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While at War!



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DEVELOPING THE RIGHT SKILLS AND TOOLS— AS A TEAM!

By Major General Randal R. Castro and Lieutenant Colonel Paul L. Grosskruger

Throughout its history, the Engineer Regiment has distinguished itself, time and time again, by its support to our Nation. And at this point in our history, we stand together at a crossroads of relevance. We must select the right fork in the road—that which takes us toward developing relevant skills and tools for our units and staffs. We must quickly address capability gaps in urban and complex terrain. We must ask ourselves “Do they have the tools they need?” “Are we skilled to accomplish the tasks required?” “Do we have the right organizations?” It is up to us to seize the initiative and make this happen!

Challenges and Opportunities

Today’s landscape is changing by the minute. It’s filled with quickly evolving technologies, instantaneous global communication, and increasingly complex urban population centers and terrain—together with highly adaptive, deadly, motivated, and elusive enemies who play by their own rules. In response, the Army has begun to adapt to meet the challenges with more responsive, specialized, modularized, effects-based organizations or modules. These capabilities-based modules—centered upon the brigade combat team, the units of employment-tactical (UEX), and units of employment-operational (UEY)—are right for our Army.

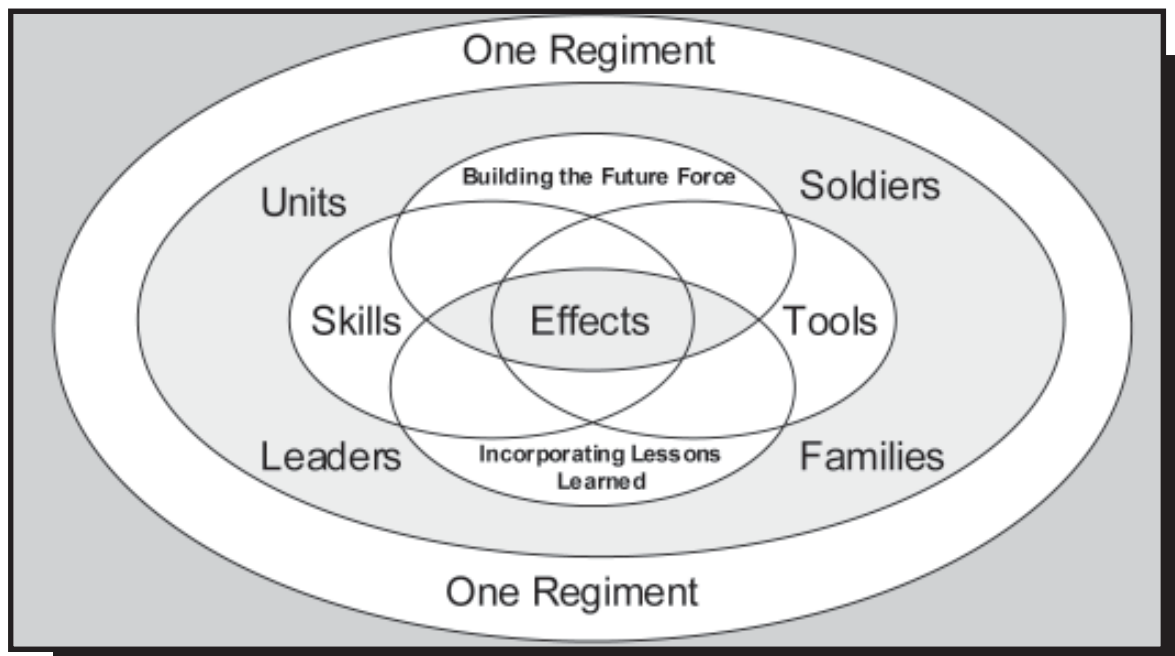
Taking the concept of modularity to completion will reduce the number of engineer battalions. However, the Regiment you see as a result of modularity is not the Regiment of tomorrow. Several Department of the Army-level studies have shown that future engineer requirements have actually increased. These requirements, coupled with numbers of engineer headquarters based on a “bottoms-up” process, will ultimately require more engineer structure than we had prior to modularity. At the brigade level is where we will mix and match modules. From the brigade level on down, we will be better able to provide a full range of support to our Army and to our Regiment. The message is loud and clear: “We’re coming back!”

A New Approach

The doctrine, organization, training, materiel, leader development, personnel, and facilities (DOTMLPF) assessment approach has served the Army and the Engineer Regiment well and is the foundation for the future. But we have to be much better at getting the skills and tools to our engineer Soldiers, staffs, and units to keep them indispensable to the land component maneuver commander. Our focus needs to be on continual “gap analysis” of engineer support to maneuver in complex and urban terrain. This approach also continuously incorporates today’s lessons learned and provides refinement in placing the right mix of skills and tools into our Future Engineer Force. This concept focuses our limited resources, maximizes our use of collaboration across the Regiment, and sets forth short- and long-term goals.

Skills

We must strive to ensure that our skills are relevant today and tomorrow and that they are indispensable to the land component maneuver commander. We have focused our efforts for years on engineer skills supporting maneuver in open and rolling terrain. Operations in complex and urban terrain—today and in the future—demonstrate the need for getting better skills for our Soldiers and staffs to enable mobility in conjunction with maneuver in such terrain. Soldiers must first be warriors, fully versed in battlefield fundamentals of “shoot, move, and communicate” and in expertly executing their military occupational specialties—from the moment they leave one-station unit training (OSUT) and advanced individual training (AIT). Sappers must be skilled in pattern analysis, change detection, search, reconnaissance, and terrain visualization. We all must be trained to expertly predict, prevent, detect, and avoid today’s improvised explosive devices (IEDs), bridge the gaps, ensure security of lines of communication, and many other engineer-unique missions. Specialized training such as the Sapper Leader Course, Urban Mobility Breacher



(need a caption)

Course, search courses, and specialty courses must be standards for our Soldiers and leaders. Finally, we must tighten the linkage between our Soldiers, leaders, and staffs in combat and our institutional schools and laboratories. Skills must also be linked with building future modular units. This must be a continuous approach where we constantly assess our current skills and update the training of our Soldiers, leaders, and staffs.

Tools

Our tools are—and always will be—our credentials and “stock in trade.” They are inseparable from our skills and the lessons learned from today’s operations and lead to the right effects for our Army. As with our skills, our tools have been designed to dominate open and rolling terrain. But today’s operations require our engineer tools to address the immense challenges of complex and urban terrain in addition to open and rolling terrain.

We are finding major equipment capability gaps for our Soldiers and units in providing assured mobility in complex and urban terrain. Some tools are out there—such as urban breachers, mine detectors, specialized explosives, mine and search dogs, RG-31 and Buffalo armored vehicles, and reconnaissance tools. In addition, the Digital Terrain Support System and TeleEngineering Kits are making great impacts. All engineers must seek out and obtain these emerging tools. Much more work is needed in getting the right tools to our units and engineer staffs and making them more indispensable. Efforts in networked air and ground technologies to detect and neutralize explosives and other hazards are needed. Also, we need to pursue modernizing equipment for our sapper modules and for construction equipment in building and

maintaining lines of communication (ports, airfields, and roads), logistic support areas, and lodgment areas.

Lessons Learned

We cannot develop relevant skills and tools for our Soldiers, leaders, and units without incorporating observations, needs, and lessons learned. Our manning and equipping strategies must be closely linked with the Total Engineer Force, continuously gaining feedback and sharing developments. It is critical for our units to forward lessons learned and recommended solutions to our institutions, because they provide an incredible windfall of information to develop solutions for better skills and tools. This not only yields better Soldiers and units but also provides invaluable feedback to our concepts teams as we craft the Future Engineer Force.

Future Engineer Force

We continue the massive efforts associated with transforming the Engineer Regiment into a more responsive and effective organization for our Army. The future engineer structure will provide more leadership challenges, opportunities, and professional development for our Soldiers and leaders than we have had in the past. Our Future Engineer Force is a total, top-to-bottom design of the Regiment that—

- Is capabilities- and module-based.
- Brings to bear the entire Regiment.
- Provides professional growth.
- Mixes and matches the right effects for the operation from across the Regiment.



Soldiers from the 9th Engineer Battalion, 2d Brigade, 1st Infantry Division, engage in house-to-house fighting in Samarra.

This is an exciting period in our history. We are about to bring to life the concept of the Future Engineer Force by activating and converting units this summer. The complete transformation of our Regiment will take a little more than five years. Our organizations will be more versatile and responsive—capable of providing all facets of engineer support. Our command and control capabilities will be greatly expanded and—perhaps the best news for our Regiment—we are fixing the logistical support to our organizations. Our battalions in the Future Engineer Force will have a forward support company in addition to a headquarters and headquarters company. We have worked very closely with the US Army Combined Arms Support Command (CASCOM) in developing a very capable support structure that will serve us well into the future.

People

Our Regiment is people—our Soldiers, Department of the Army civilians, leaders, allies, and families must always be the centerpiece of our actions if we want continued success. They ultimately put the skills and tools together to produce the desired effects for our Army. We must provide defined career paths, opportunities for professional growth, and missions filled with challenges and rewards in order to acquire and retain quality Soldiers, leaders, and civilian employees. Also, we must solidify programs to address needs and concerns of our families. To accomplish this, we must constantly and effectively communicate both internally and externally in this rapidly changing world.

One Regiment

With such a diverse organization filled with talented people, our goals of providing the absolute best skills and tools for our Soldiers, leaders, and units can certainly be realized. A thought process where we gauge our progress and win as a team is needed. It is clear that the Engineer Regiment has an incredibly bright future. Let's work together to pave the way for those to follow! Essayons!



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Training Leaders for Combat

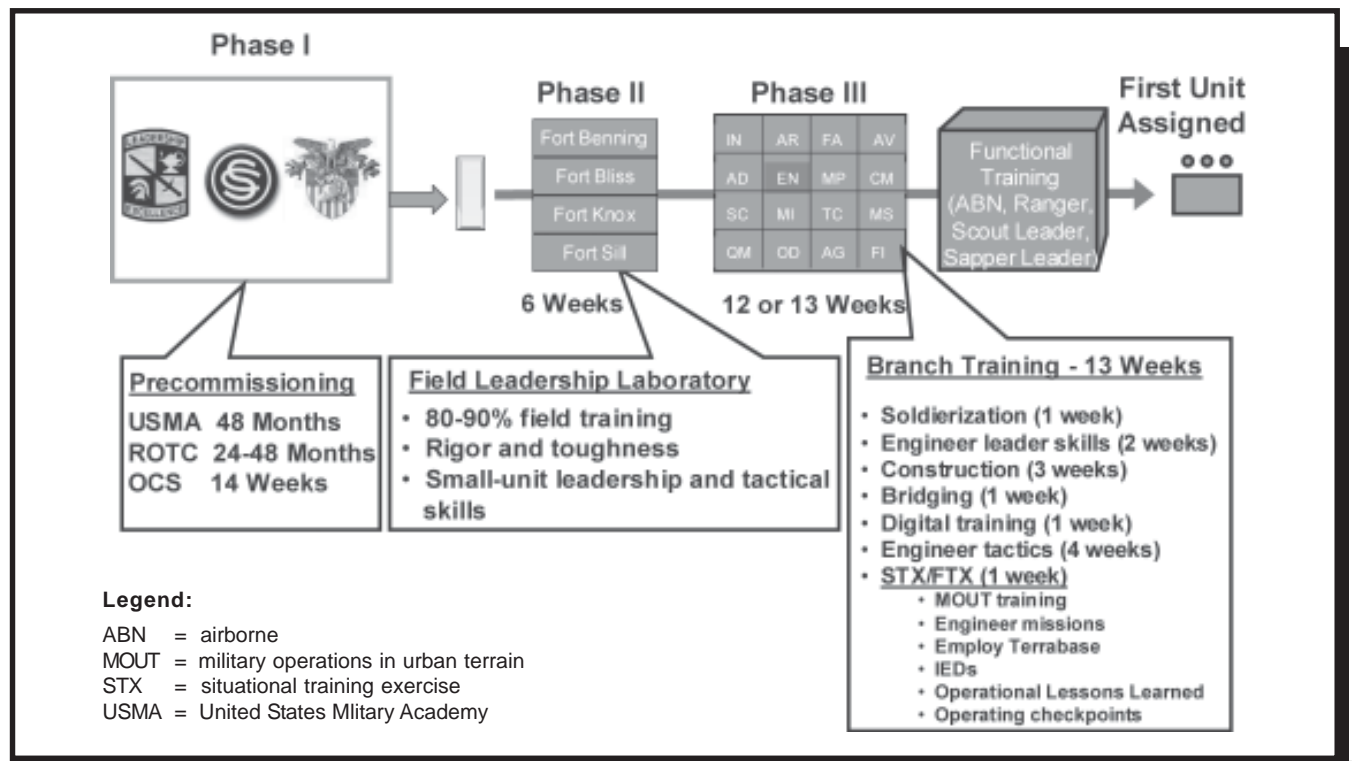
Lieutenant Colonel Shawn Howley

Teaching, coaching, and mentoring are basic blocking and tackling tasks of leader development, and that's what the "Dragon Battalion" is all about! The 554th Engineer Battalion conducts training and leader development to produce technically and tactically competent, adaptive, disciplined, and fit engineer officers for the Regiment. The battalion trains both Active Army and Reserve Component officers in the Engineer Officer Basic Course (EOBC), Engineer Command and Staff Course (ECSC), and the Pre-Command Course (PCC) and trains warrant officers in the Warrant Officer Basic Course (WOBC) and Warrant Officer Advance Course (WOAC). The primary mission of the 554th is to train engineer lieutenants for combat. The battalion has transitioned the training and education of the lieutenants in four distinct ways:

- Started small-group instruction for the EOBC.
- Redesigned both the tactics and engineering blocks of instruction to better focus on urban and complex terrain.
- Redesigned the field training exercise (FTX) to be an all-encompassing exercise, stressing the officers in troop-leading procedures, tactical skills, and engineering skills.
- Sent qualified lieutenants to follow-on combat preparatory courses on their way to their next unit of assignment. The overarching focus for the lieutenants is to be able to "shoot, move, communicate, and engineer." (Yes, the lieutenants *do* qualify on their M16, land navigate both dismounted and mounted, communicate tactical tasks on the radios, and build and blow up stuff in this battalion!)

The current organization and focus of the 554th is in an interim stage as the Army transitions in March 2006 to the new Basic Officer Leader Course (BOLC). BOLC (Figure 1) has three phases:

- BOLC I is the Reserve Officer Training Corps (ROTC) and Officer Candidate School (OCS) commissioning source.



BOLC Model

- BOLC II is a combined arms training phase focused on small-unit tactics.
- BOLC III is technically focused (for engineers) on assured mobility and field force engineering.

The 554th is currently training about 80 percent of the curriculum that will be used in BOLC III. It is continuing to refine and improve the instruction as it incorporates observations and lessons from the field. The battalion is currently in a transition point between decades of “that’s the way we’ve always done it” and “shaping” the training and education methods that will allow it to execute the BOLC III mission, while simultaneously preparing leaders for combat.

On 15 November 2004, the battalion began training EOBC lieutenants at the small-group level with captains as small-group instructors (SGIs). The method is much the same as the way we train captains in the ECSC with small-group leaders (SGLs). The SGIs are selected from a graduating ECSC class and are placed in an “SGI Academy” much like and Observer/Controller-Trainer Academy at one of the combat training centers. While in the SGI Academy, they attend the Instructor Training Course (ITC) and become familiar with the processes that support EOBC and instructional blocks they will teach to the lieutenants. A typical EOBC class of 70 officers is divided into four teams of approximately 16 to 17 lieutenants. An SGI is responsible for training, educating, and developing each team. The training and education is coordinated with the large-group “platform” instructors from the Tactics and Engineering Division in the academic section of the battalion to ensure that the appropriate method of instruction is used based on the subject to be trained. Close coordination with the large-group instructors and the SGIs also supports the consistency in the instruction between the small groups.

The tactics and engineering blocks of instruction have been refocused to better train the lieutenants in urban and complex terrain. The battalion has incorporated lessons learned from current operations in Iraq and Afghanistan into lesson plans to better prepare the officers for their “first unit of assignment”... in *your* platoons! Some of the improvements made in the tactics block are improvised explosive device (IED) awareness, urban breaching techniques, and assured mobility fundamentals. Improvements in the engineering blocks include force protection, quality control, infrastructure reconnaissance, and reinstituting “hands-on construction” in Fire Base Thunder, the battalion forward operating base in the Fort Leonard Wood training area. Senior officers will remember this as “Project Hammer” training, during which there was “hands-on construction” training for lieutenants. The purpose of restarting this training is to familiarize the junior leaders with quality control and project management of a construction project.

The FTX is the “capstone” event for the lieutenants’ training in the Dragon Battalion. The lieutenants execute a 2-week exercise during which they plan, prepare, and execute tactical and engineering missions. Some of the missions are

route reconnaissance, bridge reconnaissance, react to contact, airfield reconnaissance, and infrastructure reconnaissance—all consistent with a Southwest Asia area of responsibility. There is a common training theme in which the instruction taught in the tactics block will be revisited in the FTX, as well as the engineering block. The Opposing Force (OPFOR) is dressed in a mix of old military uniforms and/or “Arabic regional-style clothing” such as the Arabian *salwar kameez*, a very long shirt and pants.

The 554th further prepares junior leaders for combat by coordinating directly with the Engineer Branch to attain slots for the Ranger School, Sapper Leader Course, and Airborne School, just to name a few. The battalion has been successful in these courses and continues to strive to get lieutenants in other courses to better prepare them for their units. Other courses being planned for lieutenants to attend are the Cavalry Leaders Course and the Bradley Leaders Course.

Teaching, coaching, and mentoring are still the foundations upon which we train and educate leaders for our Regiment. The 554th Engineer Battalion is totally dedicated to ensuring that officers it trains are as prepared as it can possibly make them—for your unit, the Regiment, and the Army.



Lieutenant Colonel Howley is the Commander, 554th Engineer Battalion, and Chief, Department of Instruction, US Army Engineer School, Fort Leonard Wood, Missouri. He previously served with the 130th Engineer Brigade, Camp Victory, Iraq; 1st Cavalry Division, Fort Hood, Texas; 3d Infantry Division, Schweinfurt, Germany; and the 10th Mountain Division, Fort Drum, New York. He holds a master’s in human resource development from Webster University.





Using Topographic Engineering to Achieve Dominance in Complex Urban Terrain

By Mr. Ken Bergman

US maneuver warfare concepts have been developed and used very effectively over the past three decades to achieve unprecedented levels of success in Operation Desert Storm in 1991 and Operation Iraqi Freedom in 2003. Much of the combat in these conflicts entailed operations in open and rolling terrain. The reason we dominate maneuver in such terrain is largely due to the fact that we dominate the information in that environment, and we are able to deploy weapons systems and maneuver platforms that overcome threat forces before they can interdict our forces.

In contrast, complex urban terrain presents a more challenging operating environment in that threat forces can get closer to our soldiers before we can bring superior combat power to bear. Unless we are properly prepared, threat forces can make devastating attacks on our units in this type of terrain. The threat can employ explosive devices and snipers to hit allied targets of opportunity and can also employ suicide bombers in vehicles.

Information dominance and dominant maneuver are harder to achieve in urban terrain, but there are measures we can take to give our soldiers important advantages. Engineer solutions include physical measures to interdict threat forces, such as countermine operations and building barriers, as well as command and control (C2) measures that can enhance our information dominance. This article focuses on how the topographic engineering component of information dominance helps achieve dominant maneuver in complex urban terrain.

C2 capabilities are closely associated with any information dominance solutions. The “observe, orient, decide, act (OODA) loop” is a simple model for understanding C2¹. The OODA loop is used unconsciously by competing opponents. The Army military decision-making process is a very detailed version of the OODA loop. At a very basic level, the OODA loop can be compared to a boxing match: A combination of speed and a variety of different punch combinations (as well as defensive parries)—delivered at a high tempo—can rapidly overcome an opponent. Extrapolate the OODA loop to a brigade or higher echelon, and the level of complexity of

divergent decision trees grows exponentially. Geospatial information and services (GI&S) provide the foundational basis for C2 decisions in all phases of the OODA loop, helping soldiers understand the lay of the land and act on that understanding, in both open and rolling terrain and complex urban terrain.

Solutions Available Now

Combat field commanders are very focused on rapid solutions to meet their C2 needs during their tenure of field command (typically two years). There are several topographic engineering tools available today that can help soldiers achieve a better understanding of the terrain and make better decisions. Each of these capabilities can be employed to help warfighters achieve assured mobility in complex urban terrain with an accelerated and more effective OODA loop.

Urban Tactical Planner (UTP). This is a useful tool for terrain understanding, but many people are still unfamiliar with this very capable, user-friendly product. It is a planning tool intended to support military operations on urban terrain (MOUT). UTP provides an overview of the urban terrain in the form of maps, imagery, elevation data, perspective views, handheld photography, video clips, scanned building plans, tables, and text. It provides three-dimensional (3-D) visualization of key aspects of the urban environment—including buildings, roads, railroads, streams, forests, marshes, water bodies, and vertical obstructions (see Figure 1, page xx). UTP is intended for rapid dissemination on a compact disk (CD) and Intelink-S. The product can be built on short timelines to meet contingency planning requirements as they arise.

TerraExplorer® is a software package used to run UTP. The TerraExplorer viewer file runs on any laptop or personal computer, with no license fees; it can therefore be copied as often as needed and disseminated to as many users as required. Dissemination in the field is limited only by security procedures. UTP allows users to view the terrain numerous times before deploying to an area. The US Army Corps of

Engineers® Engineer Research and Development Center (ERDC) Topographic Engineering Center (TEC) builds and disseminates UTP over many key urban areas.

TEC builds a separate custom product (regional fly-throughs) that use the same TerraExplorer software found in UTP. This standalone product uses elevation data, imagery, feature data, and annotated points of interest to provide users with terrain understanding over a large area (hundreds of miles). Regional fly-throughs can consist of a single country or an entire region. Like UTP, the regional fly-through is easy to use and runs on any laptop or personal computer. It can be disseminated using a DVD or a Firewire (external hard drive), depending on file size. It can be copied for as many users as needed, without cost, subject to security procedures.

Improvised Explosive Device (IED) Detection – BuckEYE.

Finding IEDs in complex urban terrain is a challenging task, and geospatial technology is part of the solution. Many initiatives are in the planning phase or are going through research, development, and engineering processes. The BuckEYE program has shown significant success in theater. Details regarding the program are available from TEC.

Handheld Geographic Information System (GIS) Personal Digital Assistant (PDA). GI&S tools have advanced to the point where they can now be deployed on Global Positioning System-enabled PDAs. Cutting-edge PDAs in the field today enable users to digitize important features (such as road and bridge information, minefields, and obstacles). These PDAs are an early instance of the soldier as a primary source of digital terrain data. It has been said that every soldier is a sensor. Handheld PDAs with embedded geospatial software enable the Army to implement this tenet in digital form.

Terrain Team Support. Terrain teams are the critical links between GI&S technologies and ground warfighters. The Army has fielded terrain teams with world-class GIS capabilities down to the brigade level. Army terrain teams are able to build rapid-response products that lead to terrain understanding, which is a key component of information dominance. The Digital Topographic Support System (DTSS) is the C2 system used by Army terrain teams. The DTSS is supported by the Combat Terrain Information Systems (CTIS) project office. Terrain teams produce customized terrain analysis products, 3-D fly-throughs, perspective views, masked area plots, line-of-sight analyses, and hard-copy printouts of custom geospatial products. Terrain teams in theater have been developing new methods to address the complex nature of urban terrain with cutting-edge analysis tools. Additional capabilities are provided using reachback to terrain teams at higher echelons (division and corps), theater-level Army assets (Theater Geospatial Database), TEC, and the National Geospatial-Intelligence Agency (NGA). Each level provides support to terrain teams at the “pointy end of the spear.” TerraExplorer software was recently delivered to the terrain teams, so they are now able to edit existing UTP products and regional fly-throughs and to build their own fly-throughs in theater from source data.

