements for field training. The Army has a history of being at the forefront of this technology; consider Simulator Networking (SIMNET) as an example. Still, it will take some fairly innovative thinking to look at virtual environments and make them as close to combat as possible. A demonstration of a combat unit conducting a rehearsal of an upcoming mission in a massively multiplayer role-playing game (MMRPG) environment, potentially involving hundreds of users at distributed locations—with the virtual environment being a reconstruction of the town they are about to cordon and search—will turn some heads.[5] "What if," they will ask, "we can blur the lines between training, rehearsals and combat operations?" In a game environment, players are used to seeing navigation compasses that show proximity to friendly forces. Additionally, they are used to looking at a person, building or vehicle and seeing a representation above or on the item indicating what it is. With augmented reality grabbing a foothold in the mobile computing environment, archaic systems such as Blue-Force Tracker must incorporate those representations in a heads-up display.

This will begin the earnest creation of devices that mimic the views gamers are used to seeing inside video games. With greater access to data, innovative developers can then present the data in new ways, commensurate with the preference of the foot Soldier. Iconography and usability will begin to appear more regularly at the insistence of the troops on the front lines—it is those troops, after all, who must live with actions begun with faulty intelligence.

Narrative: Combat Patrol, 2025 *(continued)*

> *Captain Ender and his men finish securing the area. At intervals over the course of the next 30 minutes, the Soldiers process information as part of a reflective after-action review, with their "assistants" examining and reviewing the data. Some take this*

[5] An MMRPG is an online game played by an unlimited number of individuals, each taking the role of a character in a virtual world.

experience, put it in their information banks and begin to make changes to how they want information presented for the next mission. All the while, the information they have gathered during this raid is already being processed by a variety of measurement and signature intelligence (MASINT) applications locally and back in the States. The quantitative data are sent instantly; qualitative data, in the form of after-action analysis reports, will be sent upon completion.

When the moment presents itself, Captain Ender walks the team through the downed enemy gate, to the confines of the compound, and gathers the team around the hood of his vehicle to review the mission. As he presses "play," data flows freely from his device to his map. At intervals, he pauses the action, switches views and allows members of the unit the opportunity to discuss the procedures and outcomes. Ender pauses, worried about his wounded lieutenant. Then a green icon appears in the lower left hand part of his visor: Infanti's medical condition status has been upgraded to stable.

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This essay was chosen as the winner of the 2010 AUSA/Army Capabilities Integration Center (ARCIC) writing contest.

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