It is essential that we continue to sustain these teams with current, updated hardware and software and—more importantly—with trained, motivated soldiers who can make innovative products in the field to support the warfighter, thereby supporting information dominance. It is also essential that these teams remain tightly linked to reachback assets to ensure that they have the very best possible products available to the maneuver element.



Figure 1. Urban Tactical Planner

Solutions Available in the Future

New technology solutions will give soldiers increased information dominance in the future. Some of these efforts are available today in the commercial world and need to be packaged for use in the field. Other capabilities are still in the initial stages of development.

Light Detection and Ranging (lidar) Systems. Lidar uses an active energy source (laser) to find the range to a distant object. (This is similar to radar, which uses radio waves to detect distant objects.) Using the laser time of flight and precise location of an airborne or vehicle-mounted lidar sensor, this system can be deployed to collect extremely accurate elevation data (1-meter post spacing or better). This is a mature technology that is used throughout the developed world for detailed terrain understanding and analysis. For example, cellular telephone companies can use lidar elevation data to find the optimal locations for towers to maximize communications coverage for their customers. In the tactical world, this data set can be used to build a number of useful products, to include detailed 3-D fly-throughs and line-of sight analyses; identify ambush sites, dead space, and avenues of approach; and generate detailed feature data (see Figure 2).

Important engineering tasks can be accomplished using lidar, to include repair of buildings and precise estimates of

volume and mass in a small hill of gravel or other material. For example, ground-based lidar was used to measure the size of granite slabs used to repair the Pentagon after 9/11, and airborne lidar was used to estimate the amount of material to be removed from the Twin Towers site in New York City. Applications for lidar in the tactical environment are readily apparent.

Urban Terrain Information Constructs (UTICs) - Battlespace Terrain Reasoning and Awareness (BTRA). This program is developing automated terrain reasoning tools for use on digital C2 systems. BTRA uses feature data with embedded attribution ("right-click") data and elevation data to provide live course of action (COA) analyses. The BTRA program has produced some useful cross-country tools for warfighters for real-world applications. Emerging BTRA developments are providing advanced, dynamic terrain reasoning tools to aid in the preparation, management, and assimilation of observation, cover and concealment, obstacles, key terrain, and avenues of approach (OCOAs), as it relates to intelligence preparation of the battlespace. The intent is to use both coarse and fine terrain data sets to build tools that will help achieve assured mobility.

UTICs is an initiative to build BTRA-like tools for terrain reasoning in the urban battlespace. UTICs will gain major

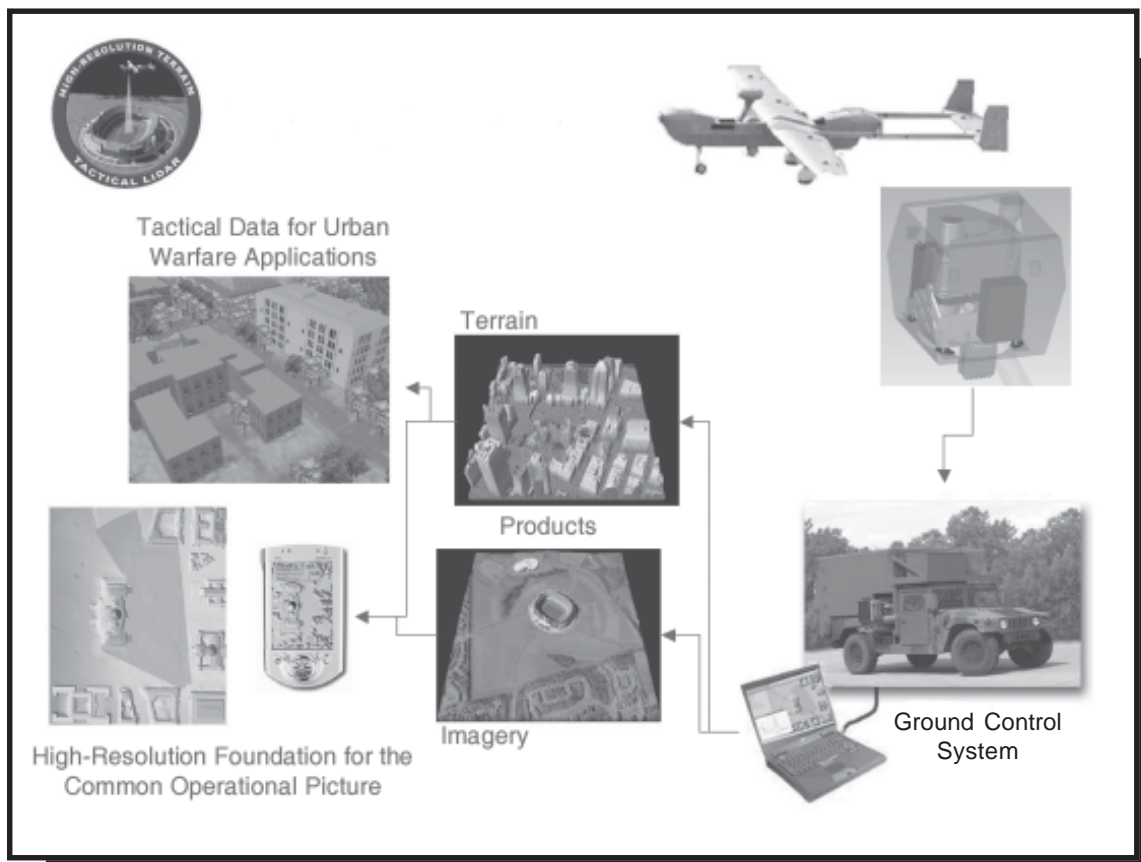


Figure 2. Tactical Lidar

computational efficiencies for dynamic situational understanding of the effects of urban environment by reasoning against critical geospatial aspects of urban terrain. By representing the complex urban terrain as network- and object-based abstractions, soldiers will be able to rapidly make tactical decisions in a changing tactical environment, thereby increasing their pace of C2 decision making (achieving a faster OODA loop). Immense efficiencies can be gained in both the computation time required to perform COA analyses and the bandwidth requirements for transmitting/sharing decision support data. These geospatial capabilities will also provide a framework to support management of cultural and civil information that will be needed to support COA analyses demanded by the command requirements of the “3-block war.”

UTICs endeavor to explore both the establishment of an abstract representation of urban environments (as well as develop the tools that will analyze the militarily relevant aspects of it) and the means to disseminate dynamic information to platforms on the move (working within communications bandwidth limitations).

3-D Solid Terrain Models. TEC is building solid terrain models of several cities, with imagery embedded in the models, for numerous customers. Individual 3-D buildings are “stood up,” and avenues of approach are clearly visible and can be examined from various angles. These hard-surface models are produced using computerized elevation data linked to a machine that deposits layers of plaster that represent buildings. Colored plaster is deposited to represent imagery overlaid on the buildings. The plaster model is then hardened so it can withstand normal handling by users. These tools are different from digital 3-D fly-throughs, since users can handle the model, view the terrain from different angles, and brainstorm contingencies in a group setting. Many users employ this tool—in addition to computer-based visualization—to achieve better terrain understanding.

Joint Geospatial Enterprise Service (JGES) – Army Prototype Program (APP). This is an initial effort to leverage and integrate distributed geospatial capabilities to support the warfighter. The JGES-APP architecture includes a central hub at TEC with connectivity to field sites (such as the Terrain Visualization Center at Fort Leonard Wood, Missouri) and overwatch support for deployed units in theater. Specific goals in the JGES-APP include understanding how to provide reachback support to field units; conflation (merging) of disparate terrain databases; dissemination of new products using limited bandwidth; and archiving and reuse of terrain data generated in the field. The JGES-APP is an early instance of enterprise GI&S support to the field

Conclusion

While American forces have achieved phenomenal success in dominating open and rolling terrain, today’s soldiers face significant challenges in complex urban terrain. Information dominance can help

overcome these challenges. GI&S capabilities provide a foundational aspect for our forces to achieve a more rapid and effective C2 decision cycle (OODA loop). Several tools are available for use today, while others are emerging from technology development programs. It is imperative that we understand and employ appropriate geospatial assets to achieve assured mobility in complex urban terrain.



Mr. Bergman, a member of TEC, is assigned to Fort Leonard Wood, Missouri, where he supports the TRADOC Program Integration Office for Terrain Data. A Naval Academy graduate, he has a master’s in systems engineering from George Mason University, and is a former Marine.

Endnote

¹ The OODA loop is an information strategy concept for information warfare that was developed by Air Force Colonel John R. Boyd (1927-1997). He was instrumental in explaining and disseminating the concept of “cycle time” and “getting inside the adversary’s decision cycle.”



Attention Units!

Many post offices will not deliver mail without a street address. Please contact us to update your mailing address if the one we are using for you does not include a street address. Include the old address and your telephone number, as well as the corrected address, and email to engineer@wood.army.mil.



Warrior Ethos, Tasks, and Drills: Spiraling Into Initial-Entry Training

By Major Janet Kirkton

*"This complex operational environment offers no relief or respite from contact with the enemy from the lowest end of the spectrum of conflict to the highest. Soldiers are and will be under great stress, physically and psychologically, no matter what their rank, specialty, or location on the battlefield. Given this reality, all soldiers must be prepared to close with and destroy the enemy—all soldiers must be warriors first."*¹

*"With an Army at war, it's critical that every Soldier, upon graduation from initial-entry training be prepared for combat. We've increased the rigor, and that puts additional demands upon our drill sergeants. But it's worth it for the men and women of this great country to have the skills and the intestinal fortitude to go forward and fight, right out of advanced individual training."*²

Warrior Tasks and Drills

Deriving operational lessons learned almost on a daily basis, the primary focus in the institutional training base and initial-entry training (IET) has shifted dramatically within the past 12 months. Given the harsh demands of campaigns in Iraq and Afghanistan and the complex terrain, IET graduates must be competent and confident immediately upon graduation. Bottom line: All soldiers must be warriors first and technical experts second.

Toward this end, the training base has been directed to increase rigor and implement a training strategy that inculcates the Warrior Ethos, and as resources are made available, spiral in the warrior tasks and battle drills. As the term spiral implies, each training cycle—one-station unit training (OSUT) and advanced individual training (AIT)—will advance to a higher level until IET produces soldiers who can perform successfully in combat.

The fundamental changes in IET are a result of Task Force Soldier. General Peter J. Schoomaker, Chief of Staff of the Army (CSA), initiated Task Force Soldier in September 2003 for the purpose of equipping, training, and instilling the Warrior Ethos in soldiers. The CSA wanted to focus the Army's efforts on winning the Global War on Terrorism. He also wanted to ensure that training being conducted within the institutional training base was relevant and that every measure was being taken to prepare soldiers for combat.

Under the direction of Brigadier General Benjamin Freakley, a Warrior Task Site Selection Board was assembled, with the primary purpose of defining the goals of Task Force Soldier. One of the goals was compiling a list of essential tasks and drills in which all soldiers must be proficient. As recent history

has taught us, many soldiers finish IET and deploy within 30 days to a theater of operation. As a result, the selection of these tasks and drills was critical.

The final product of the Warrior Task Site Selection Board's labor is collectively known as the warrior tasks and drills (WT&D). The intent is to train the WT&Ds during basic combat training or OSUT. Although training these WT&D has already been initiated, the program of instruction (POI) and training support packages continued to be refined. In addition, soldiers will receive reinforcement training on these tasks and drills during AIT.

Warrior Ethos

Another key initiative is the inculcation of the Warrior Ethos into IET. FM 7-0, *Training the Force*, gives the following definition for Warrior Ethos: "Warrior Ethos compels all soldiers to fight through all conditions to victory no matter how long it takes and no matter how much effort is required. It is the soldier's selfless commitment to the nation, mission, unit, and fellow soldiers. It is the professional attitude that inspires every American soldier. Warrior Ethos is grounded in refusal to accept failure. It is developed and sustained through discipline, commitment to the Army values, and pride in the Army's heritage".³

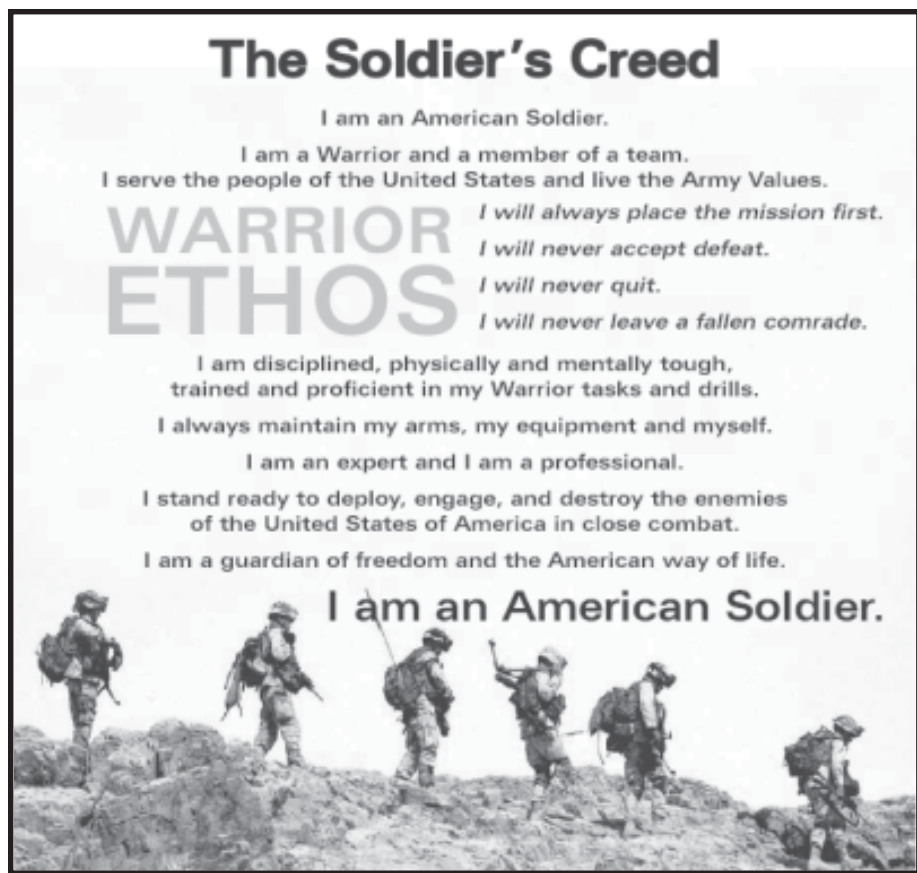
Warrior Ethos is partially defined by the Army as "...a renewed spirit of fight, teamwork, and commitment. Its tenets, "We will never leave a fallen comrade behind," "We will never

quit," "Mission first," and "Every soldier is a warrior"—which are part of the Soldier's Creed—are now at the foreground of training at every level in the Army. These tenets—often hidden in the background of day-to-day occupational skill duties—are now first priority for soldiers. Warrior Ethos is part of increasing the quality of our soldiers in IET and across the force.

The Soldier's Creed has been redesigned and has become more than a catch phrase here at Fort Leonard Wood. It is painted on dining facility walls, hung in offices and barracks, included in PowerPoint® presentations, and recited during inspections and graduations. It transcends IET boundaries into the leadership of the brigade. In addition, the Soldier's Creed is anchored around the Warrior Ethos, which states that we are soldiers first.

"The Warrior Ethos is about being a Soldier first; always a Soldier. It's not about being an infantryman; it's about being a Soldier. It's about Soldiers who can fight and win, who can close with and destroy the enemy, who can engage and kill an enemy in close combat if they have to."⁴

Although the clear focus within TRADOC is on training and developing combat-ready warriors, the Engineer Regiment will not be gaining soldiers less proficient in their technical skills. Instead, the Regiment can expect to receive engineers—regardless of military occupational specialty (MOS)—from the training base that are just as technically proficient and better prepared for combat operations than their predecessors of



just the past several months. Specifically, future graduates of IET will be—

- More experienced with US weapons (M16s, MK19s, M2s, M240Bs, and the Engagement Skills Trainer [EST 2000]).
- Physically fit, courtesy of the standardized physical fitness program.
- Trained to level 1 in combatives.
- More proficient in detecting explosive hazards.
- More proficient in operating in complex and urban terrain.
- More experienced in a field training environment.
- More experienced with convoy live-fire procedures.
- More confident and committed to the ideals espoused within the Soldier's Creed.

In addition, other initiatives in training will transform IET as shown in the table below.

Changes in Engineer IET

OSUT (MOS 21B/21C) - Mission

Task Force Sapper and Bridger transforms volunteers into American soldiers, instilled with the Warrior Ethos, through rigorous and relevant training in basic combat and engineer skills, producing disciplined and MOS-qualified 21B combat engineers and 21C bridge crewmembers who are prepared for combat.

As part of OSUT, combat engineers will train the WT&Ds during the execution of the 14-week POI, without any additional time spent at the training base. As a result, there is a significant increase in training in the field; on checkpoint, urban, convoy, and patrol operations; on combatives; and on land navigation. The training units will also initiate a weapons immersion program, with the overall intent of increasing the familiarity, accountability, and comfort level of IET soldiers with their assigned weapons. To the greatest extent possible, soldiers will carry their weapons with them at all times.

Explosive hazards training is also taught to all engineer soldiers. The primary focus of this training is on detection by visual means of both improvised explosive devices (IEDs) and

unexploded ordnance (UXO). During the conduct of this training, soldiers perform an engineer reconnaissance during IED lane training, followed with reinforcement training during a field training exercise (FTX). As part of this training, the soldiers also execute reaction to attack, including casualty evacuation.

All MOS 21B OSUT soldiers also receive 3 days of urban breaching training, which includes three breaching techniques. The *manual technique* prepares soldiers to breach doors, windows, and walls. The *ballistic technique* involves using a shotgun to breach a door. The *explosive technique* uses the silhouette charge, C-charge, water charge, and window charge.

In addition to the WT&Ds, the 21C POI will continue to improve in the near future. With the fielding of new equipment, new training development products must be continually produced. As an example, all 21C OSUT soldiers will begin training on the dry support bridge by the third quarter of fiscal year 2005. A task site selection board is needed for this course, and the US Army Engineer School plans to hold this in conjunction with the Warfighter Symposium. (See article on page xx.)

The training highlight for engineer OSUT is the combat engineer field training exercise (CEFTX), which is the culminating event of the course. This exercise is 5 days/4 nights spent in the field, focused on assessing individual soldier tasks. Training highlights of this event include convoy resupply, movement to contact, security patrol, secure an objective, enter and clear a building, 4-hour mission-oriented protective posture exercise (MOPPEX), react to contact, react to ambush, avoid ambush, react to indirect fire, react to chemical attack, duplicate and military operations in urban terrain (MOUT) tasks.

Engineer AIT – Mission

Task Force Horizontal continuously transforms basic combat training graduates at Fort Leonard Wood, Missouri, and Panama City Beach, Florida, into technically competent, values-based, teamwork-oriented Career Management Field 21 soldiers (21E heavy construction equipment operator; 21F crane operator; 21J general construction equipment operator; 21G quarrying specialist (Reserve only); 21V concrete and asphalt equipment operator; 21D diver; and 62B construction

Initial-Entry Training Transformation	
FROM	TO
Graduating soldiers who are ready to join a unit	Graduating soldiers ready to win and survive in combat
Conducting garrison-oriented training	Conducting field-oriented training
Focusing on drill and ceremonies	Focusing on tactical movements and combat drills
Passing the Army Physical Fitness Test	Increasing campaign endurance, combat fitness, and combat drills
Qualifying on the M16 rifle	Employing weapons found in units
Learning soldierization and the Army Values	Learning soldierization, Army Values, and the Warrior Ethos

equipment repairer), who are prepared to contribute on Day One in their first unit of assignment in a contemporary operating environment.

Task Force Vertical continuously transforms basic combat training graduates at Fort Leonard Wood; Sheppard Air Force Base, Texas; Gulfport, Mississippi; Goodfellow Air Force Base, Texas; and Fort Belvoir, Virginia, into technically competent values-based, teamwork-oriented soldiers (21R interior electrician; 21T technical engineer; 21K plumber; 21W carpentry and masonry specialist; 21M firefighter; 21L lithographer; 21S topographic surveyor; 21U topographic analyst), who are prepared to contribute on Day One in a contemporary operating environment.

Regardless of MOS, all engineer soldiers will receive reinforcement training on the WT&Ds as an addition to their current POI. In fact, all MOSs—except the 21Ds and 21Ms—will return to Fort Leonard Wood to conduct this reinforcement training as the culmination of their IET experience. Although extremely important and critical to the success of our soldiers in combat, this initiative presents quite a significant challenge in its execution. Given the multitude of MOSs that must be trained, and the number of engineer soldiers trained on an annual basis, the brigade must conduct an AIT FTX every week, except for the two weeks during Exodus. As mandated by TRADOC, all those MOSs whose courses exceed 6 weeks in length will also requalify on the M16.

In order to execute this training, engineer AIT soldiers will go through battle-focused training (BFT) rather than common engineer training (CET). The resources associated with CET will be transformed in order to execute BFT. Initially, this training will remain 5 days, but will grow to 8 training days by fiscal year 2006. Additionally, to capitalize on their technical training and prepare them for combat operations, soldiers will attend BFT after their MOS technical training. Although soldiers are already executing BFT, most are still doing so before their technical training. However, the transition of BFT to post-technical training began in the second quarter of fiscal year 2005. The goal is to be completely online with this initiative by the start of the next fiscal year.

In addition to M16 requalification, some additional training highlights of BFT include forward operating base procedures, checkpoint operations, vehicle operations focused on IED defeat, urban operations, movement to contact, convoy live fire, crew-served weapons reinforcement, and 48 hours of field training.

As indicated by the training listed above, there are substantial resources being allocated to the training base. In support of the WT&Ds, numerous forward operating bases, MOUT sites, a convoy live-fire range, and other ranges and



Task Force Sapper soldiers conduct MOUT operations during a CEFTX.

training areas are being constructed at Fort Leonard Wood. In addition, we are receiving new equipment, weapons, and the additional time to train.

As the Warrior Ethos and WT&D continue to spiral in at a rapid pace, Fort Leonard Wood's 1st Engineer Brigade is committed to producing engineer soldiers that are world-class. As the Regiment, we expect you will notice a difference in these men and women who will be joining you. A significant investment is being made to ensure that our IET graduates are ready. As the brigade responsible for their training, we stand ready to take your comments and feedback as to our success.



Major Kirkton is the Brigade Operations Officer, 1st Engineer Brigade, Fort Leonard Wood, Missouri. She has had numerous assignments, including Assistant Professor at the United States Military Academy and Chief of Engineer Doctrine, US Army Engineer School, Fort Leonard Wood. She is a graduate of the Command and General Staff Officers Course at Fort Leavenworth, Kansas, and holds a master's in education from the University of Virginia.

Endnotes

¹ Warrior Ethos Web site at <<http://www.tradoc.army.mil/pao/TNSarchives/March04/036504.htm>>.

² General Kevin P. Byrnes, Commanding General, US Army Training and Doctrine Command, June 2004.

³ Field Manual 7-0, *Training the Force*, 22 October 2002.

⁴ General Byrnes, February 2004.



Task Force Trailblazer: Providing Assured Mobility

By Major Paul D. Harron

Task Force Trailblazer is an adaptation of a long-standing engineer mission—providing assured mobility. During Operation Iraqi Freedom, the primary obstacle to assured mobility for US and coalition forces is the improvised explosive device (IED). IEDs are improvised mines, and Trailblazer performs nonstandard minefield clearance.

The Task Force Trailblazer mission was originally conducted by the 14th Engineer Battalion (Corps)(Wheeled), a multicomponent battalion with three Active Army companies and one Army National Guard company. The battalion was respected theaterwide for its efforts in keeping the main and alternate supply routes safe. It established tactics, techniques, and procedures (TTP) that were passed on during a relief in place with the 141st Engineer Battalion (Corps)(Wheeled), North Dakota Army National Guard, in April 2004. In Iraq, the 141st is attached to the 264th Engineer Group, Wisconsin National Guard, which directly supports the 1st Infantry Division.

Mission

Trailblazer involves clearance and sanitation of main and alternate supply routes to provide assured mobility for 1st Infantry Division elements.

Clearance, which is observing and removing possible IEDs and unexploded ordnance (UXO), is performed on both sides of the road and the median, if applicable. When specialized equipment is used, it covers 4 meters of the roadway. A foot patrol covers as much as 300 meters of the roadway.

Sanitation involves identifying and eliminating potential IED emplacement sites and hide sites used by anti-Iraqi forces. There are two types of sanitation: hasty and deliberate. *Hasty sanitation* is the removal of debris and trash within 5 meters of the roadway to reduce the ability to disguise an IED. *Deliberate sanitation* is a more extensive effort that focuses on the area within 300 meters of the roadway. Conducting this type of sanitation denies the enemy the ability to conduct



Charlie Company, 141st Engineer Battalion, conducts a patrol near Baqubah, Iraq.

attacks from well-disguised positions. Deliberate sanitation in this type of environment requires a combined arms effort; it is necessary to have maneuver support to provide security as sanitation operations are conducted. The enemy, just like in a traditional battlefield, looks for favorable terrain. In this type of environment, the enemy looks for terrain that allows him a tactical advantage for the emplacement of IEDs and the ability to hide and detonate them or provide an ambush overwatch.

Intelligence Support

Upon arrival into theater, the 141st prepared to receive its equipment, while an advance party traveled to Forward Observation Base Speicher to begin the relief in place. The battalion's S2 and S3 traveled north to conduct initial coordination for this process and familiarize themselves with the terrain. During this initial visit, the unit realized the critical nature of intelligence in the assured mobility fight—so critical that the S2 remained in Iraq to continue to learn mission, enemy, terrain, troops, time available, and civilian consideration (METT-TC) for Trailblazer.

As in any operation, intelligence plays an important role in determining the task organization. It became evident that enemy actions and terrain would drive the battalion's efforts to reduce and eliminate IEDs within its area of operations. Using METT-TC analysis, named areas of interest (NAIs) were established that allowed Trailblazer patrols to focus their efforts. The contemporary operating environment (COE) teaches

that the enemy is a learning and changing enemy. This requires constant reevaluation and adjustment of TTP in order to remain effective in the counter-IED fight and keep our soldiers safe.

Anti-Iraqi forces initially surface-emplaced IEDs, which were easy to identify visually. These IEDs were also command-detonated with a visible wire leading to the anti-Iraqi force member with the detonator. As Operation Iraqi Freedom continued, IEDs became more sophisticated. Anti-Iraqi forces started burying IEDs and remotely detonating them. Now the 141st looks for an antenna sticking out of the ground, rather than a round with wires running from it, which makes the task more difficult. As this TTP developed, an Interim Vehicle-Mounted Mine Detection (IVMMD) System was included in our patrol set. The IVMMD System allowed soldiers a greater level of force protection and the ability to detect mines by



A soldier places charges on UXO found on a Trailblazer Patrol.

more than visual observation. As the enemy changes, so does the mission, so the ability to be flexible is critical to success.

The battalion's initial equipment set used high-mobility multipurpose wheeled vehicles (HMMWVs) and 5-ton dump trucks, which were effective for identifying IEDs. Additionally, M1114 up-armor HMMWVs and add-on armor kits for HMMWVs improved safety while conducting route clearance operations.

Combined Arms Effort

Task Force Trailblazer truly needs to be a combined arms effort. Due to the constant presence required on the roadways to be effective, it is critical to have good relationships with the task forces that own the terrain, as well as with air assets, if they are available.

One of the most important lessons the 141st learned from the 14th was the importance of face-to-face coordination with the landowning task forces. While conducting Trailblazer, there were many occasions when it was necessary to call a task force to assist a Trailblazer patrol with quick reaction forces (QRFs). Coordination ahead of time was essential.

During Operation Iraqi Freedom, explosive ordnance disposal (EOD) teams, who dispose of the IEDs, were located with the task forces. The task force QRF is responsible for escorting the EOD teams to the site. To reduce the possibility

of fratricide, the task force must know that Trailblazer is in its battlespace.

Another consideration in the combined arms fight is the need for mechanized and armor support for our patrols. By integrating these assets into patrols, it is possible to take a more active stance when engaged by the enemy. There were also several occasions when Trailblazer relied on air QRF to support operations when Trailblazer elements were attacked.

Conclusion

As we enter the next phases of Operation Iraqi Freedom, there will be several changes in Task Force Trailblazer operations. The most notable is that the task force is beginning to train Iraqi security forces to conduct route clearance operations. Initially, it includes joint patrols to ensure their capability and safety. As Iraqi forces become more confident, it is likely that the Trailblazer mission will expand to include patrols by Iraqi forces on their own. There are many hurdles on the way to making this transition, but the goal is a free Iraq, capable of maintaining democracy. To achieve this, the Iraqi people must take ownership and pride in their own country.



Major Harron is the intelligence officer for the 141st Engineer Battalion, deployed to Iraq in February 2004. His past assignments include battalion S2, air defense artillery platoon leader, executive officer, communications officer, and S4. He holds a bachelor's in criminal justice studies from the University of North Dakota.



A soldier from Bravo Company, 141st Engineer Battalion, carefully handles a remote detonator from an IED.

Endnote

¹Task Force Trailblazer is the brainchild of Colonel Christopher J. Toomey of the 555th Engineer Group—now the 555th Maneuver Enhancement Brigade (Provisional), 4th Infantry Division (Mechanized). During Operation Iraqi Freedom, Colonel Toomey identified the need for assured mobility due to intelligence and enemy tactics that were being used, primarily the IED.

This article is dedicated to four engineer soldiers who lost their lives while conducting the Task Force Trailblazer mission. They are Specialist Phil Brown, Specialist James Holmes, Staff Sergeant Lance Koenig, and Specialist Cody Wentz.

IED Defeat

Observations from The National Training Center

By Lieutenant Colonel Thomas H. Magness

There is no silver bullet. Try as we might, there is no single tool capable of defeating the use of improvised explosive devices (IEDs) on the battlefield—whether in Iraq, Afghanistan, or at the National Training Center (NTC). No amount of armor plating or distribution of electronic countermeasure (ECM) devices will guarantee the safety of our soldiers and the freedom of maneuver of our forces. Old school thinking assumes that the enemy will be successful and friendly forces must be prepared to react—at the point of blast.

Leaders at all echelons who seek *proactive* IED defeat solutions should consider the following nine observations. Based on trends at NTC and framed by the fundamentals of assured mobility, they are a combination of those things that engineer units and leaders (as part of combined arms teams) do well, and must sustain—and do not do well, and must improve. They all carry with them a consistent theme: skills and tools. These are the elements that make engineer soldiers unique. They are the special “brand” that are applied across the entire combat team by those whose principal focus from sunup to sundown is enabling mobility in concert with maneuver. They produce a mentality that resonates throughout the entire formation: *We are all soldiers. We are not all infantry. We are uniquely skilled and equipped for some specific, challenging missions to include addressing the No. 1 threat to the mobility of the force—IEDs. We are combat engineer sappers!*

Predict. Predict actions and circumstances that could affect the ability of the force to maintain momentum.

Observation No.1: Prediction begins with rigorous pattern and terrain analysis.

Databases of IED events must be linked vertically and horizontally. They must be searchable and queryable to facilitate analysis at the tactical level. This is not something that is reserved for some theater-level intelligence cell. The need for real-time intelligence and enemy patterns requires tactical-level information management systems and leaders comfortable with the exploitation of this analysis. There is clearly more we can and must know about the enemy and how he fights. Tactical leaders must demand accurate and consistent reporting from every IED incident, as well as every route reconnaissance and clearance mission. Pattern analysis is only as good as the data that feeds it. At a minimum, tactical reports must include the location; date/time; friendly target; IED

components; initiation system; friendly/enemy battle damage assessment (BDA); friendly/enemy actions; names, descriptions, and addresses of suspected or known insurgents; and observations and key lessons learned.

Our terrain analysis must be focused to facilitate not only “seeing the terrain” but also “seeing the enemy (who is using IEDs...on the terrain.” Our own observations at NTC indicate an erosion of terrain visualization skills and of confidence in our visualization tools. Soldiers and leaders must be able to use tools such as TerraBase, FalconView™, Digital Topographic Support System (DTSS), and Urban Tactical Planner to identify terrain that favors the enemy’s use of IEDs. They must be able to import imagery, video, and digital products to facilitate real-time “change detection” (the ability to identify differences and possible IED indicators along or adjacent to a route). Topographic products must allow the commander to see the enemy’s patterns of IED employment on the terrain that favors their use. As new tools are developed for urban terrain visualization, engineers must be the terrain visualization masters. (See articles on pages xx and xx.)

Observation No.2: Conduct postblast reconnaissance.

Too often our IED event databases lack the necessary information to facilitate detailed analysis. We cannot miss the critical step of postevent analysis. Determine the necessary components of postblast reconnaissance and train our engineer soldiers, if not the entire combat formation, on the fundamentals of this requirement. This is evidence collection—a technical reconnaissance task, not higher-level analysis such as that conducted by an EOD technician. Units regularly leave the blast site and assume that the already-stretched EOD assets cannot accomplish this low-priority task. There is much to be gained from each event if a trained analyst has access to digital photographs, measurements, residue, detailed reports, and patrol backbriefs. Again, the output from our enemy pattern analysis is only as good as the input.

Detect. Detect early indicators of impediments to battlefield mobility, and identify solutions through the use of intelligence, surveillance, and reconnaissance (ISR) assets.

Observation No.3: Follow the rules of Reconnaissance and Surveillance (R&S) 101.

Pattern and terrain analysis, along with other intelligence products and data, must result in a focused tactical R&S plan. This is no change from the way we have conducted tactical

operations for years. Areas in which the terrain favors the enemy's use of IEDs, and that are consistent with previous patterns, become named areas of interest (NAIs). Observers (scouts, patrols, unmanned aerial vehicles [UAVs], and aerial observers) must be specifically tasked to answer IED-specific priority intelligence requirements (PIR). Command posts manage the execution of this focused R&S plan and provide vertical and horizontal situational awareness of the results. Similarly focused targeting processes must result in PIR/NAI/observer linkages tied to proactive reconnaissance of IED recruiters, trainers, suppliers, financiers, bomb makers, and leaders in the IED "food chain." We do not need new doctrine in this area—we need the focus and execution embraced by our current field manuals.

Engineer staff officers bring focus to this process. Engineer leaders leverage all of the reconnaissance tools and special equipment within their respective organizations (see Figure 1). Terrain visualization products are developed to facilitate the proposed observer plan. Patrol debriefs and other intelligence from subordinate units conducting route reconnaissance provide updates to the R&S plan as it is developed. The technical analysis of IED patterns; bomb making material; initiating systems; and enemy tactics, techniques, and procedures (TTP) help focus NAIs and observers at points far "left of blast."

Observation No. 4: Conduct focused route reconnaissance.

Each combined arms formation must have dedicated units in which unique skills and tools for the reconnaissance task reside. These units should be experts in the various reconnaissance and react-to-contact battle drills associated with this mission. They must know their route intimately from multiple repetitions of disciplined travel. They must be "human change detectors." They are drilled in the ways of the enemy

and regularly updated on enemy patterns and emergent friendly and enemy TTP. These units are the first to gain the skills associated with the Explosives Ordnance Control Agent (EOCA) course that spans the gap between combat units and EOD and are prepared to respond to some battlefield explosive threats. These units are the first to receive the equipment and associated training to conduct this focused task to include ECM devices, robotics, and mobile counter-IED technologies. These skills and tools cannot be randomly distributed across the formation. Nor can this critical reconnaissance mission be randomly assigned to units that lack the skills and tools for it. Engineer reconnaissance and clearance units and sapper organizations focused on these tasks must be formed, focused, resourced, and trained now.

The IED Task Force offers the following suggestions for preventing IED emplacement:

- Develop good relationships with the local populace.
- Coordinate with local police; conduct joint patrols.
- Use patrols, observation points, and checkpoints; deny access to key terrain.
- Use counter-IED—ambush teams and scout-sniper teams.
- Reduce availability of bomb making materials.
- Clean routes of trash, brush vegetation, and abandoned vehicles.

Prevent. Prevent potential impediments to maneuver from affecting the battlefield mobility of the force by acting early.

Observation No. 5: Focus your targeting.

The most effective way to prevent the effects of IEDs on friendly forces is to deny the enemy the opportunity to ever get an IED on the ground. Be proactive. Focus the targeting



Figure 1. Conducting route clearance in a Buffalo mine-protected vehicle

process on insurgents and enemy operatives associated with any link in the IED chain (see Figure 2). Use terrain and pattern analysis tools and products to focus operations to deny the enemy the use of key terrain to his advantage. Combined arms organizations must own their respective battlespace. Do not cede it back to the enemy.

Engineers must be engaged in the targeting process, especially at the brigade and task force levels. Masters of the terrain help planners visualize key areas for R&S. Engineer leaders bring a detailed understanding of key routes from repetitive reconnaissance by subordinate units. They also leverage a “family” relationship with the EOD community and bring an understanding of technical explosives issues to the targeting process, as well as current and projected EOD unit capabilities.

At NTC, the No. 1 predictor of the ability to prevent the enemy use of IEDs is the quality and depth of relationships within the communities of the friendly unit area of operations. Human intelligence networks will identify insurgents and the locations of their bomb making supplies. Local leaders will root out troublemakers within their towns and villages. Build and maintain efficient, two-way communication channels, and provide incentives for informants. Include these key relationship elements in the lethal and nonlethal targeting processes.

Avoid. Avoid detected impediments to battlefield mobility of the force, if prevention fails.

Observation No. 6: Develop and maintain information management systems.

Our ability to see first, understand first, act first, and finish decisively is directly related to our ability to develop and

maintain information management systems. The technology exists now to provide critical mobility information (route status, known and suspected IED locations, and enemy IED templates based on terrain and pattern analysis) as input into the common operating picture (COP). The Army Battle Command System (ABCS), when fully leveraged, gives commanders and leaders the ability to provide relevant, near-real-time information about the battlefield. Engineer leaders must consider the following:

- Do we have staff engineers at *all* task force and higher command posts to facilitate vertical and horizontal information flow?
- Do we have clearly understood reporting requirements and a headquarters empowered to demand timely and accurate reports from (maneuver and engineer) subordinate units?
- Do we have a common understanding of route status assessment criteria?
- Do route status changes result in action by maneuver units to confirm, deny, or mitigate the impediment to friendly maneuver?
- Are route statuses serving as input to the targeting and planning processes?
- How do we alert friendly units to the change of the mobility picture? Do we have redundant digital and analog means to alert all friendly units—to include adjacent and higher-echelon units operating in our battlespace?

Neutralize. Neutralize, reduce, or overcome (breach) impediments to battlefield mobility that cannot be prevented or avoided.

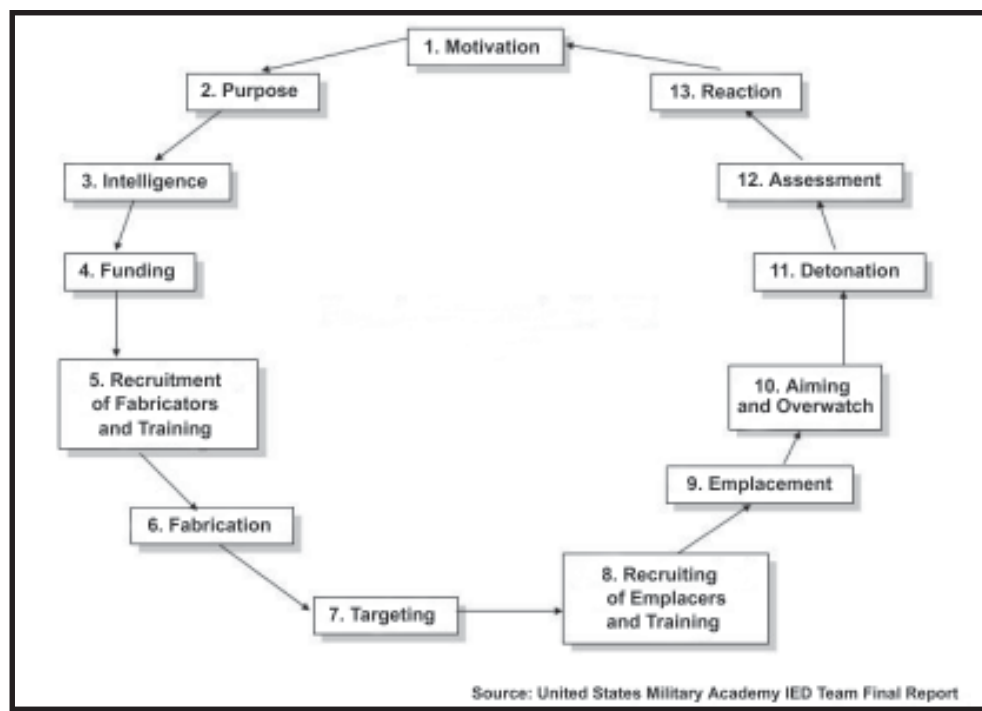


Figure 2. Components of an IED life cycle

Observation No. 7: Integrate EOD units into brigade combat team operations.

Maneuver units continue to be challenged with the integration of EOD units. For most organizations, whether deploying to NTC or into theater, the first opportunity to work with these professionals is upon arrival. Engineer leaders, as the closest “relative” to an explosives technician with whom most maneuver units will habitually train and work, must take some degree of ownership of EOD and its associated tactical mobility implications. Whether a combat engineer battalion or brigade troop battalion, there must be a node resourced and trained to be the socket into which units like EOD can plug. Engineer units and leaders must be comfortable operating with EOD units and accounting for their unique battlefield requirements.

Effective EOD integration requires a dedicated security element. EOD personnel cannot secure themselves during tactical employment for an IED event. The security force must be sufficiently briefed on known or suspected threats, well-rehearsed on all react-to-contact and IED event battle drills, and appropriately resourced with firepower and counter-IED tools for this critical mission. Units that approach the security requirement as a low priority or assign random units often regret having done so. Maneuver units are forced to “wait for EOD”—painful words for friendly forces who themselves become vulnerable in likely enemy target or ambush areas.

Protect. Protect against enemy countermobility effects.

Observation No. 8: Moving target versus a stationary threat.

At NTC, this is where we are seeing units having measurable success in countering the enemy’s intentions for his use of IEDs. Disciplined soldiers, realistic training, and the hard work of our noncommissioned officer corps are daily proving the value of these tactical considerations to protect the force:

- Treat every movement as a combat patrol. Prepare and rehearse accordingly.
- Be deliberate about the positioning of key systems and vulnerable team members within the formation.
- Maintain low profiles in vehicles and appropriate vehicle spacing within moving formations.
- Use all available protective gear, to include body armor, eye and hearing protection, and seat belts.
- Rehearse, rehearse, and rehearse. Prepare for reacting to all forms of contact. Ensure that all members of the patrol understand the mission, the threat, and all contingency plans. Assume nothing.
- Ensure that load plans are standardized and enforced. Tie down all loose equipment.
- Communicate—before, during, and after each combat patrol. Identify redundant means of communication along routes and within urban population centers.


- Identify all echelons of medical support available to the combat patrol. Resource combat lifesavers and medical personnel with the best available medical gear. Check and replenish all medical stocks immediately upon returning from each trip “outside the wire.”

Observation No. 9: Moving threat versus stationary personnel and facilities.

A desperate enemy is increasingly leveraging the vehicle-borne improvised explosive device (VBIED) against coalition forces. Friendly units must continue to maintain vigilance against a mobile enemy weapon that can be experienced anywhere on the battlefield. Key tactical considerations include standoff, while conducting operations such as patrols and checkpoints, and heightened situational awareness built on known VBIED indicators and enemy pattern analysis. Soldier discipline and the items mentioned above for combat patrols will also protect soldiers on the battlefield against a mobile threat.

Summary

Recent battlefield lessons have also been a classic opportunity to showcase “One Regiment, One Fight” and leverage the knowledge and expertise of the US Army Corps of Engineers® to protect facilities and equipment. Personnel at the Engineer Research and Development Center (ERDC) have done some terrific work to develop plans and specifications for hardening entry control points and vulnerable facilities. They have also tested a variety of materiel solutions, many of which are now being used to protect soldiers and their equipment. Fundamental considerations of material strength, explosive resistance, flame retardants, access control, standoff, and hardening—areas of expertise in various centers and cells across the Engineer Regiment—are daily proving their importance in protecting the force.

Observations at NTC confirm that successful units take a holistic, proactive, broad-based approach to IED defeat solutions based on the fundamentals of assured mobility. And while the various responsibilities nested within the fundamentals of predict, detect, prevent, avoid, neutralize, and protect are distributed across the combined arms team, it is the engineer—the Chief of Mobility—who pulls it all together and employs the tools and technologies, appropriately focused, to defeat the IED threat. There truly is no silver bullet, but there IS a silver castle! *Train the Force!* 

Lieutenant Colonel Magness is the Senior Engineer Trainer (Sidewinder 07) at the National Training Center, Fort Irwin, California. Prior to this assignment, he served as district commander for the Detroit District, US Army Corps of Engineers. He is a graduate of the United States Military Academy and the Command and General Staff College. He holds a master’s from the University of Texas and is a licensed professional engineer in Virginia.

Note: This article reflects the personal opinions of the author and are based entirely on lessons learned at NTC.

Countering IEDs and Explosive Hazards

By Mr. Robert G. Baker and Mr. Dorian V. D'Aria

As revealed in history, our military becomes increasingly better and more agile with each battle. Ours is the most dynamic and powerful country on this earth, because our military is willing to adapt and evolve. Change and advances in technology enable our country to continue to prosper and take the lead in the Global War on Terrorism. Since the Countermine Task Force was formed in 2001 (by the direction of the Commanding General, US Army Training and Doctrine Command [TRADOC]), the US Army Engineer School has been instrumental in developing the tools and skills needed to enable mobility through complex terrain and urban environments. This was accomplished while negating explosive hazards (EH) such as mines, booby traps, unexploded ordnance (UXO), and improvised explosive devices (IEDs). This article describes current initiatives and contains an overview of the collaborative agencies working to combat this threat.

The Countermine/Counter Booby Trap Center, which was created in January 2002, changed its name to the Counter Explosive Hazards Center (CEHC) in April 2004. The CEHC was formally recognized and approved by Headquarters, Department of the Army, on 18 November 2004 to function as the US Army integrator for all countermeasures involving EH (including mines, IEDs, and other EH that threaten US and allied forces). A key element is the prediction, detection, avoidance, and neutralization of EH, so commanders can



maneuver unencumbered through complex and urban terrain.

The CEHC provides expertise not provided elsewhere in the Army's institutional training base. Additionally, the CEHC bridges the gap between emerging warfighter requirements and institutionalized training. Based on comments and mission analysis from the field, the CEHC develops new or improved capabilities, as well as the requisite tools to equip our soldiers, to counter EH on the battlefield.

The CEHC conducts explosive hazards awareness training (EHAT) to deploying forces, develops EH countermeasures, conducts new equipment training for commercial-off-the-shelf equipment, produces training aids and programs of instruction, and assists in the identification and fielding of viable countermeasure solutions. In addition, the CEHC develops the intellectual and situational superiority of combat units through handbooks and new tactics, techniques, and procedures (TTP) to

Active Army and Reserve Component units, government civilians, contractors, other US services, and allied forces. The CEHC provides eleven courses, which are used to train approximately 4,000 students annually. Several are train-the-trainer-type courses to empower units to rapidly spread the latest TTP and engineer knowledge. Additionally, it assists with the integration of doctrine, organization, training, materiel, leader development, personnel, and facilities (DOTMLPF) assessments across the five tenets of IED defeat—predict, detect, prevent, neutralize, and mitigate—that were initially derived from the five fundamentals of assured mobility.

In addition to resident instruction, the CEHC develops exportable countermeasures, which are provided directly to field units for rapid implementation, as well as institutionalized into soldier, noncommissioned officer (NCO), and officer educational programs of instruction, new functional courses, training materials, field manuals, and emerging doctrine. The CEHC's Intelligence and Technology Branch continually searches to identify and anticipate evolving EH threats.

Another area where the CEHC is breaking new ground is in the development and training of counterterrorist military search techniques. This effort is in response to needs from the field to safely and methodically search for explosive materials and bomb making contraband, plus the requirement to locate and preserve forensic intelligence to crack terrorist infrastructures. The



A man-portable kit contains specialized tools and equipment for search teams.

primary focus of this training is to teach the searchers to identify bomb makers and bomb making materials—prior to detonation—and preserve the evidence found.

Based on proven British techniques against terrorists in Northern Ireland, Bosnia, and elsewhere, the CEHC training is designed to provide US forces with the technical skills, doctrinal capability, and tools to safely execute counterterrorist search missions. It has spiraled into a 15-day course, called Unit Searcher, with four main objectives: protect potential targets, gain evidence, gain intelligence, and deny enemy resources. During this course, and a second 15-day course called Unit Search Advisor, the students undertake a number of practical search exercises: in person, vehicle, area, route, and occupied and unoccupied building search. Additionally, the search advisors concentrate on the planning cycles that are crucial to ensuring successful searches missions. To equip soldiers to perform these tasks, the CEHC has prepared a specialized man-portable search kit, which contains all the tools and equipment search teams require to execute this mission. The CEHC is continually refining this kit and endeavoring to establish a standardized

search kit that would be available through the regular supply system. This particular materiel solution crosses three of the five tenets of IED defeat—predict, detect, and prevent.

The Engineer School and CEHC have championed the establishment of a mine detection dog program and specialized search dog program. This effort led to the establishment of the 67th Engineer Detachment (Mine Dog), part of the 577th Engineer Battalion, 1st Engineer Brigade, Fort Leonard Wood, Missouri—and the creation of the “K9” additional skill identifier (ASI) for engineer soldiers trained as mine detection dog handlers. The specialized search dog program utilizes nonaggressive explosive detection dogs, which operate off-leash to search buildings, routes, vehicles, or other venues for explosive devices, weapons, or contraband. The Engineer School has already deployed mine dog and search dog teams into both Iraq and Afghanistan with resounding success. During one specific house search of a suspected vehicle bomb maker, a specialized search dog alerted on the explosive scent off an automobile starter located in the suspect’s garage. At the conclusion of the investigation, it was revealed that the suspect had bomb residue on his hands. He had transferred

the residue to the starter while removing it from his car, after completing another project—making a bomb.

The CEHC also developed the doctrine and training for the Mine and Explosive Ordnance Information Coordination Center (MEOICC) in Iraq. This is the US military’s first effort to develop a standardized doctrine, training, and organizational structure to track explosive threats in an area of responsibility. The MEOICC is our military counterpart to the national or regional Mine Action Centers (MACs) that are used during demining operations within a country. The MEOICC specifically supports military operations and objectives, provides a common operational picture (COP) of EH on the battlefield (using the Tactical Minefield Database [TMFDB]), and provides an interface with the MAC and non-governmental organizations operating within the common battlespace.

The TMFDB is an automated tracking system to record, geographically locate, and display all known EH in the Iraq or Afghanistan theaters. This provides a COP for commanders/decision makers, a database for analysis, and maps and overlays to warn of danger areas and allows the sharing of information

between US military and coalition partners or humanitarian/nation building agencies.

To accommodate all the training that is evolving, the CEHC will develop a state-of-the-art training center to be completed in fiscal year 2006. The Engineer School's efforts have had congressional support, resulting in the appropriation of \$10.4 million for the construction of a CEHC and \$3.7 million for mine dog kennels to begin in fiscal year 2005. This is Phase I of an \$18 million construction effort to establish a permanent counter-EH training complex. It will provide specialized training areas and classrooms, search villages, a motor park for nonstandard counter-IED/mine equipment, and permanent mine dog facilities. It will also have adequate space for route and area clearance, enhancing the overall realism of the training. Until it is institutionalized throughout the force, operator and maintainer training for nonstandard counterexplosive equipment will be taught at this facility. All the activities will be colocated in one area on Fort Leonard Wood—the Humanitarian Demining Training Center, the 67th Engineer Detachment, and possibly a Department of Defense (DOD) mine dog training academy—which will provide better fusion and integration of

the CEHC, forming an Counterexplosive Hazard Center of Excellence.

A major effort has been directed toward fighting the war on IEDs, and the Army was tasked to develop a DOTMLPF-integrated IED defeat strategy. To that end, TRADOC was designated as the Army's specified proponent for IED defeat, and TRADOC designated the US Army Maneuver Support Center (MANSCEN) as the proponent for IED defeat DOTMLPF integration on 29 September 2004. MANSCEN then directed the CEHC to take the lead on this action and put together a DOTMLPF assessment and action plan, which eventually led to the development of the Integrated Capability Development Team (ICDT). The ICDT is responsible for evaluating capability gaps and ensuring proper vision on emerging countermeasures and institutional success in all efforts.

As part of the combined arms team, CEHC and the Engineer School work with numerous external agencies—such as the Rapid Equipping Force (REF) and the Joint Improvised Explosive Device Defeat Task Force (JIEDD TF)—to develop and field innovative counter-IED solutions. In October 2003, the Chief of Staff of the Army directed the formation of a JIEDD TF to orchestrate

Army efforts to eliminate IED threats. The CEHC became a member of the advisory committee and works closely with the JIEDD TF. In June 2004, the US Army Central Command (CENTCOM) commander asked the Secretary of Defense for a synchronized DOD response to the IED threat. On 17 July 2004, the Deputy Secretary of Defense established an Army-led joint Integrated Process Team (IPT)—organized around the existing Army JIEDD TF—to focus DOD efforts to defeat the IED threat. The IPT identifies, prioritizes, and resources materiel and nonmateriel solutions in a synchronized response across the services and DOD, in coordination with interagency and international partners. The task force, augmented by joint services staff, continues to accomplish the counter-IED operational mission and provides necessary staff support to the IPT. Working together, CEHC, the Engineer School, and MANSCEN are part of a joint, interagency, and multinational counter-IED effort that integrates intelligence, training, technology, and materiel solutions into a holistic program.

As IED countermeasure solutions are developed by the REF and JIEDD TF, the CEHC helps develop operational TTP, training packages, and other



RG-31



Buffalo



Zeus

Hunter-Killer Team

DOTMLPF integration requirements. One system under development that covers a combination of DOTMLPF integrations is called the "Hunter-Killer." This system is an enhanced route clearance concept, consisting of mine-protected vehicles (the RG-31 and Buffalo) along with an interim vehicle-mounted mine detector (IVMMD) and supporting vehicles.

The Hunter-Killer project covers all five of the tenets that the JIEDD TF targets. It primarily detects EH through visual means and by metal detection with the IVMMD. The EH may be interrogated by the Buffalo and destroyed or neutralized by sappers or explosive ordnance disposal (EOD) personnel. Additionally, it can detect certain types of radio-controlled IEDs through the use of sensors and jamming capabilities. Finally, it has the ability to destroy EH at standoff distances, using lasers or remote weapon stations.

Hunter-Killer incorporates the integration of EOD and engineers working in concert on a specific system. During Operation Iraqi Freedom, a gap was identified between EOD and engineer capabilities. (See article on page xx. - Close the Gap) The Engineer School and US Army Ordnance School have been working together to integrate EOD and engineer skills on the battlefield. One such effort is the explosive ordnance reconnaissance agent (EORA) course. This course is non-military occupational specialty (MOS)-specific, but has specialized training that enhances the ability to identify, mark, and report EH that will eventually be included in route clearance platoons of clearance companies.

The next level in the EH tiered training approach is the explosive ordnance clearance agent (EOCA). This program trains an engineer NCO in limited battlefield disposal of EH, and upon graduation, the soldier is awarded an ASI. There is an annual proficiency requirement to retain the identifier.

Other EOD/engineer integration efforts include the Explosive Hazards Coordination Detachment, which is

responsible for analyzing EH incidents, providing technical advice on EH, and creating and maintaining EH databases. The detachment includes the Explosive Hazards Coordination Cell and the Explosive Hazard Team (EHT). Each EHT is led by an EOD branch-certified captain and assisted by an EOD sergeant first class.

These are a few of the initiatives that CEHC and the Engineer School are engaged in to help our military defeat IEDs and EH, while they fight the Global War on Terrorism. A common component of asymmetrical warfare is that the threat will continue to change and evolve as new tactics, techniques and devices to defeat US forces are explored. To predict and anticipate threat, our development of countermeasures must remain a constant evolution. Each of us can make a difference, and we must continue to evolve in order for our nation to remain a global leader of democracy. Change is an ongoing project that has no end: each battle fought relinquishes lessons learned and a better approach for the next battle.



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Mr. D'Aria was the US Army Engineer School and Training and Doctrine Command senior engineer threat intelligence analyst, from 1988, until his recent assignment as the technical director for the Counter Explosive Hazards Center. He served 10 years in the Army as a military police officer and Army aviator. His background is in combat developments, instruction, and training development.



Heavy Rescue Operations During Operation Iraqi Freedom

By Major Adam S. Roth

Bombing in Baghdad! You have probably heard that often in the past year or so and seen images of people digging through rubble with their bare hands to help those who are trapped in a building partially destroyed by a bomb. But after the bombing of the United Nations compound in the summer of 2003, we knew that something had to be done to protect the force during incidents such as this. We needed to be able to react appropriately in a chaotic situation and turn it into a managed process. The purpose of this article is to show how the 458th Engineer Battalion (Corps)(Wheeled) took a division-directed mission and turned it into a force multiplier for the 1st Cavalry Division.

Battalion Structure

The 458th, an Army Reserve unit from Johnstown, Pennsylvania, was alerted and mobilized in support of Operation Iraqi Freedom in November 2003. The battalion consists of a headquarters and headquarters company, three line companies—each with three line platoons of combat engineers transported by 5-ton dump trucks—and a support platoon with a complement of heavy construction equipment. The unit's wartime higher headquarters, the 1st Cavalry Division, directed heavy rescue training as a component of consequence management, resulting from

vehicle-borne improvised explosive devices (VBIEDs) or other catastrophic incidents in the division sector. The 458th is ideally suited to perform these functions due to the following organic assets:

- An ample supply of highly adaptable combat engineers
- Heavy equipment
- Experience in identifying and clearing unexploded ordnance (UXO) and improvised explosive devices (IEDs)
- Skills acquired from civilian experience

Mission

A team of battalion personnel who have civilian-acquired skills in heavy rescue, firefighting, emergency management, and US Army search and rescue performed a mission analysis. This team has experience at the 11 September 2001 Twin Towers and Pentagon attacks. The mission of the 458th—the Rescue One organization—is to conduct initial consequence management operations in response to a civil disturbance, weapon of mass destruction (WMD), or VBIED mass casualty incident in the 1st Cavalry Division area of responsibility, providing heavy rescue and urban search and rescue assistance in a tactical environment to solve or mitigate the incident.

Vision

The training vision that emanated from this mission statement was a platoon for each of the three line companies capable of performing initial incident command and search and rescue assistance at a secure site. The core of Rescue One's leadership started to come to grips with a mission that has no formal US Army mission training plan. We relied on our collective experience and basic fundamentals from the Federal Emergency Management Agency (FEMA). We developed a four-phase training program with assistance from the Fort McCoy Fire Department while Rescue One was at the Fort McCoy Mobilization Station. The program included a selection process, classroom instruction, lane training, and confined-space training. The selection process included both technical skills and mental evaluation (for the stresses that the rescuer would experience). Classroom instruction focused on incident command, planning and organization, search and rescue techniques, basic rescue knots, shoring and cribbing, and patient packaging. Lanes training included surface search procedures for victims, confined-space rescue, and low-angle victim extraction using rope rescue techniques. The culminating event was a full-blown incident simulating a three-story building destroyed by a VBIED with full incident command and search for victims. Confined-space training focused on a low-light constricted environment with small search teams.

The Rescue One officers then developed follow-on training and sustainment training in theater that included mission readiness exercises, brigade-level rock drills, incident preplanning, and incident scenarios. Mission readiness

exercises focused on being able to move out with all equipment and personnel—implementing the lariat advance (alert advance call)—used in Cold War Germany. The brigade-level rock drill rehearsed a major high-value target, including all subordinate staff down to the squad leader level. Incident preplanning of high-value targets included all required coordination between landowners, facility owners, staff, and emergency managers. Incident scenarios were coordinated with landowning Brigade Combat Teams (BCTs).

Organization

The Rescue One organization is broken into three separate alarm responses: Alpha, Bravo, and Charlie.

Alpha Response

This is the initial response where all Rescue One officers respond to the incident scene, once dispatched by the 1st Cavalry Division. The primary purpose of the Alpha response unit is sizing up the initial incident and determining additional resources. The incident commander makes two critical determinations upon arrival: expected duration of the incident (longer or shorter than 12 hours) and overall incident site security. The primary concern when operating in central Baghdad, instead of downtown New York City, is that security is crucial in all vehicular movements. Driving with lights and sirens is not possible.

Bravo Response

This is a single sapper platoon of search-and-rescue specialists, transported in organic vehicles. The Bravo

Photo by Major Adam S. Roth



**Rescuers employ
airbags to free a
trapped victim.**

response unit can perform search-and-rescue operations and shoring.

Charlie Response

The Charlie response unit—the remaining two platoons from each of the line companies—sustains operations for a longer duration. The unit brings life support items such as tentage and lighting for sustained operations in a secure location.

Incident Command

A secure scene is key to a successful deployment. There must be 360-degree security around the incident scene prior to employment of rescue personnel. This is normally provided by the landowning BCT. Once the site is secure, each element is assigned a sector by the incident commander and maintains radio communications with all employed search teams during the entire operation.

Accountability of personnel, tools, and equipment (controlled through regulated access to the site) and rescuer safety is critical for the incident commander. He must also manage many external assets contributed by US military, coalition, and host nation forces:

- Firefighting forces
- Police and security forces
- Hazardous material (HAZMAT) and nuclear, biological, and chemical (NBC) agents
- Public Affairs Office
- Host nation government
- Local utilities

Unity of command is imperative in this structure so all components are working toward the same goal. The use of interpreters is also critical when working through the myriad of issues that the host nation can assist with.

Actions on Scene

Once incident command is established, as with all military operations, a priority of work is established. The steps, generally followed in this order, are site survey, surface search, confined-space rescue, and high- and low-angle rescue.

- **Site Survey.** After arriving on scene, the officers of Rescue One quickly ascertain which portions of a structure, or structures, are accessible.
- **Surface Search.** The Halo search method (systematic calling and listening) is used.
- **Confined-Space Rescue.** Once it is determined that a victim is in a confined space, rescuers use a combination of mechanical tools, air monitoring equipment, and hand tools to enter the confined space. With a combination of searching and shoring, the team enters the void and extracts the victims.

- **High- and Low-Angle Rescue.** Frequently, the effects of bomb blasts will either create a deep crater or take out normal means of egress (such as a stairwell).

Training

The battalion's heavy rescue unit has conducted numerous training events in conjunction with the supported BCTs. Training always begins with an alert phase, followed by either a ground or an airmobile movement of the Alpha and portions of the Bravo response units to the incident location. Due to heightened security concerns post-blast, we are often forced to travel via air since ground main supply routes and entry control points are frequently secured. The scenario includes employment of the Charlie response unit staging of equipment for later employment. Training scenarios also included integration of supporting firefighting organizations (fighting real fires developed for the scenario) and medical organizations (establish a casualty collection point, conduct triage, and transport casualties) under the incident command of Rescue One. Rescuers have the opportunity to perform technical rescue operations.

Employment

The battalion's heavy rescue unit met with many of the supported BCTs within the Task Force Baghdad area of responsibility very early in the deployment and conducted site assessments of major high-value targets. Critical structural, contact, and accountability information saves time in the event of an actual incident. Rescue One supported postblast consequence management at two vehicular bombings and assisted in numerous vehicular entrapments and mass casualty events as a result of VBIEDs.

Summary

The 458th Engineer Battalion provides a substantial capability, tackling a nonstandard—but very critical—mission for forces entering a battlespace lacking the infrastructure (either coalition or host nation) to conduct rescue operations in the event of WMD/VBIED incidents. This enhances force protection for the entire force and is a force multiplier for all maneuver commanders in a postblast environment with multiple entrapped casualties. The framework of Rescue One provides a critical asset to the maneuver commander in an expeditionary theater and, given the current operating tempo and threat, should be considered as a primary mission in Future Force development and deployment decisions.



Major Roth is the executive officer of the 458th Engineer Battalion and the battalion chief of Rescue One. He is also a volunteer firefighter in Johnstown, Pennsylvania. He has commanded a combat heavy company and has served in numerous staff and leadership positions. He holds a master's in mechanical engineering from Boston University.



EOD and Engineers “Close the Gap”

By Lieutenant Colonel Craig Jolly

“The artificial separation between explosive ordnance disposal (EOD) personnel and combat engineers MUST end—combat engineers will deal with unexploded ordnance (UXO) whether we want them to or not—just a matter of inadequate EOD troops to the UXO task. This is a structural deficiency that it is imperative for us to fix.”

*Brigade Commander
3d Infantry Division, Iraq*

Today’s construct for operating in explosive hazard (EH)-contaminated theaters fails to provide maneuver commanders the freedom of action to accomplish missions effectively in the contemporary operating environment (COE). The problem has many aspects: an EOD construct based on Cold War doctrine, an enemy able to press home an asymmetric advantage through the gap caused by this doctrine, and a world increasingly filled with EHs. Many would say that an easy fix is to transfer proponentcy for EOD to the Engineer Regiment. However, ownership does not correct the root causes of the problem, which are a lack of integrated EH planning and a graduated response to EH contamination. On 1 September 2004, the Commanding General of the US Army Training and Doctrine Command (TRADOC) approved a solution—hammered out over an 18-month period by the Ordnance and Engineer Branches—to bridge the EH capability gap. In order to understand the solution, we must first examine the problem and its causes. This will provide a framework to outline the approved course of action that will provide assured mobility to the force in an EH-contaminated environment.

Background

After the Vietnam War, the focus of the US Army was the conduct of operations, on a linear battlefield, against a peer or near-peer adversary. The operational synergy developed between the Engineer and Ordnance Branches for the conduct of EOD operations during the Vietnam era eroded as the Engineer Regiment concentrated its attention on breaching linear obstacle belts.¹ This approach created a mobility support architecture that was effective during the Cold War but is dysfunctional in relation to the assured mobility concept developed for current operations. This gap is illustrated at Figures 1 and 2, page xx.

The US Army Legacy Force (now known as the Current Force) was developed to counter the Cold War threat. The Vietnam-era requirement to clear explosive ordnance (EO) for safety and immediate tactical movement is no longer trained due to the doctrinal approach of warfighting that was developed in the 1980s. The art of disrupting booby traps and UXO clearance has eroded to the point that no institutional knowledge exists in the Engineer Regiment. An example of the current asynchronous environment is the conduct of area clearance operations in Afghanistan, which have been slowed dramatically by the requirement for EOD technicians to deal with each item of UXO encountered.² Clearing mines and booby traps is the responsibility of engineers, providing they have been trained. However, engineer elements have not been trained to complete the entire task of UXO clearance.

Currently, engineers can be called on to reduce or clear non-mine UXO hazards, on a limited basis, under the direct technical guidance of EOD forces.³ The current paradigm is that direct technical guidance requires the direct supervision of an EOD technician. However, sending a highly trained EOD technician forward to deal with a mortar round or simple blast mine is analogous to sending a brain surgeon to stitch a finger. It is clear that just as calling for indirect fires is a task shared by forward observers and infantry section commanders, certain aspects of EOD should be shared tasks on the battlefield. Since close combat in tunnel systems, booby-trapped weapon caches, and military operations in urban terrain (MOUT) over a dirty battlefield are now the reality—and the doctrine exists to enable engineers to conduct limited UXO clearance—why is there a problem?

In the early stages of both Operations Enduring Freedom and Iraqi Freedom, the assets allocated to conduct mobility support tasks were not adequate in quantity or coordinated in time and space to adequately meet the maneuver requirements.⁴

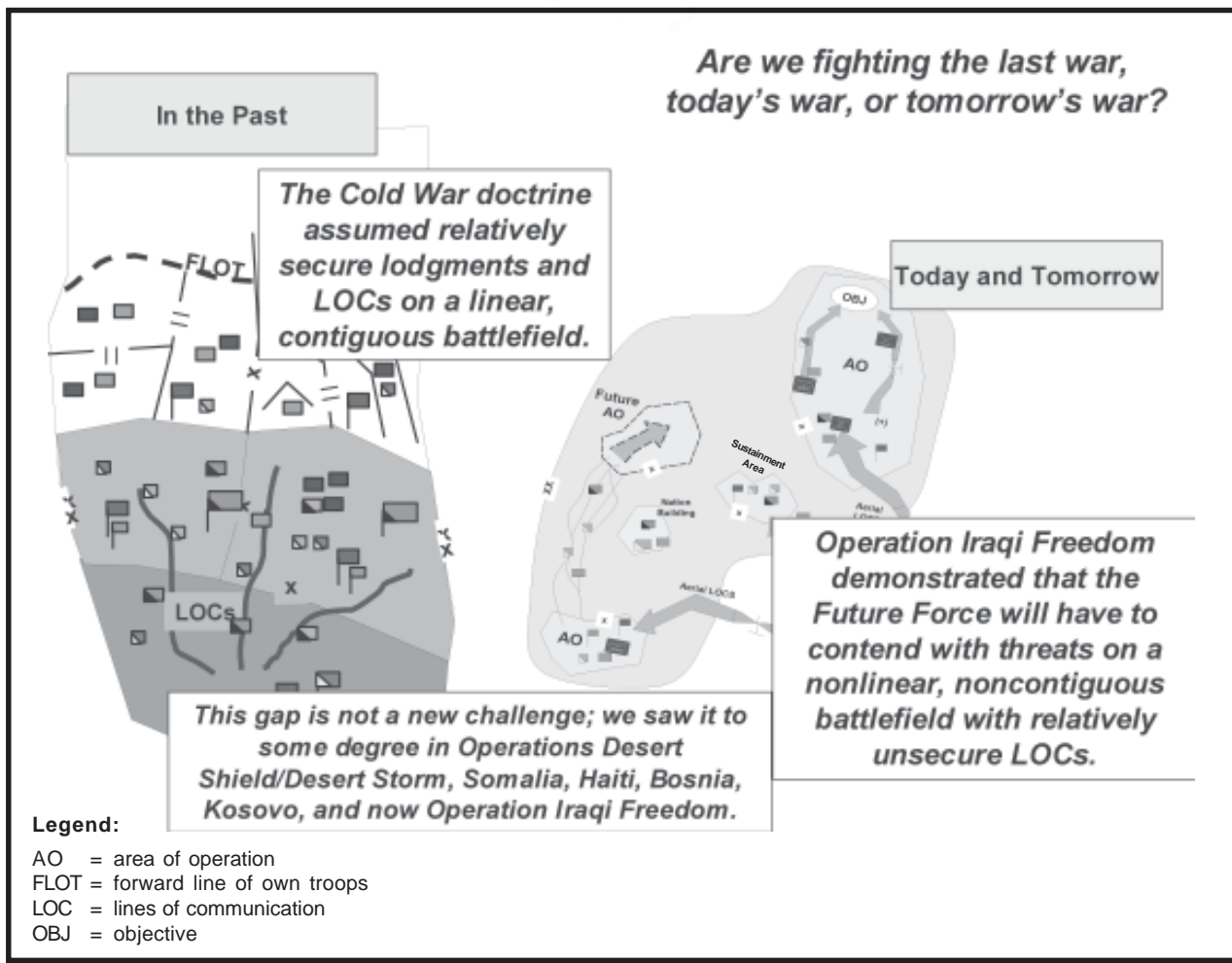


Figure 1. The Gap

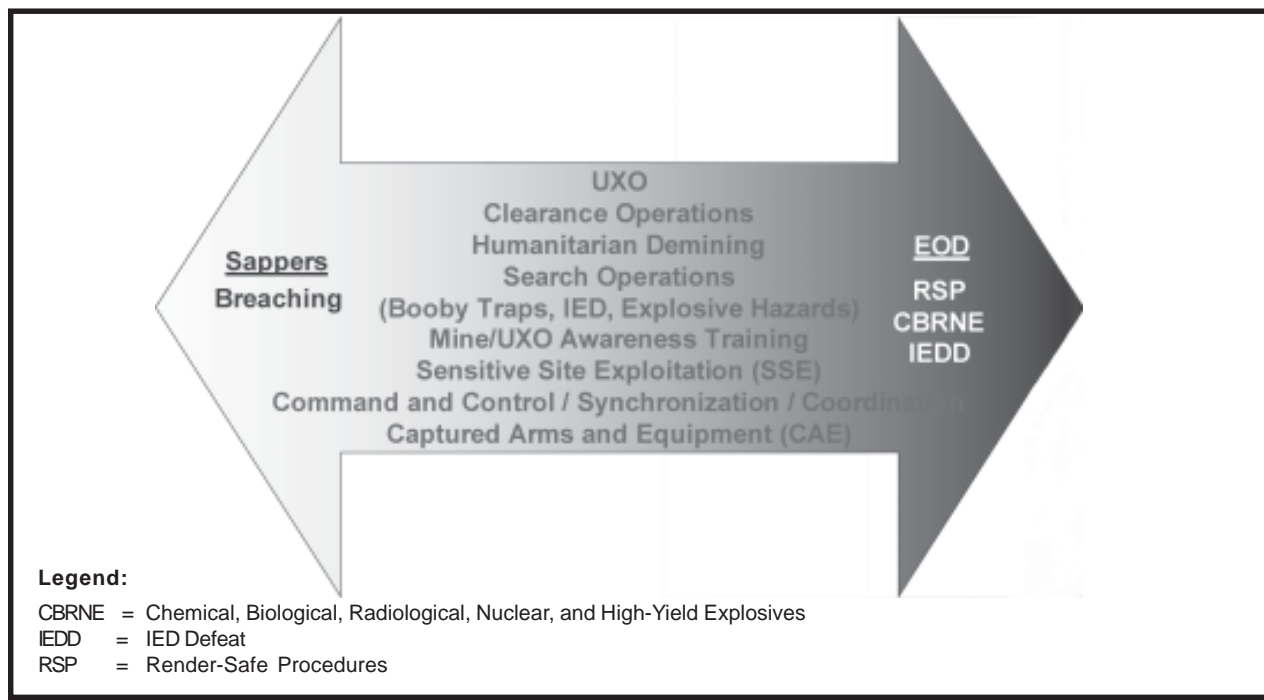


Figure 2. Interpretation of the Gap

As limited EOD assets were held at the highest levels, maneuver commanders were faced with the decision to either sacrifice tactical and operational momentum for safety or utilize their embedded assets to get on with the job. When these tasks were performed as part of an operation to maintain operational areas (for example, route or area clearance operations), clear coordination of the engineer and EOD effort was required. But without embedded EOD planning staffs, this did not occur. This can be directly attributed to EOD personnel not being integrated into the planning process, and it is considered to be the cause of the perceived lack of responsiveness of EOD personnel⁵ and the EOD-engineer tension in theater⁶.

The Solution

On 19 March 2004, the Chief of Staff of the Army (CSA) directed TRADOC to investigate the advisability of assigning proponentcy for EOD to the US Army Engineer School. The question the CSA directed to TRADOC had been under consideration for more than 12 months by an EOD-engineer working group cochaired by the Ordnance and Engineer Schools. It was determined that a simple change of proponentcy did not address the root cause of the problem—a dysfunctional planning process combined with an EH reduction construct based on Cold War doctrine. The integration of EOD planning into the mobility, countermobility, and survivability (M/CM/S) Battlefield Operating System (BOS)—combined with the development of a complimentary set of EOD and combat engineer skills to deal with EO—had already been identified as the appropriate solution.

To counter the threat, EOD capabilities must be integrated among the various units participating in any operation.⁷ Doctrinally, it appears that this issue is clear-cut.^{8,9,10} Organizationally and operationally, this planning does not occur adequately and is based more on the personality of the EOD commander. The integration of this capability into the M/CM/S BOS is imperative; otherwise, command, control, coordination, and synchronization of capabilities cannot be achieved. The first step to bridging the gap is to synchronize EOD capabilities on the battlefield, ensuring uninhibited mobility in order to maximize combat power at the decisive time and place.¹¹ Organizationally, this is to be achieved by the establishment of EOD staff cells combined with the establishment of explosive hazard coordination cells (EHCCs)¹² and explosive hazard teams (EHTs)¹³ within the Engineer Regiment to apply the appropriate effects on the battlefield.

Examples of how EOD could be synchronized through the M/CM/S BOS are as follows:

- Developing a common operational picture (COP) through an understanding of EO hazards and their effect on maneuver combined with predictive analysis to identify probable contaminated areas.
- Selecting, establishing, and maintaining operating areas through avoiding or reducing EO hazard risk.

- Attacking the enemy's ability to influence operating areas by synchronizing EO clearance capabilities on the battlefield to mitigate risk and reduce EH in areas we wish to operate.
- Maintaining mobility and momentum through the provision of the right level of EOD support for breaching and UXO clearance operations.

How these staff cells are to be integrated with the M/CM/S BOS is depicted graphically at Figures 3 and 4, page xx.

While it is clear that the M/CM/S planning capability must be rectified, training must also be conducted to tackle the functional gap between EOD and engineers. As the COE is not characterized by the United States having a peer adversary, enemy forces must use asymmetric approaches to negate US superiority. The second component of the solution is the establishment of an EH-reduction construct to provide a graduated response on the battlefield. A truly graduated response requires the force to deal with EH, within their limitations, at each level and is analogous to the soldier-combat medic-doctor-surgeon construct for the treatment of casualties. The current capability set is outlined below:

Warfighter. The warfighter must be able to identify and react to UXO and react to IED.

Explosive Ordnance Reconnaissance Agent (EORA). An EORA can be trained by an EOD company, on request, and is responsible for “the investigation, detection, location, marking, initial identification, and reporting of suspected EO, in order to determine the need for further action.”¹⁴ Although this course has been developed, there have been an extremely limited number of individuals trained. This capability is very similar to the Explosive Hazard Awareness Training (EHAT) conducted by the Counter Explosive Hazard Center at the Engineer School, which is given to deploying engineer units and selected other individuals as part of their predeployment training. This capability is considered to be the next level in the continuum.

EOD Technician. An EOD technician is capable of “the detection, identification, field evaluation, rendering-safe, recovery, and final disposal of UXO. It may also include the rendering-safe and/or disposal of EO which has become hazardous by damage or deterioration, when the disposal of such EO requires techniques, procedures, or equipment which exceed the normal requirements for routine disposal.”¹⁵

Bridge to the EH Capability Gap

It is the delta between the highly trained EOD technicians (who conduct both the render-safe and disposal of munitions), the EORA- or EHAT-trained soldiers (who conduct reconnaissance), and the Engineer Regiment's current capability that is the functional gap in the current EH construct. To fill this gap, the following skill has been identified and the new construct depicted graphically at Figure 5, page xx. An explosive ordnance clearance agent (EOCA) is an engineer

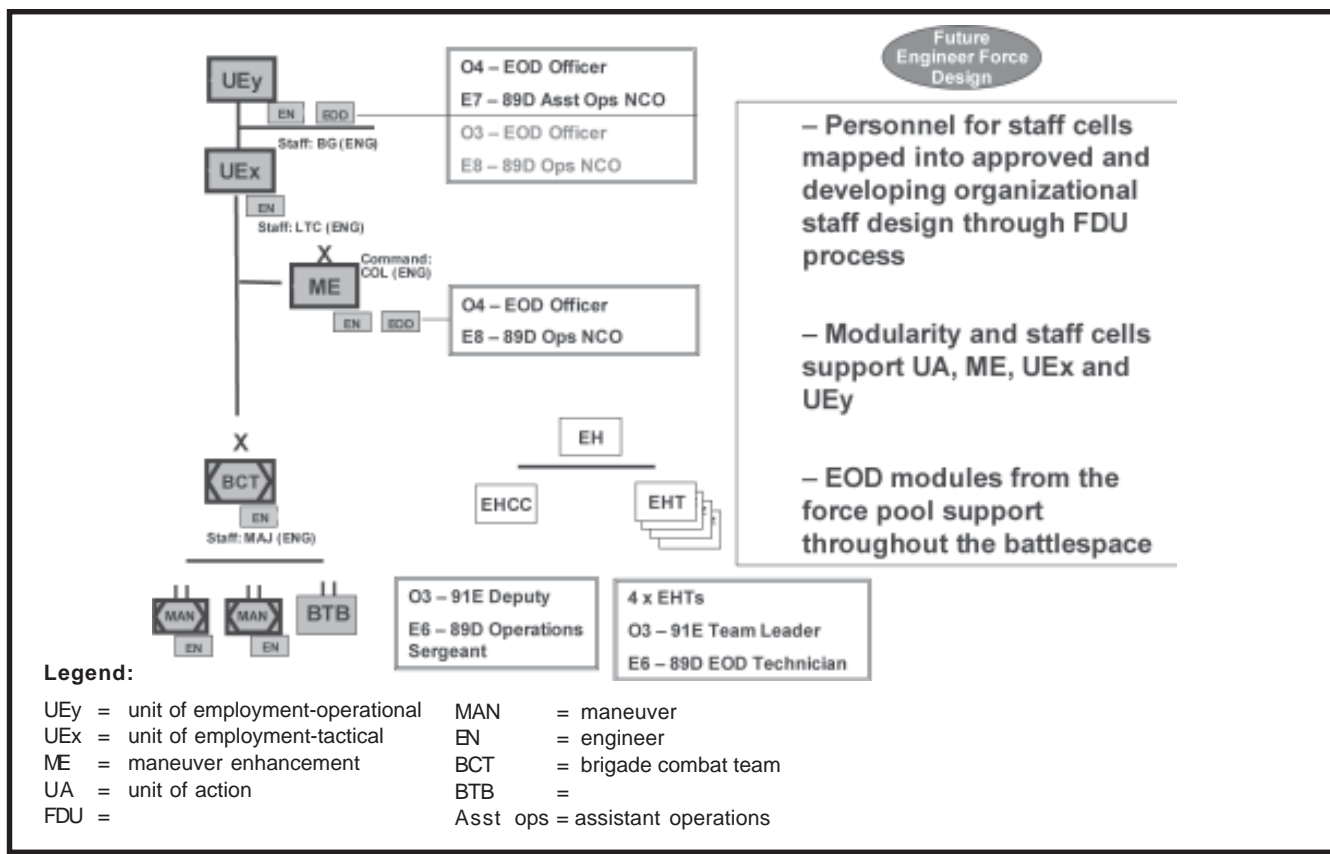


Figure 3. EOD Staff Integration

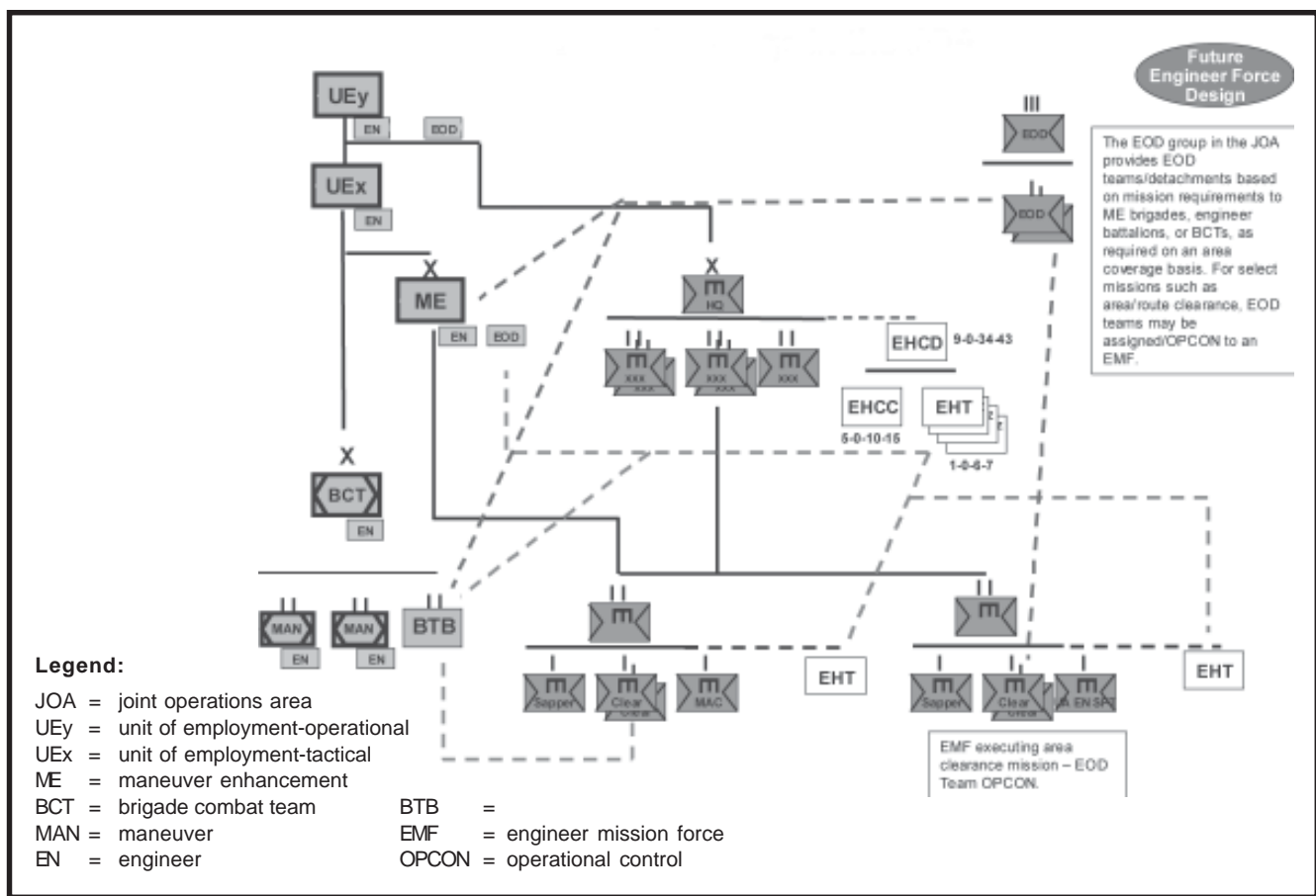


Figure 4. EOD Coverage in the JOA

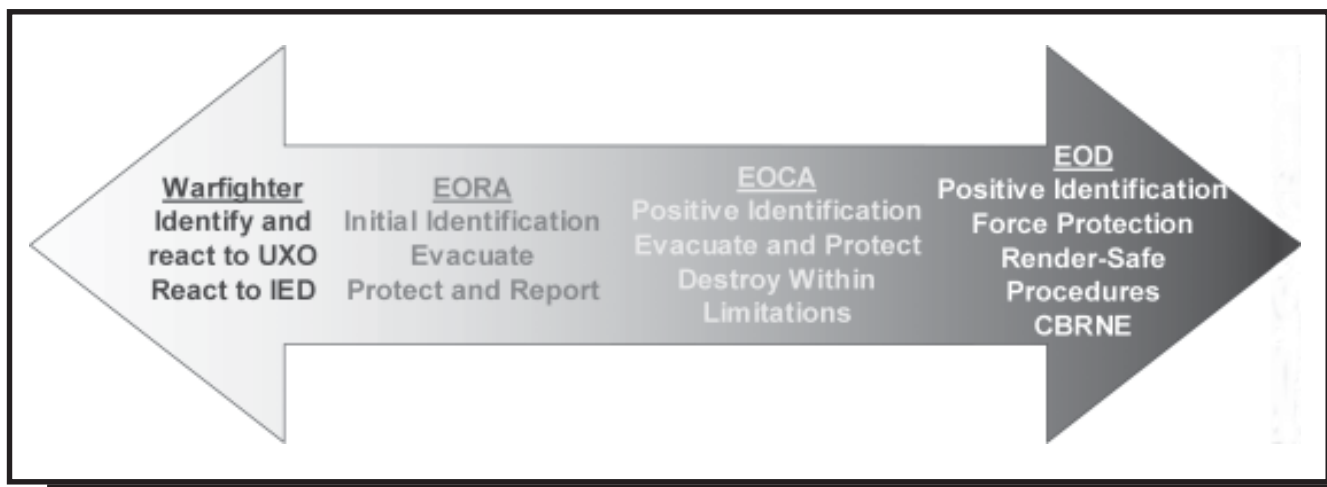


Figure 5. Approved Explosive Hazard Reduction Construct

with an additional skill identifier who is capable of investigating, detecting, locating, marking, reporting, and preparing of protective works for UXO. It also includes the disposal in place—when authorized by the EOD staff cell—of UXO identified in draft Technical Manual 093-89D-02, *Explosive Ordnance Clearance Manual*,¹⁶ and theater-specific UXO, after risk analysis and positive identification.¹⁷

Assured Mobility

So how does this tie to assured mobility? Assured mobility is the Engineer Regiment's cornerstone doctrine and outlines how the Regiment interacts with other BOSs and supports maneuver on the battlefield. The assured mobility concept requires engineers to be capable of integrating EOD capabilities into their operations to reduce EH in the battlespace in order to provide force protection and tactical mobility to the maneuver force. This is based on intelligence and integrated EOD planning and results in the right EH-reduction effect—coordinated in time and space—available to the maneuver commander for the conduct of operations. This facilitates tactical maneuver and immediately reduces the risk to the force from EO. When planned correctly, the maneuver commander is provided with an immediate measure of force protection and the capability of making an informed decision to either—

- *Ignore the threat* and continue the operation, accepting the potential consequences.
- *Avoid the threat* by diverting the operation and accepting the disruption to the plan.
- *Destroy the EO in place*, using his embedded engineer asset or allocated EOD element, which may impose a temporary halt to operations but decrease the risk to the force.
- *Remove the EO*, on advice from EOCA or EOD, if it is safe to do so.

- *Render-safe the EO*, if it poses a significant risk to the force, then remove for safe disposal. This option will impose the greatest time delay and will require the deployment of specialist EOD resources.

This approach has been accepted and approved by the Commanding General of TRADOC. A pilot Explosive Ordnance Clearance course is proposed to be conducted in Afghanistan in early 2005, with the first course at Redstone Arsenal, Alabama, commencing 1 March 2005. EOD planning cells are established in theater and will be expanded in concert with the developing explosive ordnance clearance (EOC) capability.

Conclusion

Engineers are on the battlefield now, destroying mines and UXO to meet operational requirements. They are meeting this operational necessity with minimal training in mine warfare and none in UXO clearance. Operations Enduring Freedom and Iraqi Freedom provide clear indications as to the types of environment that US forces are likely to conduct operations in the future and signify the detrimental effect on the mobility and tempo caused by a lack of integrated EOD planning.

Given the amount of high-tech ammunition used by coalition forces, EOC is a priority force protection issue now. The conduct of EO reconnaissance and in situ disposal of UXO is essential to protect the force and provide freedom of maneuver to the commanders on the ground. To meet this challenge, the force requires a multitasked soldier who is capable of facilitating mobility and providing immediate force protection and EH reduction advice. This must be combined with the development of habitually associated EOD planning cells to synchronise the EOD effect at all levels. This serves to coordinate EOD effects on the battlefield, fully enable the EOD component of the force, and focus the efforts of the EOD

technicians to where they are most required—dealing with complex weapons that pose a high threat. EOD personnel and engineers must maintain a set of different, but complimentary, skills to assure the mobility and protection of the force. Today's construct for operating in EH-contaminated theaters fails to provide maneuver commanders the freedom of action to accomplish missions effectively in the current operating environment. However, tomorrow's construct will not only "close the gap" between EOD and engineers, it will close the gap that our enemies have been exploiting and save soldiers lives.



Lieutenant Colonel Jolly is an infrastructure project manager with the Australian Defence Organisation (ADO). He was previously the chief of the Engineer Command and Staff Course Division at the US Army Engineer School, Fort Leonard Wood, Missouri. He has served in a wide variety of engineer command and training assignments within the Australian Army. Command appointments include both the 35th Field Squadron and 23d Support Squadron, and his instructional appointments include a posting to the School of Military Engineering, where he served as the course manager for both the Regimental Officer Basic and Advanced Courses. He is a graduate of the Royal Military College-Duntroon and the Australian Command and Staff College. He holds a master's in management and defence studies from the University of Canberra.

Endnotes

¹ Major Craig Jolly RAE, US Army Engineer School "Closing the Gap" White Paper, March 2003.

² Interviews with Major Mark Griffin RE and WO2 Tony Quirk RAE from the Countermine, Counter Booby Trap Center (now the Counter Explosive Hazard Center), US Army Engineer School, Fort Leonard Wood, Missouri.

³ Field Manual (FM) 3-100.38, *Multiservice Procedures for Unexploded Explosive Ordnance in a Joint Environment*, 23 August 2001, Chapter III, p. 2.

⁴ Every commander commented on the requirement for a greater synchronization of EOD/engineer activities to provide assured mobility and force protection during the Operation Iraqi Freedom Engineer After-Action Review conducted in Baghdad, May 2003. Source After-Action Review video viewed by the author 12 May 2003.

⁵ On many occasions, EOD personnel were conducting higher-priority tasks. However, this was not evident to lower echelons of command because there was no command and control or communication established to facilitate this flow of information.

⁶ Engineer/EOD conference "Closing the Gap," Redstone Arsenal, Alabama, 9-11 December 2003.

⁷ FM 9-15, *Explosive Ordnance Disposal Service and Unit Operations*, 8 May 1996, pp. 1-2.

⁸ *The Army Universal Task List*, Chapter 5 – Mobility/Survivability BOS, outlines the following: ART 5.3 Conduct Survivability Operations – ART 5.3.4 Provide Explosive Ordnance Disposal Support. 5-49. Neutralize domestic or foreign conventional, nuclear, chemical, and biological munitions and improvised devices that present a threat to military operations and military civilian facilities, materiel, and personnel, regardless of location.

⁹ *The Joint Universal Task List* has no mention of EOD tasks except under SN 1.1.4 Provide for Engineer Route Support and Clearances – Determine the need for EOD support.

¹⁰ FM 9-15, pp. 1-2.

¹¹ Ibid.

¹² The EHCC has a similar role as the Mine and Explosive Ordnance Information Coordination Center (MEOICC), which is currently deployed on Operation Iraqi Freedom and has integrated EOD planners.

¹³ An EHT is deployed with clearance modules and provides technical advice and assists in planning clearance operations. In peacetime, this organization is also responsible for training, sustaining, and certifying EOCAs.

¹⁴ Army Regulation 75-14, *Interservice Responsibilities for Explosive Ordnance Disposal*, 14 February 1992, p. 1.

¹⁵ Ibid.

¹⁶ This manual is being developed by the Ordnance School, based on generic munitions, and will be supplemented by theater-specific addendums as authorized by the theater EOD staff cell.

¹⁷ This definition is to be articulated in all EOD-related doctrine.



Antipersonnel Obstacle Breaching System


By Mr. Bobby Skinner

The Antipersonnel Obstacle Breaching System (APOBS) will soon be available for light engineer unit training. The training strategy can be found in Department of the Army Pamphlet 350-38, *Standards in Weapons Training*. The strategy is designed for all 21B combat engineers in light engineer platoons to fire one live APOBS annually. Other light units (11B infantryman, 19D cavalry scout, and 18C special forces weapons sergeant) will fire a live APOBS while training at the National Training Center or Joint Readiness Training Center.

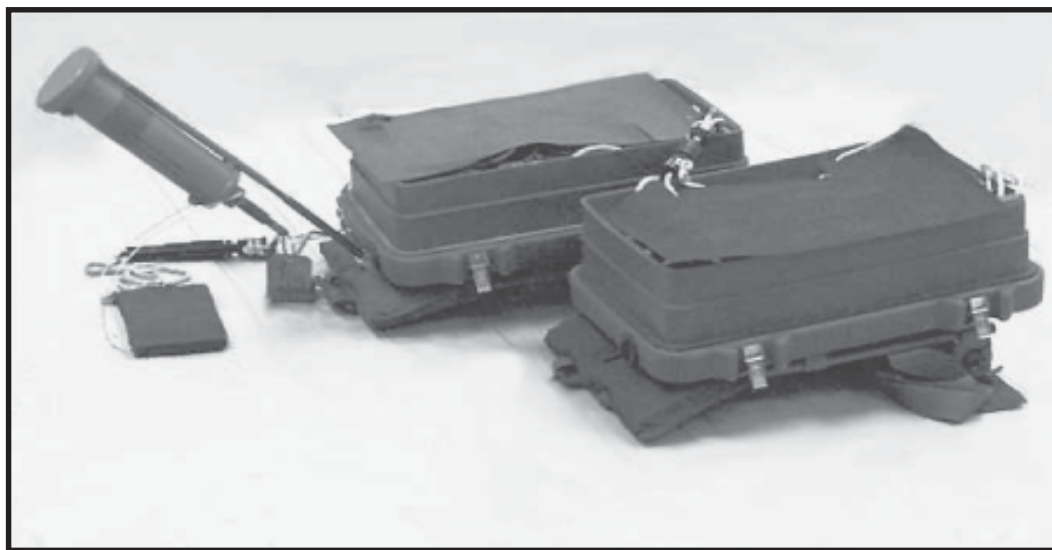
The APOBS is a two-soldier, portable, linear demolition charge that is used against antipersonnel mines and wire obstacles. It consists of five major components: a rocket motor, a fuse, a 25-meter line charge consisting of 60 grenades and detonating cord, a 20-

meter line charge consisting of 48 grenades and detonating cord, and a container for shipping or storage. The APOBS has two molded plastic prepackaged backpacks to hold the line charges. The 65-pound backpack contains the front 25-meter line charge and the line-charge connector and has a provision to hold the rocket launch rod. The 55-pound backpack contains the rear 20-meter line charge. The two users open the backpacks, connect the two line charges, emplace the rocket on the launch rod, aim, and ignite the rocket motor, which launches and carries the two connected line charges across the obstacle to be breached. A drogue parachute, attached to the end of the 20-meter line charge, provides stability during flight. When the 45-meter line charge is directly over the obstacle, the fuse ignites the detonating cord, which

activates the grenades. The APOBS can be fired in either command mode or delay mode. The system includes a tool kit with spare parts, a screwdriver, earplugs, and a field card that provides technical data.

The US Army Engineer School Standards in Training Commission Manager can be contacted at 573-596-0131, ext 3-6243 or DSN 676-6243. 

Mr. Skinner is the US Army Engineer School Standards in Training Commission Manager. He served in the US Army for 26 years, with 23 years as a 12B combat engineer. He has had various assignments, including Leadership Task Force for the Chief of Staff of the Army, and Assistant Commandant of the Libby Noncommissioned Officer Academy.



APOBS



EQUIPPING THE FUTURE FORCE SAPPER

By Captain Michael P. Frank

What makes the Future Force sapper a unique soldier on the battlefield? What capabilities will he bring to the warfight? This article highlights some of the capabilities and systems that will make sappers indispensable and relevant to Future Force operations.

Assured Mobility

Key to the success of the Future Force will be its ability to maintain an unprecedented level of freedom of maneuver. This will be accomplished by using emerging technologies, some on maneuver platforms and some manned by sappers. To provide assured mobility, we must see first, understand first, act first, and finish decisively. The Future Engineer Force (FEF) will add increased mobility and enhance the combined arms force to move across the battlefield with increased survivability. The FEF will be able to quickly locate and neutralize all antitank and antipersonnel mines and other explosive hazards to enhance mobility and force protection.

Counter Explosive Hazards Capabilities

The FEF will see significant increases in counter explosive hazards capabilities through significant technological advances and changes in organizational design. Technological advances include predictive tools, standoff detection, command and control, increased situational awareness, robotics, and enhanced force protection. Organizational design changes are focused to support modularity, and they significantly differ from any changes throughout our

Regimental history. These changes will enable maneuver, maneuver support, or maneuver sustainment operations by allowing our forces freedom to maneuver when and where they want by denying an opponent's ability to use explosive hazards against them.

The Future Force Brigade Combat Teams (BCT), equipped with the Future Combat System, will use its embedded technologies to provide assured mobility in support of maneuver. The BCTs are also a significant organizational change as sappers are replaced by embedded capabilities provided by technology. The embedded technologies of the BCT are enhanced situational awareness and prediction tools linked to standoff detection and neutralization capabilities, enabled through robotics. The more effective prediction capabilities will allow the FEF to focus the employments of detection technologies on the high-risk and high-payoff areas of interest required to support maneuver. Enhanced command and control capabilities and real-time situational awareness will enable commanders to make informed decisions on bypass or precision maneuver. Robotics will be used to reduce the workload and to perform dangerous and hazardous tasks.

Technological advances and organizational design changes will also enable sappers to provide assured mobility for maneuver support and maneuver sustainment operations. The fielding of our objective capabilities change detection and standoff neutralization, and enhanced individual and platform protection will significantly improve our route and area clearing capabilities. Until these technologies mature and are fielded

across the force, we will provide the initial capability through commercial-off-the-shelf systems and the creation of the engineer clearance company. The future engineer clearance company will consist of a headquarters section, three route clearing platoons, and an area clearing platoon. The route clearing platoon will be equipped with a vehicle-mounted mine detector, a mine-protected interrogation vehicle, and a medium mine-protected vehicle.



RG-31 Medium Mine-Protected Vehicle

Similarly, the future area clearing objective capability is an autonomous or semiautonomous robotic day and night area clearance capability. Until the required technology matures, we will equip the area clearance platoons with medium and mini-mechanical flails, mechanical proofing, enhanced neutralization capability, and mine-protected command and control platforms similar to those in use by sappers supporting current combat operations. Mine detection dog teams will provide additional proofing capability (see *Engineer*, July-September 2004, page 18).



MV-4 Medium Mine Flail

This combination of new technologies and future organizational changes will assist in denying an opponent the ability to use explosive hazards as antiaccess or area denial capabilities. However, sappers will always be required to counter existing and future explosive hazard threats to meet the commander's intent. The FEF will be equipped and organized to provide these critical capabilities.

The FEF has a new piece of robotic countermining equipment, the Mechanical Antipersonnel Mine Clearing System (MAPMCS), a system used in current combat operations. The working principle is based on simultaneous use of two tools, the flail and roller, providing highly reliable mine clearance. The flail rotor has a number of chained hammers to conduct mine clearing. The flail hammers are made of high-quality material that is heat-treated and wear-resistant. The chained hammers and high rotational speed of the flail enables the machine to dig and powder antipersonnel mines until detonated or shattered. The machine is remotely controlled from a safe distance or an armored vehicle. The system is employed remotely to antipersonnel minefields and activates trip wires.

The Matilda, a small, man-portable robot that includes a manipulator arm, fiber-optic control kit, and extended-run batteries, is also in the FEF tool bag. The robot is used for military operations in urban terrain (MOUT) and tunnel and cave missions. The Matilda provides standoff capabilities that keep soldiers out of danger areas for long periods of time while performing hazardous missions.



Matilda Robot

Demolitions Capabilities

Demolitions, another area where sappers bring a critical capability to the warfight, will be used in a variety of roles, from assuring mobility in MOUT, to destroying improvised explosive devices (IEDs). An assessment of demolitions capabilities for sappers determined that current capabilities are spread across many different systems and require improved handling characteristics like portability, rapid emplacement and

execution times, ease of operation, and reduced minimum safe distances (MSD). The Tactical Explosives System (TES), a “system of systems,” is the future of Army explosives. The TES consists of two primary subsystems, a family of initiators, and a modular charge capability. The initiators will be controlled via a man-in-the-loop, the Tactical Internet using battle command capabilities, or programmed smart algorithms. The TES will follow a spiral development approach to maximize the availability of current and future technologies while providing incremental but satisfactory capabilities that support the sapper.

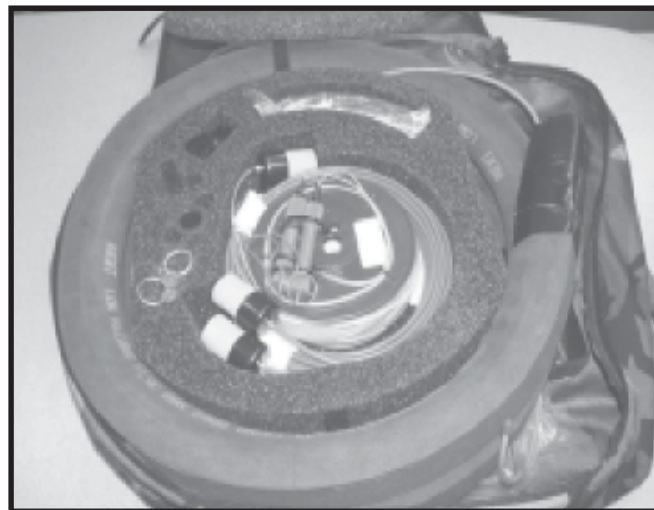
The FEF requires a remote command-initiation capability for demolition missions. The TES uses the Remote Activation Munitions System (RAMS) as a springboard to develop the TES remote initiation capabilities for the family of initiators. RAMS provides the sapper the capability to remotely initiate munitions and propagate an untethered line-of-sight (LOS) and non-line-of-sight (NLOS) signal to deliver the desired effect through an asymmetric battlespace. Through technology improvements, RAMS integrates several technologies to provide an untethered remote LOS and NLOS initiation capability. RAMS uses one modular system for demolition initiation tasks, which improves portability and decreases the soldier’s vulnerability to threat fires by lessening exposure time. Furthermore, RAMS significantly lightens the load the soldier has to carry to employ demolitions and reduces breaching times during urban operations. This retains the element of surprise from the forced-entry technique and allows the soldier to engage hostile targets with greater tactical advantage. RAMS can be hand-emplaced and emplaced by unmanned ground vehicles (UGVs) and unmanned aerial vehicles (UAVs).

The TES incorporates the capabilities of a special operations forces demolition kit (SDK) and an urban operations set (UOS) as the first modular charge capability. The SDK-UOS provides the capability to tailor charges to the target and eliminates the various adhoc charges currently being constructed for various missions. The SDK-UOS allows the sapper to construct the smallest, lightest charge feasible that allows tailored standoff distances suitable for specific missions and maximum precision for numerous types of targets and mission scenarios. Additionally, the SDK-UOS provides state-of-the-art methods to attach charges to targets. The SDK-UOS modular charges can be hand-emplaced and emplaced by UGV and UAV, providing the sapper the first capability to neutralize targets from a standoff.

The SDK-UOS also provides stand-alone capabilities to the sapper that will ultimately reduce MSDs in Army doctrine to safely perform breaching operations through hearing, blast, and fragmentation protection devices. Furthermore, the SDK-UOS provides a capability to nonexplosively cut through material when explosive breaching is not permitted.

Finally, the rapid wall breaching kit (RWBK) is a man-portable, rapidly deployable system that provides an organic capability to gain forced entry into buildings to maintain

freedom of maneuver and to shape the battlespace for friendly forces in an asymmetric battlespace. The RWBK provides a capability that is preformed, prepackaged, easily and rapidly employed, lightweight, and safe.



Rapid Wall Breaching Kit

Conclusion

This combination of new technologies and future organizational changes will assist in denying an opponent the ability to use explosive hazards as anti-access or area denial capabilities. The technologies provide an increased level of safety by using unmanned vehicles (robots), giving Future Force sappers a standoff capability, enhancing their ability to breach obstacles, and continuing to provide assured mobility for maneuver. The FEF will be equipped and organized to provide these critical capabilities.

These are just a few of the capabilities and systems sappers will bring to the future battlefield. These capabilities are not generally transferable to a maneuver platform, and even if they were, infantry and armor soldiers will not have the time to train to proficiency on executing these missions and operating these systems to achieve the desired effect. So it is safe to say that the Future Force sapper will be a critical enabler of assured mobility and mission success in Future Force operations.



Captain Frank is a field artillery officer working in the Acquisition Corps, Program Management Functional Area, as a team chief for Mine/Countermine, Robotics, and Demolitions in the US Army Engineer School, Directorate of Combat Developments, Fort Leonard Wood, Missouri.



Combat Service Support to the Future Engineer Force: A Modular Approach

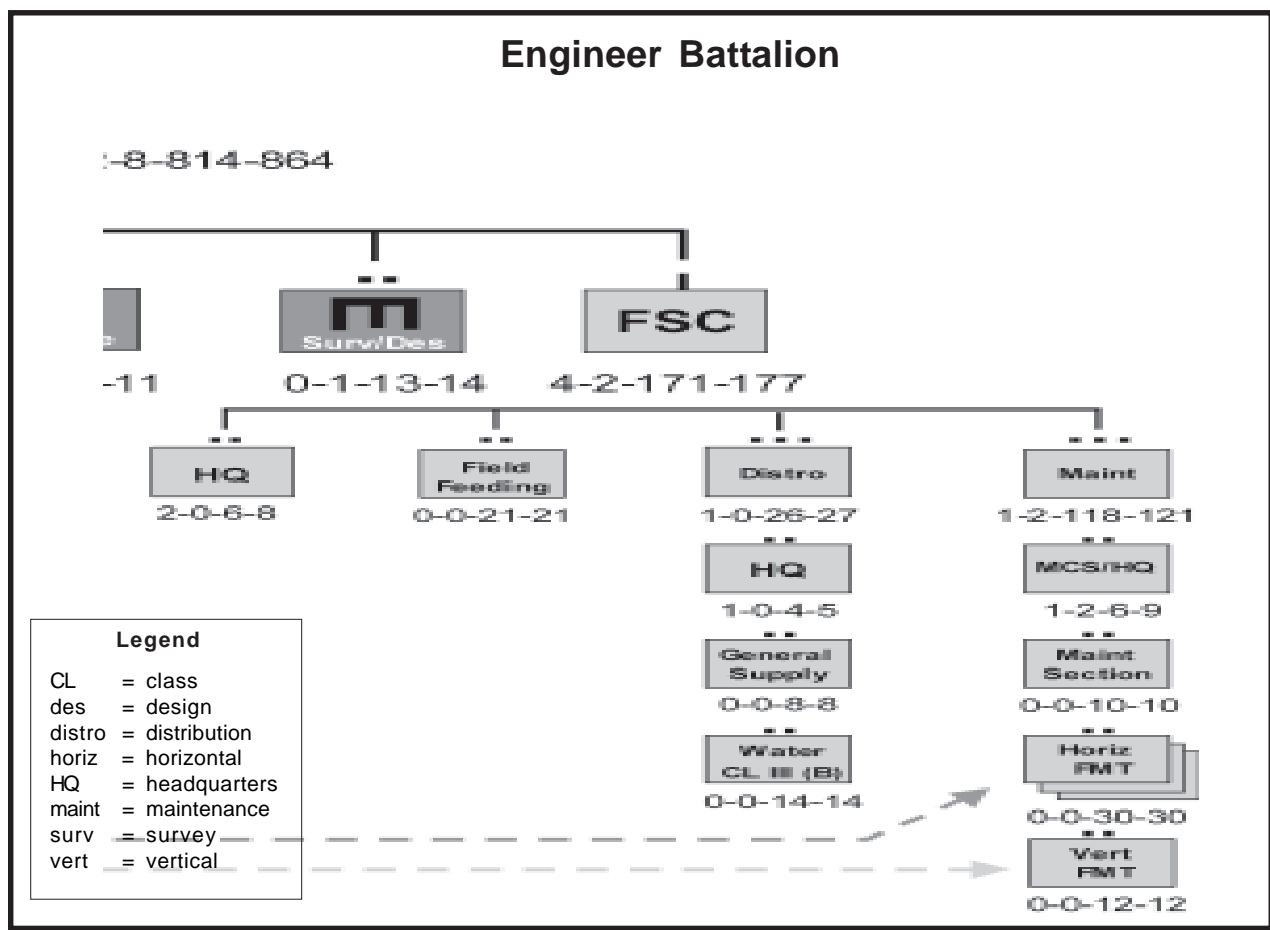
By Major Brian D. Slack

By now, almost everyone in the Army has heard of the terms *modularity* and *expeditionary*. Most of the uncommitted Army (not currently deployed or preparing to deploy in support of the Global War on Terrorism) is consumed with transforming its Cold War formations into brigade combat teams (BCTs), units of employment (UEs), and support brigades. As the Army moves along its transformation path, a fundamental change in how these new organizations are supported will be required if they are to be truly modular and expeditionary.

The concept of modularity is predicated on units that are flexible and agile: scalable formations that can be mission-tailored for specific operations. For these units to be sustainable, a new modular approach to combat service support (CSS) is needed. In conjunction with the US Army Engineer School, the Combined Arms Support Command has developed a modular support organization for the Future Engineer Force (FEF) that is modeled after the CSS being provided inside the new BCTs. The forward support company (FSC) is the corner-stone of sustainment for the FEF (today's

corps- and theater-level engineer battalions). The figure below shows an example of an engineer battalion with its FSC and forward maintenance teams (FMTs).

The concept of maintenance support for the FEF starts with uniquely designed FMTs that are organic to each engineer company. These FMTs perform field-level maintenance (previously referred to as organizational- and direct-support maintenance) under a two-level maintenance concept. In the two-level concept, the FMT is manned and equipped to perform both organizational-




and direct-support maintenance. In garrison, FMTs plug into the maintenance platoon of an FSC that is organic to each engineer battalion. If an engineer company gets task-organized with a different deploying engineer battalion, the engineer company's FMT also gets task-organized under the gaining engineer battalion's FSC maintenance platoon. Each FMT—equipped with its own Unit-Level Logistics System-Ground (ULLS-G) and prescribed load list (PLL)—performs all repairs, parts requisitioning, dispatching, and services for its engineer company. This plug-and-play concept of maintenance support truly enables sustainment of any combination of forces tailored into an engineer mission force (EMF). The base maintenance section of the FSC is designed to provide maintenance support for the engineer battalion headquarters and any specialty platoons/sections, as well as the FSC. In the maintenance control section (MCS) of the maintenance platoon, a maintenance control officer and two warrant officers (senior automobile maintenance officer and engineer equipment repair technician)

provide maintenance management of the engineer battalion's equipment.

Concerning the remaining areas of CSS, the FSC is designed to provide a 90 percent solution for the sustainment of an engineer battalion composed of five to seven engineer companies combined into an EMF. The field-feeding section is equipped to provide mess support for five to seven engineer companies. The distribution platoon orders and distributes all classes of supply within the battalion or EMF. It carries the sustainment stocks that exceed the organic carrying capability of the engineer battalion for three days of high-intensity conflict or seven days of low-intensity conflict. Medical support is provided by organic medical assets in each engineer company headquarters and a medical treatment section in the engineer battalion headquarters. Combat engineer companies are supported by a senior medic and one trauma specialist per line platoon. Construction engineer companies are supported by one trauma specialist. The engineer battalion medical-treatment section is composed of a physician's assistant, a trauma

sergeant, two trauma specialists, and a four-litter ambulance.

Based on a still-developing concept, future engineer brigades will receive CSS on an area support basis from a combat service support battalion (CSSB). The CSSB will provide the link between the FSCs that support each battalion-sized EMF and higher-level sustainment forces in the theater support command. As required, the CSSB will augment FSCs with maintenance, transportation, and other logistical support. The combination of FSCs and CSSBs will provide sustainment across the full spectrum of operations for the FEF and would be in concert with the Army's construct for support of the total Army force. 

Major Slack is an engineer concepts officer in the Directorate of Combat Developments, US Army Engineer School, Fort Leonard Wood, Missouri. His past assignments include engineer observer-controller at the Joint Readiness Training Center; commander of A Company, 70th Engineer Battalion; and Task Force Engineer for 1st Battalion, 17th Infantry Regiment, and 1st Battalion, 501st Parachute Infantry Regiment, in Alaska.



Dedication

The following members of the Engineer Regiment have been lost in the Global War on Terrorism since the last issue of *Engineer*. We dedicate this issue to them.

Second Lieutenant Christopher W. Barnett	1st Battalion, 156th Armored Regiment	Shreveport, Louisiana
Specialist Justin B. Carter	1st Battalion, 15th Infantry Regiment	Fort Benning, Georgia
Staff Sergeant Joseph E. Rodriguez	8th Engineer Battalion, 1st Cavalry Division	Fort Hood, Texas
Specialist Bennie J. Washington	44th Engineer Battalion, 2d Infantry Division	Camp Howze, Korea
Specialist Johnathan Castro	73d Engineer Battalion, 25th Infantry Division	Fort Lewis, Washington
Private First Class Lionel Ayro	73d Engineer Battalion, 25th Infantry Division	Fort Lewis, Washington
Sergeant Lynn R. Poulin	133d Engineer Battalion	Belfast, Maine
Specialist Thomas J. Dostie	133d Engineer Battalion	Portland, Maine
Sergeant First Class Sean M. Cooley	150 Engineer Battalion, 155th Armor Brigade	Lucedale, Mississippi
Specialist Robert A. McNail	150 Engineer Battalion, 155th Armor Brigade	Lucedale, Mississippi
Specialist Nicholas C. Mason	276th Engineer Battalion	West Point, Virginia
Specialist David A. Ruhren	276th Engineer Battalion	West Point, Virginia
Specialist Lyle Rymer	239th Engineer Battalion	Fort Chaffee, Arkansas
Staff Sergeant Johnathan R. Reed	1088th Engineer Battalion	New Roads, Louisiana
Specialist Michael S. Evans II	1088th Engineer Battalion	New Roads, Louisiana
Specialist Christopher J. Ramsey	1088th Engineer Battalion	New Roads, Louisiana

THE FUTURE ARMY TACTICAL FIRE FIGHTING TRUCK

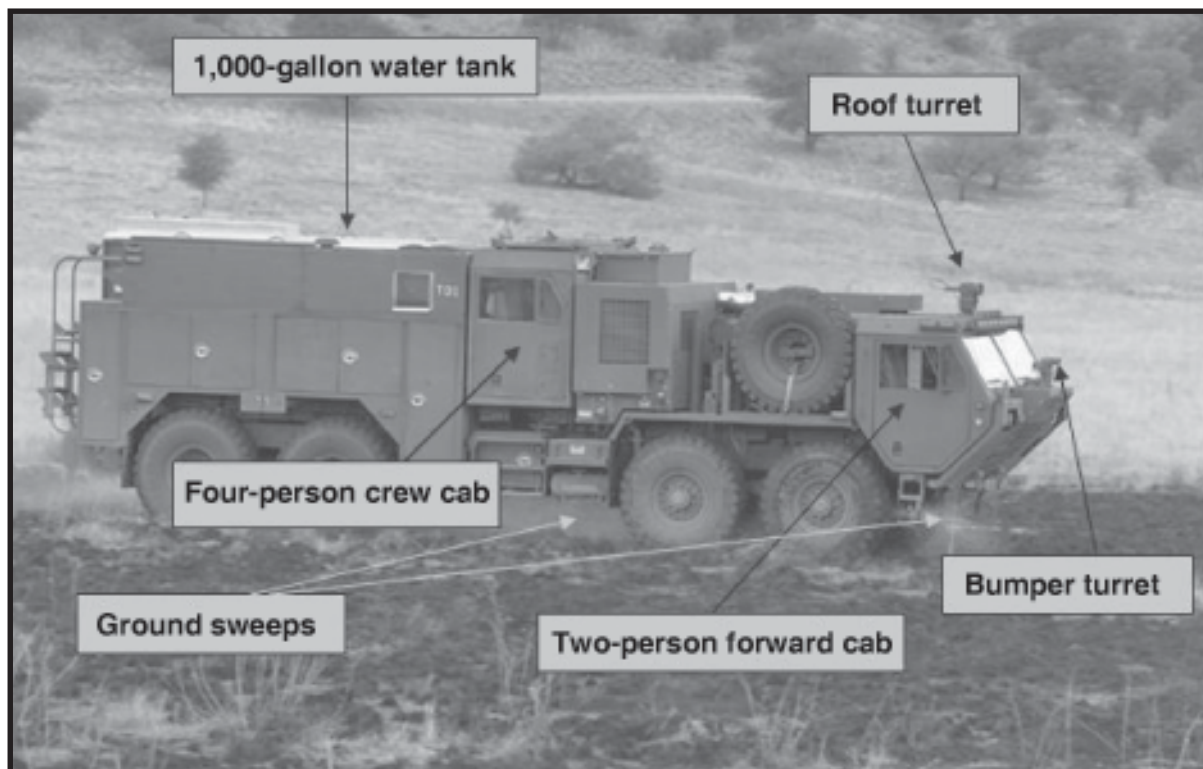
By Major Mollie Pearson and Mr. Michael Bonomolo

On 29 January 2005, the 406th Engineer Fire Fighting Detachment, 89th Regional Readiness Command, received the first M1142 Tactical Fire Fighting Truck (TFFT). This new fire truck replaces the 20-year-old Amertek, Incorporated, Military Adaptation of a Commercial Item (MACI) 2500L. The Army will purchase more than 100 of these new fire trucks over the next five years.

History

On 5 April 1974, the Department of the Army (DA) approved a Required Operational Capability (ROC) document for a family of fire fighting equipment. The ROC stated that this new type of TFFT would have the capability to combat three types of fires: structural (military buildings, troop housing, and storage areas), brush, and aircraft crash/rescue (small and intermediate). The determined materiel solution was the MACI 2500L, fielded from the early to mid-1980s. The MACI, a commercial fire fighting vehicle adapted for tactical use, had its share of mechanical problems.

The MACI was unreliable and difficult to repair. A major contributing factor for the poor maintenance and lengthy repair times was that as the last MACI was fielded, Amertek divested itself of its fire truck production line. As a result, repair parts became scarce and often required off-line manufacturing. Second, the MACI's ability to effectively carry out three missions was considered a limiting factor for the Future Engineer Force (FEF), which is expanding the fire fighting tasks from three to five. A third factor was the truck's lack of water capacity. According to Army Regulation 420-90, *Fire and Emergency Services*, an aircraft rescue fire fighting vehicle must carry a minimum of 1,000 gallons of water to support Army tactical airfield operations. Air Force fire test site results, using empirical calculations adapted from the Federal Aviation Administration (FAA),¹ determined that tactical airfields supporting 46 missions or more per day—or servicing CH-47 aircraft or larger—require fire trucks with a water capacity of at least 1,000 gallons. Unfortunately, the MACI's lower water capacity of 660 gallons requires that there be two trucks on-station when supporting airfield operations.



Passenger-side view of the M1142 Tactical Fire Fighting Truck



M1142 Tactical Fire Fighting Truck versus the Military Adaptation of a Commercial Item 2500L

Development

In 1995, having read feedback from field units, personnel from the US Army Engineer School determined that the aging and unreliable MACI should be replaced. Before development could begin, a user requirements document was needed to justify the expense of purchasing a new fire truck. The document articulated user requirements to the materiel developer, who translated approved user requirements into a fire truck blueprint releasable to industry. The Engineer School chose to express its user requirements via a Statement of Continuing Needs in 1996 and 1997; two were drafted and subsequently approved in late 1997. The materiel developer then deciphered the user requirements into engineering standards that industry would understand—a Request for Proposal (RFP). In 1999, the materiel developer released the RFP, soliciting the design solution from industry.

The TFFT contract was awarded to Pierce® Manufacturing, Incorporated, of Appleton, Wisconsin, in mid-2000. The mobility Battlefield Operating System of the Army's Program and Objective Memorandum allocated no funding for research and development. Therefore, it was decided to use known components to put the TFFT together, and an Army heavy expanded-mobility tactical truck (HEMTT) was mated to a commercial fire fighting package. The project manager consulted subject matter experts (Army firefighters) from the US Army Training and Doctrine Command and the US Army Reserve about parts required, as well as field demands emplaced on a TFFT, to ensure the best design possible.

It was decided early in the process that commercial fire fighting standards according to the National Fire Protection Association (NFPA) would be used as a guide, and strict adherence would not drive the development of the TFFT. There were many reasons for this. The TFFT is a multifunctional fire fighting truck envisioned to combat five types of fires/hazards encountered by firefighters in the field: wildland; structural (limited to two stories or less); petroleum, oil, and lubricants (POL) and hazardous materials (HAZMAT); tactical vehicle; and aircraft crashes. Designing the fire truck to meet all five missions to NFPA standards would significantly increase cost, require a larger vehicle, and increase engineering and development time.

Design Challenges

The TFFT user requirements challenged Pierce to come up with a unique design. Among the many technical challenges to overcome, the following were the most noteworthy:

Expanding the HEMTT crew carrying capacity from two to six. Pierce placed an air-conditioned four-man crew cab just to the rear of the HEMTT engine. Communication between the driver's compartment and the crew cab is accomplished via a vehicular intercom system.

Providing the pump operator with an unimpeded 360-degree view of a fire or crash scene. The pump panel was placed forward of the four-man crew cab on top, facing toward the front of the vehicle. Access to the pump panel is through the crew cab's removable roof, and a recessed shelf provides a place for the operator to stand.

Sustaining uninterrupted water pressure to the outlets and water cannons for pump-and-roll capability, as the vehicle altered its speed. Coupling the 1,000-gallons-per-minute water pump to the transmission-driven power takeoff meant that less energy was received by the pump, which lowered the water pressure to the water cannons as the HEMTT slowed. Aircraft crash rescue techniques, or pump-and-roll, require the fire truck to maintain continuous water pressure to overcome the intensity of a fuel fire. Pierce surmounted this deficiency by adding a second engine, a 200-horsepower (hp) Deutz® pump engine, to exclusively power the water pump. It was located forward of the four-man crew cab just below the pump panel. The second engine can be started at any time and is not affected by the speed of the truck, assuring nonstop power to the water pump. There are maintenance access panels on both sides and an inherent exhaust pipe, though fuel is drawn from the HEMTT's fuel tank.

Maintaining command and control among the TFFT crew, both for fire fighting and day-to-day operations. The TFFT was provided with a set of four frequency-modulated (FM) handheld radios and one cab-mounted, very high-frequency (VHF) base radio. This allows the on-site fire chief to communicate with his team at a fire or crash site. Communicating between the two cabs is accomplished via a Fire Com 3020R intercom set. Additionally, a Single-Channel Ground-to-Air Radio System (SINCGARS) provides command and control with the maneuver commander's forces.



Left, side view of current TFFT step; right, a view of the proposed larger step to accommodate the firefighter's boot.

Overcoming the front cab's narrow steps to accommodate the width of the firefighter's boot. The ability to modify the HEMTT chassis was limited by regulations. A human factors engineering modification was submitted by the Army Research Laboratory and is being evaluated as a general fix for all HEMTTs.

Overcoming the lack of comprehensive basic issue items/components of end items fire fighting equipment currently on the fire team's table of organization and equipment. The project manager purchased commercial-quality fire fighting equipment and made it part of the technical data package that is required to support the TFFT.

Storing the additional equipment procured for the TFFT in the limited storage areas. Pierce designed storage areas on both sides of the TFFT.



Members of the 89th Regional Readiness Command with the Army's newest fire truck.

Operational Test

The TFFT was subjected to an operational test at Fort Huachuca, Arizona, from July to August 2003. An overall summary of the test reached this conclusion:


*"Soldiers from four different Regional Readiness Commands from across the United States successfully used the TFFT to conduct all firefighting missions prescribed in the TFFT operational mode summary/mission profile (OMS/MP) during the Initial Operational Test. Missions consisted of structural fires, aircraft crash rescue fires, vehicle-HAZMAT fires, vehicle rescues, and wildland fires. Computer-controlled, propane-fed simulators were used to simulate the structural and aircraft crash fire missions. Both crews conducted each mission successfully during daylight and hours of darkness. Salvage vehicles were used to conduct the vehicle rescue and vehicle-HAZMAT missions. Both firefighting teams successfully executed these missions during daylight and hours of darkness. A 5-acre wildland fire was ignited in the local training area and successfully contained and extinguished by the two firefighting teams working in tandem. The TFFT proved to be highly mobile throughout the test and provided the soldiers with ready access to all equipment necessary to execute each mission. The soldiers were unanimous in their opinion that the TFFT is far superior to systems currently assigned to their units."*²

The Future

Fielding of the TFFT, to the engineer fire fighting teams—all components—and to Ordnance Ammunition Company fire fighting teams will be completed in fiscal year 2007. Revisions to the DA-approved distribution

schedule are being staffed at this time, with the revisions necessitated by the ongoing deployments and redeployments of engineer fire fighting teams.

The Project Manager (PM), Heavy Tactical Vehicles (HTV), is committed to providing soldiers the best possible equipment, consistent with the requirements of the Engineer School. As this system is fielded, PM HTV will welcome comments from the field concerning product improvements or modifications for inclusion in future production or for consideration as field retrofits. Information on this feedback system will be provided to soldiers of gaining units during new materiel introductory briefings.

The Engineer School—along with PM HTV and industry partner, Pierce Manufacturing, Incorporated—have worked together over the last seven years to develop, build, test, and procure a fire fighting vehicle to meet the multiple, varied missions required of an engineer firefighter. With our combined teamwork, we have produced a TFFT unmatched in its abilities to support the Current and Future Engineer Force. 

Major Pearson is Chief, Engineer Support Branch, Materiel Division, Directorate of Combat Developments, at the US Army Engineer School, Fort Leonard Wood, Missouri.

Mr. Bonomolo is a combat developer in the Directorate of Combat Developments, US Army Engineer School, Fort Leonard Wood, Missouri. He has had numerous assignments in the military as a company commander, platoon leader, as well as battalion maintenance office communications-electronics staff officer for both an armor and engineer battalion.

Endnotes

¹FAA Advisory Circular 150/5210-6C and the NFPA formula, Appendix A, National Fire Protective Association 418, pp. 418-9.

²Test Report for the TFFT IOT, test #2003-OT-E/CS-1960, HQ, US Army Test Command (OTC), 19 September 2003.

The Engineer Writer's Guide

Engineer is a professional-development bulletin designed to provide a forum for exchanging information and ideas within the Army engineer community. We include articles by and about officers, enlisted soldiers, warrant officers, Department of the Army civilian employees, and others. Writers may discuss training, current operations and exercises, doctrine, equipment, history, personal viewpoints, or other areas of general interest to engineers. Articles may share good ideas and lessons learned or explore better ways of doing things.

Articles should be concise, straightforward, and in the active voice. If they contain attributable information or quotations not referenced in the text, provide appropriate endnotes. Text length should not exceed 2,000 words (about eight double-spaced pages). Shorter after-action-type articles and reviews of books on engineer topics are also welcome.

Include photos (with captions) and/or line diagrams that illustrate information in the article. Please do not include illustrations or photos in the text; instead, send each of them as a separate file. Do not embed photos in PowerPoint. If illustrations are in PowerPoint, avoid excessive use of color and shading. Save digital images at a resolution no lower than 200 dpi. Images copied from a Web site must be accompanied by copyright permission.

Provide a short paragraph that summarizes the content of the article. Also include a short biography, including your full name, rank, current unit, and job title; a list of

your past assignments, experience, and education; your mailing address; and a fax number and commercial day-time telephone number.

Include a statement with your article from your local security office that the information contained in the article is unclassified, nonsensitive, and releasable to the public. Not only is *Engineer* distributed to military units worldwide, it is also available for sale by the Government Printing Office.

We cannot guarantee that we will publish all submitted articles. They are accepted for publication only after thorough review. If we plan to use your article in an upcoming issue, we will notify you. Therefore it is important to keep us informed of changes in your e-mail address or telephone number. All articles accepted for publication are subject to grammatical and structural changes as well as editing for style.

Send submissions by e-mail to <engineer@wood.army.mil> or send a 3 1/2-inch disk in Microsoft Word, along with a double-spaced copy of the manuscript, to: Editor, *Engineer Professional Bulletin*, 320 MANSCEN Loop, Suite 348, Fort Leonard Wood, Missouri 65473-8929.

Note: Please indicate if your manuscript is being considered for publication elsewhere. Due to the limited space per issue, we seldom print articles that have been accepted for publication by other Army professional bulletins.

Skills to Win: Defining Success for Engineer Soldiers and Leaders

By Mr. Daniel Goff

Warfighter Symposium attendees will have a unique opportunity to directly impact the future of the Engineer Regiment. One of the breakout sessions will provide a forum to discuss critical training tasks for the Future Engineer Force: common engineer tasks, military occupational specialties (MOSs) 21B combat engineer and 21C bridge crewmember tasks, and engineer lieutenant tasks. Participants in the session will develop a recommendation for the critical tasks that should be trained in each of these three areas. After the symposium, that recommendation will be staffed to the US Army Engineer School Commandant for approval.

Critical Task Selection Board

The selection of critical tasks is the foundation of the Army's training development system. The process, as described in US Army Training and Doctrine Command (TRADOC) Regulation 350-70, *Systems Approach to Training Management, Processes, and Products*, is used to determine the tasks that a job incumbent must perform to accomplish his or her duties, as well as survive in the full range of military operations. A board of subject matter experts, known as a critical task selection board (CTSB), determines the critical tasks for a job or MOS. Engineer School training developers use these tasks to craft learning objectives and training materials, which ensure that each critical task is trained in some fashion. The CTSB also provides a recommendation as to where each of the tasks should be trained (a resident-based environment or in the unit). The training developer uses this recommendation to finalize the overall training design for an MOS.

Training developers have some flexibility in how a CTSB is conducted. In the past, the Engineer School has used on-site subject matter experts, electronic surveys, and teleconferences to conduct the board. In July 2003, TRADOC released additional guidance to ensure operational coordination between TRADOC and other major commands during CTSBs. This guidance requires that all voting members be representatives from operational units in the US Army Forces Command (FORSCOM), US Army Reserve Center (USARC), or Army National Guard (ARNG).

Since the Warfighter Symposium provides an excellent opportunity to capture the knowledge and experience of our

Regiment's activities throughout the Army, a breakout session was established to conduct a CTSB. The three areas that will be discussed in the breakout session were selected for a variety of reasons, with the common factor in each being the critical nature of the associated skills in an Army at war. Participants in the breakout session will be asked to discuss the following questions:

- What engineer tasks are common to all noncombat engineer MOSs?
- What tasks should be modified, added, or deleted from the MOS 21B and 21C task lists?
- What tasks must engineer lieutenants master to successfully lead soldiers in wartime?

Common Engineer Tasks

There are currently 20 of these tasks trained in the Common Engineer Training (CET) course. This course is a prerequisite for most noncombat engineer Advanced Individual Training (AIT) soldiers, as well as a phase of engineer reclassification training. In December 2004, TRADOC mandated that all proponent schools incorporate the warrior tasks and battle drills into AIT. The Engineer School accomplished this mandate by redesigning the CET course to focus on the warrior tasks and drills. The redesigned course, retitled Battle-Focused Training, will be offered in AIT only, but not as a component of reclassification training. The cost of this redesign was the elimination of all but three common engineer tasks from the curriculum:

- Prepare an AN/PSS-12 Mine Detector for Operation.
- Locate Mines With the AN/PSS-12 Mine Detector.
- Install Wire Obstacle Materials.

Any additional common tasks identified by the 2005 CTSB will be incorporated into the Battle-Focused Training Course or the AIT courses for each MOS.

MOS 21B and 21C Tasks

The tasks associated with MOS 21B were last reviewed and approved in 2003, and the tasks associated with MOS 21C were last reviewed and approved in 1998. Actions completed in support of Operation Iraqi Freedom, particularly in the areas of urban operations and improvised explosive device (IED)

detection, suggest that a review of both critical task lists is necessary. In addition, 21C tasks associated with the addition of the dry support bridge will be discussed.

Engineer Lieutenant Tasks

The critical task list for lieutenants was last reviewed and approved in 2003. The Army is prepared to implement dramatic changes in lieutenant training in fiscal year 2006, with the stand-up of the Basic Officer Leader Course (BOLC). BOLC is divided into three phases, with the first two phases conducted at sites other than the Engineer School. BOLC I is the lieutenant's precommissioning, and BOLC II is a common curriculum designed to instill the Warrior Ethos. BOLC III will provide proponent-specific training. BOLC III is projected as a 14-week phase that will employ a tracked curriculum to provide assignment-oriented training to engineer lieutenants. The design of the phase is ongoing, and the Warfighter Symposium CTSB will provide the final opportunity to cement the critical tasks to be trained before BOLC III implementation. (See article on page xx for more information.)

The review of the critical tasks in these three areas is significant and cannot be accomplished without gathering data before the symposium. During the months of February and March, the Engineer School Department of Training Development (DTD) sent out surveys to the Regiment requesting input on the tasks associated with common engineer skills, combat engineers, and engineer lieutenants. DTD compiled and analyzed the results and will present them at the breakout session. These results will serve as a springboard for the discussion of critical tasks, with the overall goal being task lists that can be submitted to the Engineer School Commandant for approval.

Ensuring Success

The success of the CTSB also depends on the participation of individuals who represent all aspects of our Regiment, both Active Army and Reserve Component. Participants must be able to speak to the essential tasks required for engineer leaders and soldiers.

The Engineer School is dedicated to providing the skills and abilities that our Regiment must possess to fight and win. No one knows those skills better than the men and women who are employing and leading soldiers today. The breakout session on critical training tasks is an exciting step forward for the Engineer School, ensuring that we capture the voice of the Regiment in our training. Come join us at the Warfighter Symposium and help define success for the Army engineer.



Mr. Goff is the Director of Training Development for the US Army Engineer School, Fort Leonard Wood, Missouri. He has more than 15 years of experience in training and leader development for the US Army. In 2002, he received the National Award for Education, Training, and Career Development from the American Society of Military Comptrollers.

Communication— The Key to Our Success



By Lieutenant Colonel Paul L. Grosskruger

The Engineer Regiment is a “Team of Teams,” a diverse organization comprised of Reserve, National Guard, and Active Army units; the US Army Corps of Engineers (USACE); engineer leaders in our major commands, joint commands, combat training centers, and industry; and engineers in our allied forces and our sister services. If harnessed, the possibilities of information sharing and collective problem solving across our organization are endless. While simultaneously engaged in operations and transformation, communication within our Regiment is more essential than ever! Our major efforts in strategic communication in 2004 centered on visits to engineer commands around the world, the ENFORCE Conference, the Councils of Colonels, the Commandant’s video teleconferences (VTCs), the Engineer Professional Bulletin, and hosts of conferences both here at Fort Leonard Wood and in the field. We must, however, do much better with communication and harnessing our finite resources of funds and time in 2005.

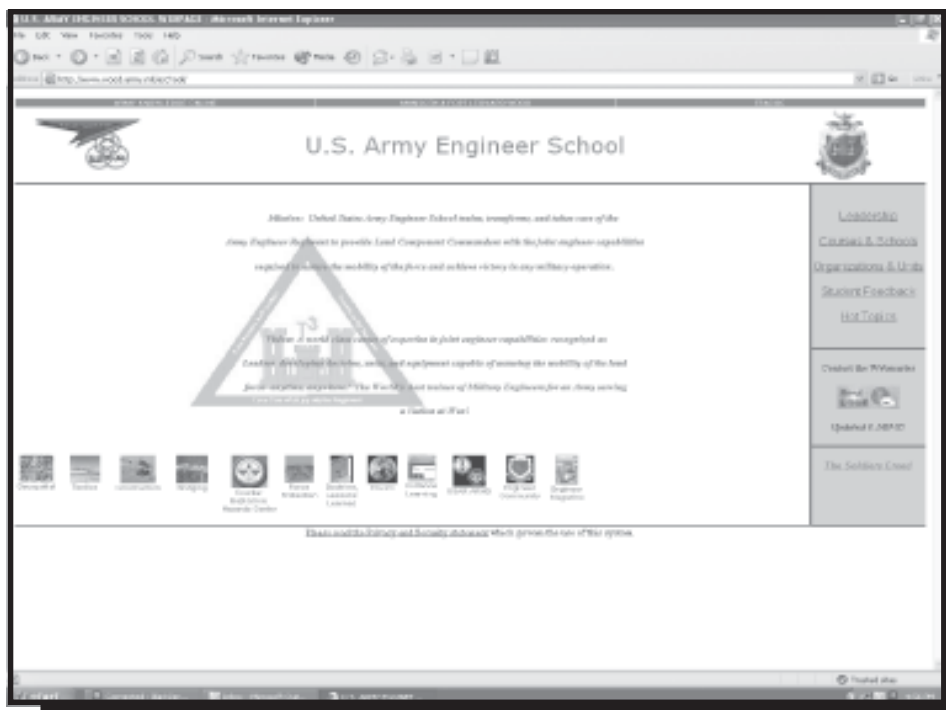
Some work was done within the US Army Engineer School on collaborative techniques to more effectively communicate with the field, but much more needs to be done. The Army Knowledge Online (AKO) collaborative Web site, located under the US Army Training and Doctrine Command (TRADOC)/Engineer School, will take more shape in the months ahead. The goal is for all leaders of the Regiment to use this tool often for getting the most current information, providing comments for various initiatives, and providing up-to-date responses to requests for information. A goal in 2005 and beyond is to work more on using collaborative feedback with the Total Engineer Regiment—utilizing the phenomenal levels of expertise and insights of our soldiers and leaders.

US Army Corps of Engineers

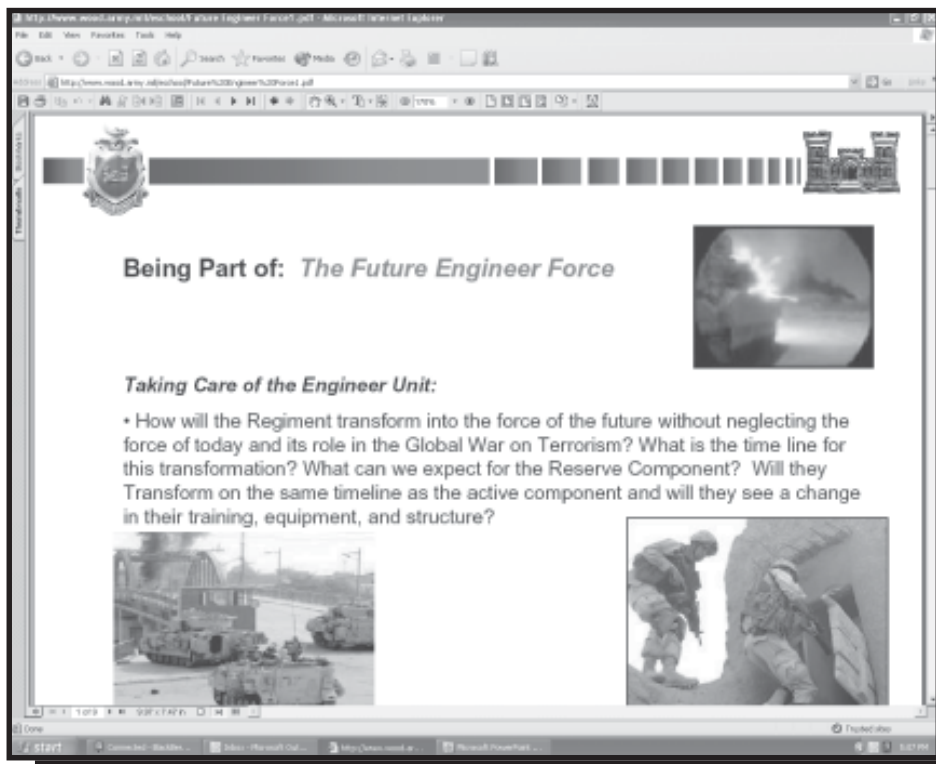
The Engineer School and the USACE Public Affairs Office are teaming in 2005 on periodic newsletters and updates periodically sent out via email. This systematic “push” of information gives the members of our Regiment the most recent situational reports (SITREPs), messages, briefings, and actions with the purpose of keeping current on “big-picture” developments. Additionally, beginning this year, the Engineer School will publish a Regimental Letter from the Commandant that is intended to inform every Soldier in the Regiment.

Engineer School Web Page

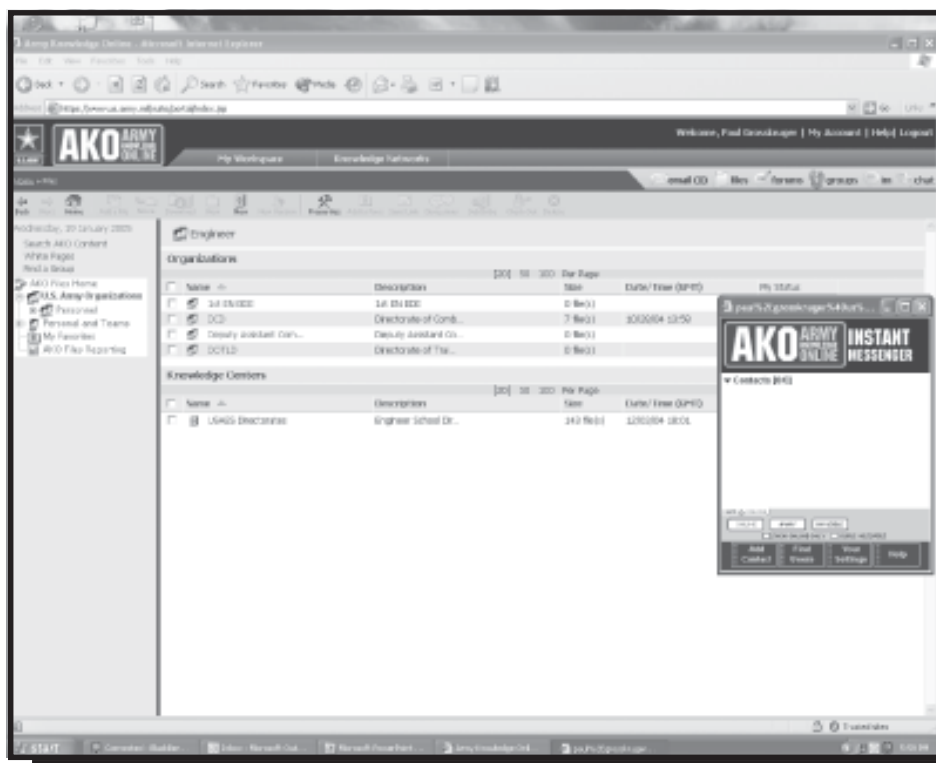
The nonsecure Internet protocol router (NIPR) Web page will continue to provide up-to-date, open-source information on the Engineer School’s mission and vision, the directorates, and course information. This will continue to be used to disseminate information on general



Engineer School Home Page



Engineer School Web Page



Army Knowledge Online Home Page

topics such as upcoming events and points of contact and for collecting requests for more information. Check this site for periodic messages and themes to the Regiment from the Engineer School.

Army Knowledge Online

An area packed with potential is the Army Knowledge Online (AKO) Collaborative Knowledge Center. Under TRADOC, the Engineer School has a site that has general, “For Official Use Only (FOUO)” information and has files for staffing and collaboration between the Engineer School directorates and leaders of the Regiment. More collaboration at the FOUO level within our Regiment—using this site—may be our “way ahead” in harnessing our limited time and resources while simultaneously ensuring that all stake holders share in the development of holistic solutions.

Secure Web Sites

There is a tremendous amount of information on the secure Internet protocol router (SIPR) knowledge sites within our major commands and functional task forces, such as that on improvised explosive device (IED) defeat. Expanded use of SIPR by our institutional base “operationalizes” the workstations of our decision makers across the Regiment. This means of secure collaboration tackles the challenges of coordinating operations across the globe, while also addressing the critical need for constant operational security. It is definitely only the beginning, since collaborative capabilities on SIPR knowledge sites are improving dramatically.

Lieutenant Colonel Gross-kruger is the US Army Engineer School Chief of Staff. Previous assignments include command of the 94th Engineer Combat Battalion (Heavy), V Corps Assistant Corps Engineer, S3 of the 36th Engineer Group, and executive officer of the 317th Engineer Battalion (Mechanized). He also commanded the 535th Engineer Company (Combat Support Equipment) and Headquarters and Headquarters Company, 82d Engineer Battalion (Mechanized).

Practical Application of the Fundamentals of Assured Mobility

By Major James M. Ahearn

The world has changed. The monstrous complex obstacles we faced in training exercises for the last fifty years have largely been replaced by point obstacles, usually in the form of an improvised explosive device (IED), small arms ambush, or a combination of the two. Although we may face the mines/wire/tank-ditch monolith again someday, we now have to focus our efforts on defeating the current threat. Too often our instinct is to rewrite doctrine—to start from scratch—when all that is really needed is a new look at the skills and tools we already have. The fundamentals of assured mobility are a case in point: this relatively new doctrinal framework simply codifies things we already know.¹ We have to be able to see and understand the battlefield faster than the enemy, and we must act in such a way that we affect the opponent's decision cycle rather than react to him. This article discusses trends identified at the National Training Center (NTC) and presents straightforward techniques that engineer staffs can use to implement the fundamentals of assured mobility on today's battlefield.

Focus on the Target

The six fundamentals of assured mobility are *predict, detect, prevent, avoid, neutralize, and protect*. The first three are purely offensive—they seek to determine the enemy's course of action ahead of time and interdict those actions. The last three are more defensive—the enemy has already been able to influence the battlefield, and we must now react in such a way as to preserve combat power and mitigate enemy action.

The mechanism for achieving the first three fundamentals is the targeting process. Many engineers (in fact, many of the key players on organizational staffs) are unfamiliar with this process because it has always been the domain of the artilleryman. Targeting is nothing more than “the process of selecting targets and matching the appropriate response to them.”² We must be alert to enemy patterns of behavior and then allocate assets accordingly in order to disrupt those patterns. This lack of successful interdiction is also seen at NTC. Over the last year, the Opposing Force (OPFOR) has routinely emplaced IEDs at the same location at the same time of day over a several-day period. Each time, the unit was slow to react—patterns were not identified in a timely manner, and

assets were not allocated to interdict the enemy. The problem is twofold: We fail to see first and understand first, and then we miss the opportunity to act first. So how do we overcome this challenge?

Effective targeting requires accurate information management. The close working relationship between the staff intelligence and engineer sections is imperative. During a rotation at NTC, the brigade engineer section will receive an incredibly high number of IED reports. Only a small number of these are actually enemy devices; the remainder are simply meals, ready to eat (MRE) boxes that fell off trucks or other trash that routinely litters the battlefield. Often, the intelligence section will conduct analysis of raw data, and engineers fail to advise them of these false reports. The result is that we conduct analysis based not only on enemy actions but also on the strength of our load plans. Obviously, this leads to improper analysis. Based on this, we may wind up setting an observation post to overwatch a bumpy section of road rather than the actual location of enemy activity!

Information management systems must be able to efficiently process data. The Pattern Analysis Plot Sheet (often referred to as the pinwheel)³ is usually developed by the intelligence section. A graphic representation of incidents complements the pinwheel and facilitates hasty identification of enemy patterns. Terrain analysis teams can produce products to support this process. Where these assets are not available, the same can be accomplished by posting sticky notes to the map. The key is to determine the minimum amount of data that indicates patterns and establish a system to effectively display that information.

Once enemy patterns have been identified, they should become the subject of the targeting process. As previously stated, the purpose of this process is to allocate available assets in such a way as to have the most damaging impact on enemy operations. Targeting is often categorized as having *lethal* (kinetic) and *nonlethal* (nonkinetic) effects. The former is a matter of identifying locations of enemy activity and identifying assets to observe targets and take appropriate action once detection is successful. Nonlethal effects is a relatively new process and is not as clearly defined. The intent is to incorporate all available assets into the concept of operations—whether they are civil affairs teams, Army

“The six fundamentals of assured mobility are predict, detect, prevent, avoid, neutralize, and protect.”

engineer construction assets, available contractor support, or even nongovernmental organizations. To understand how such assets contribute to assured mobility, consider the identification of recurring IED activity in or near an area that has less than optimal social conditions—such as a lack of electricity, insufficient sewage systems, or substandard medical care. By addressing such concerns, units can potentially deny the enemy success by robbing him of his legitimacy. As the average citizen comes to the realization that life is better without conflict, he is more likely to cooperate with friendly forces or at least discourage enemy activity in his area.

Establish a Common Operating Picture

A key element of assured mobility is a unit's ability to establish a common operating picture (COP). According to Field Manual 3-90, *Tactics*, “The commander can reduce the risk associated with any situation by increasing his knowledge of the terrain and friendly, neutral, and enemy forces. He has a greater risk of making a poor decision if his situational understanding is incomplete or faulty.”⁴ This is crucial on today's battlefield. Units routinely operate in urban environments, where observation is limited to a few blocks and unit boundaries are routinely crossed. Systems must be in place to transmit situational understanding to the lowest level. There are two primary challenges associated with establishing the COP: battle drills to receive and disseminate information and battle tracking systems that are easy to understand and update. By addressing these issues, units are better able to establish situational awareness across the entire formation, enabling soldiers to become aware of threats as they occur and avoid danger.

A critical challenge is the ability to alert units to developing situations. In order to maintain situational awareness, units must be made aware of the boundaries they will cross and contact procedures for each unit whose area they will travel. All of this must be done before leaving their point of origin and should be covered in premission briefs and rehearsals.

Another area of concern is mobility battle tracking. Successful units find ways to present pertinent information in a manner that is simply understood. An effective technique for managing information makes use of a common numbering system that identifies obstacles on the route status chart, the obstacle tracker, and the map board (see Figure 1, page xx). The ability to manage the processing, analysis, and dissemination of information enables leaders at all levels to

make informed decisions and negates the enemy's ability to influence operations.

Get EOD Into the Fight

Following the initial analysis and dissemination of information, neutralization efforts must be coordinated. Although efforts are underway to develop a graduated response to the IED threat, explosive ordnance disposal (EOD) teams are currently our only asset for disposing of explosive hazards. Too often at NTC, this valuable asset is not effectively integrated into operations due to the lack of dedicated security and ineffective systems for prioritizing EOD effort. Engineer staffs are well-positioned to rectify this situation. (See article on page xx.)

The solution is not difficult. Units must be tasked well in advance to provide security for a specified period of time, with the understanding that this security element will not leave the EOD team until the tasking is complete. One technique is to rotate the tasking among all subordinate maneuver units on a regular schedule. This technique has two advantages: it provides predictability as units determine their troop-to-task matrix, and it enables a systematic response to all levels of explosive hazards.

EOD classifies all incidents according to four categories.⁵ Category A incidents require an immediate response, while Categories B, C, and D imply a lesser degree of urgency. As the owners of battlespace, maneuver units will almost always have unexploded ordnance (UXO) incidents in their area of operations. By tasking each maneuver unit with security, they can link up with EOD and “clean up” these Category B, C, and D incidents in their area for the duration of the tasking. If a Category A incident occurs, whether it be within their boundaries or those of an adjacent unit, the security detachment and the EOD team immediately respond to the higher-priority incident. Once complete, they can return to work in their own area of operation.

EOD response must then be further prioritized. What does EOD respond to if there are two or more Category A incidents at the same time? One technique is to develop a commander's critical asset list (CCAL), which lists all of the things that the commander determines are most critical to the success of his mission. For example, in the days leading up to an election, polling sites might be at the top of the list, followed closely by routes that enable voters to travel to the polls, and then main supply routes (MSRs) (see Figure 2, page xx). This list must be

MRS Status					
Route	Priority	Status	Trafficability	Threat	
MSR Bull Run	1	A	A	Constriction at Granite Pass	G
MSR Ia Drang	2	G	G	2 Way Traffic: MLC 70	G
MSR Long Island 1	3	G	G	2 Way Traffic: MLC 70	G
MSR Long Island 2	4	G	G	2 Way Traffic: MLC 70	G
MSR Saint Mihiel 2	5	G	G	2 Way Traffic: MLC 70	G
MSR Saint Mihiel 1	6	G	G	2 Way Traffic: MLC 70	G
MSR Cantigny	7	G	G	2 Way Traffic: MLC 70	G
MSR Lexington	8	G	G	2 Way Traffic: MLC 70	G
MSR Yorktown	9	G	G	2 Way Traffic: MLC 70	G
Buna	10	B	G	2 Way Traffic: MLC 70	B
Rio Grande	11	G	G	2 Way Traffic: MLC 70	G
Chapultepec	12	A	G	2 Way Traffic: MLC 70	A

Incident Report				
Incident Number	DTG Received	Type	Location	Remarks
29	200857NOV04	UXO	NV50471693	
34	231803NOV04	UXO	NV33539534	
38	232035NOV04	UXO	NV33709510	
41	241253NOV04	UXO	NV48621318	
44	251012NOV04	UXO	NV42080789	
52	251645NOV04	UXO	NV48119491	
55	260547NOV04	IED	NV40711713	

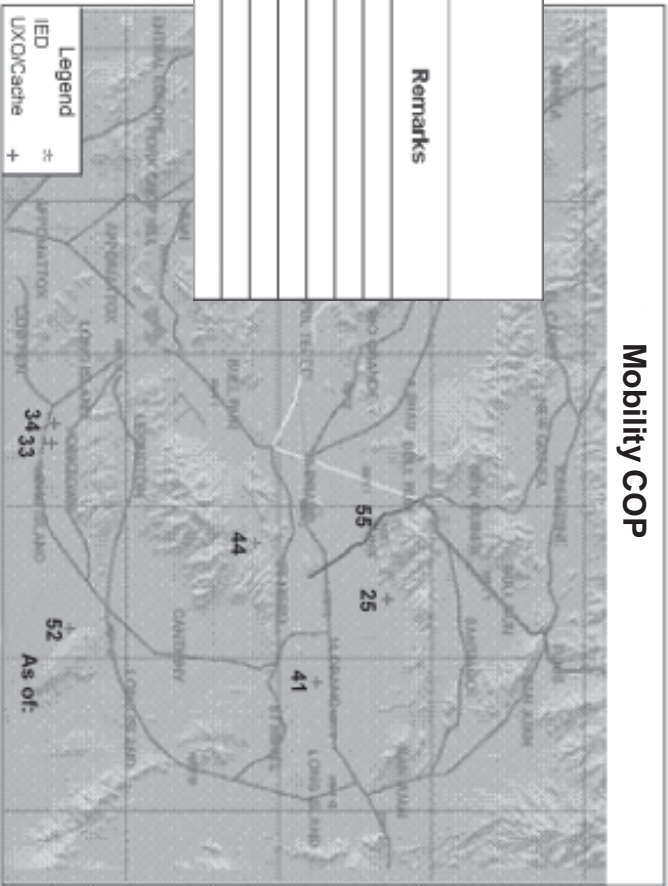


Figure 1. Mobility tracking systems that use a common numbering system allow the user to quickly cross-reference information and develop situational awareness.

reviewed and updated on a regular basis, as priorities will change constantly.

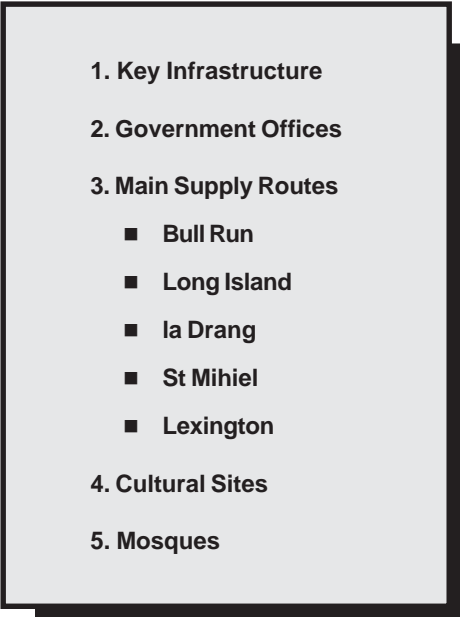


Figure 2. Commander's Critical Asset List

Summary

It is clear that the Army is fighting a new enemy, and battlefield mobility has become more important and more challenging than ever before. By leveraging the targeting process as an ongoing part of the military decision-making process, units are better able to make the most efficient use of all available assets in a continuous operations environment. By becoming an integral part of this process, engineer staffs can guide the effective use of assets to implement assured mobility. Establishing a COP is paramount. Systems that accurately portray the entire battlefield at any moment enhance situational awareness and facilitate better decision making at all levels. We will never completely destroy the enemy's ability to emplace obstacles, but successful use of limited assets such as EOD mitigates his effectiveness. By focusing the skills and tools available on assured mobility, engineers significantly contribute to victory on the front lines of today.



Major Ahearn is the Assistant Brigade Engineer Trainer at the National Training Center. Previous assignments include Assistant Engineer Operations Officer, Eighth US Army, Yongsan, Korea; and Commander, Bravo Company, 10th Engineer Battalion, 2d Brigade, Third Infantry Division, during the invasion of Iraq. He is a graduate of the Engineer Officers Advanced Course.

Endnotes

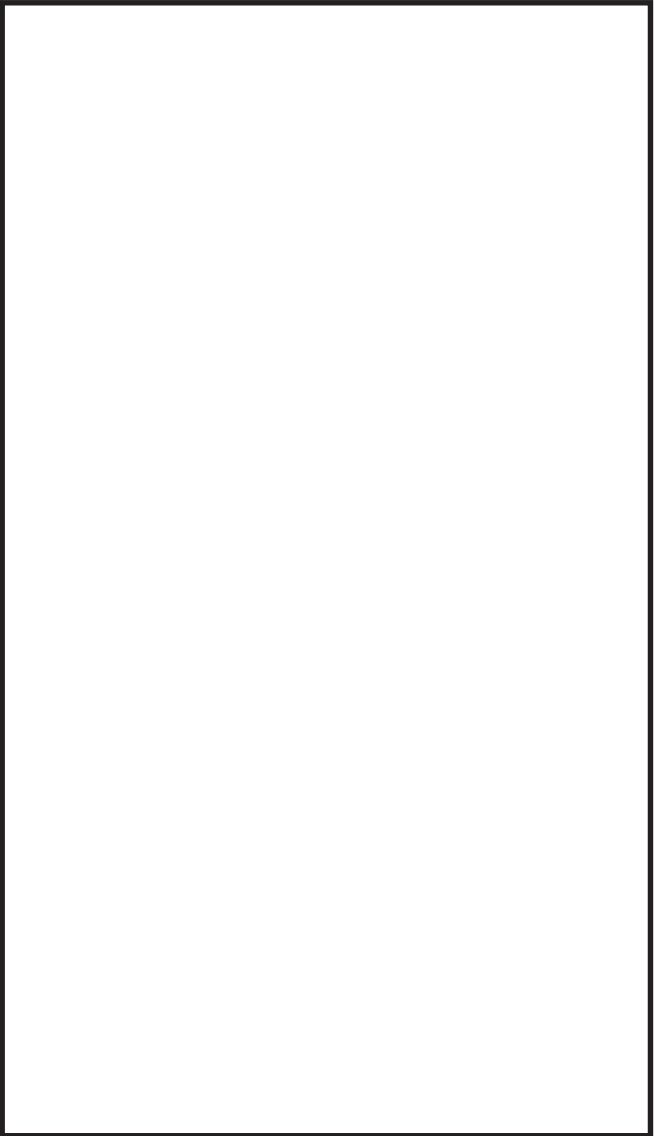
¹ FM 3-34, *Engineer Operations*, January 2004, paragraph 3-40, <<http://atiam.train.army.mil/portal/atia/adlsc/view/public/300211-1/fm/3-34/ch3.htm#p3>>.

² FM 6-20-10, *The Targeting Process*, May 1996, Chapter 1; <<http://atiam.train.army.mil/portal/atia/adlsc/view/public/296978-1/fm/6-20-10/Ch1.htm#ch1>>.

³ FM 34-130, *Intelligence Preparation of the Battlefield*, July 1994, Figure 3-3-12; <<http://atiam.train.army.mil/portal/atia/adlsc/view/public/296806-1/fm/34-130/Ch3.htm>>.

⁴ FM 3-90, *Tactics*, July 2001, paragraph 1-32, <<http://atiam.train.army.mil/portal/atia/adlsc/view/public/297119-1/fm/3-90/ch1.htm>>.

⁵ FM 9-15, *EOD Service and Unit Operations*, May 1996, Chapter One, <<http://atiam.train.army.mil/portal/atia/adlsc/view/public/296899-1/fm/9-15/Ch1.htm#top>>.



OFFICER PROFESSIONAL DEVELOPMENT



By Chief Warrant Officer 4 Frederick Kerber

"The Corps of Engineers provides the Army and the nation with officers trained and experienced in providing essential engineer support in many different forms. Engineer officers perform missions that span the entire military and civil engineering spectrum while serving our Army and nation in war and peace. Engineer officers should strive to obtain and excel in the tough assignments; this is the fundamental tenant of successful career progression in the transforming Engineer Regiment of the 21st century."

This quote from the new version of Department of the Army (DA) Pamphlet (Pam) 600-3, *Officer Professional Development and Career Management* (tentatively scheduled to be published in March 2005), first paragraph of Chapter 16, provides a great overview for our new engineer officers. Branch qualification is no longer used for the professional development of officers. The Army Chief of Staff did not like the "lily-pad" ideology to success and wants skills and experiences—rather than assignments—to drive professional development. Officers must take a commonsense approach to their own professional development.

Under the new DA Pam 600-3, three professional development tracks have been established for engineer officers:

- **Tactical Command Professional Development Progress.** Typical assignments start in sapper and Stryker companies with follow-on assignments for majors, lieutenant colonels, and colonels being unit of action (UA) engineers, UA/maneuver enhancement (ME)/unit of employment-tactical (UEX) plans engineers, brigade troop battalion commanders, UEX commanders, and ME brigade commanders.
- **US Army Corps of Engineers (USACE) Command Professional Development Progress.** Typical assignments start in modular combat engineer commands, vertical and horizontal companies, and battalion and brigade staffs, with follow-on assignments for majors, lieutenant colonels, and colonels being deputy district engineers and district commanders.
- **Nonspecific and Command Professional Development Progress.** Typical assignments are in the US Army Recruiting Command (USAREC) and training commands, with follow-on assignments for majors, lieutenant colonels,

and colonels being engineer brigade staffs, S3s/executive officers, engineer battalion commanders, garrison commanders, unit of employment-operational (UEY) plans/operations engineers, brigade commanders, and district commanders.

The new version of DA Pam 600-3 will include warrant officers, who are undergoing an education and training redesign with the integration of the Warrant Officer Educational System (WOES) into the Officer Educational System (OES). Currently, the US Army Engineer School's Directorate of Training and Leader Development (DOTLD) is conducting an analysis of "integration," where the term integration is as follows:

- **Integrated Training.** The environment (classroom) is the same, and terminal learning objectives (TLO) are the same.
- **Shared Training.** The environment is shared, but TLOs are different.
- **Shared Curriculum Training.** The environment is not shared, but TLOs are the same.
- **Warrant Officer-Specific Training.** The environment and TLOs are completely different and separated.

Engineer warrant officers are not striving to be commissioned officers or limited duty officers but will continue to be the Army's technicians.



Chief Warrant Officer 4 Kerber is the Warrant Officer Coordinator and Chief Warrant Officer of the Branch (CWOB) in the Engineer Personnel Proponency Office, US Army Engineer School, Fort Leonard Wood, Missouri. He has also served in combat engineer battalions and combat support hospitals. He has more than 30 years of active federal service, with 22 of them as an engineer warrant officer.

ENLISTED CAREER PROGRESSION



By Sergeant First Class David Hatch

The US Army Engineer School's Engineer Personnel Proponency Office recently completed a draft revision of Department of the Army (DA) Pamphlet (Pam) 600-25, *US Army Noncommissioned Officer Professional Development Guide*, which is being reviewed at the US Army Human Resources Command (HRC). Prior to fiscal year 2005, engineer military occupational specialties (MOSs) were separated into three career management fields (CMFs):

- CMF 12, Combat Engineering
- CMF 51, General Engineering
- CMF 81, Topographic Engineering

Information on these CMFs was further spread through three chapters in DA Pam 600-25. With the consolidation of all engineer MOSs into CMF 21, there are still three distinct categories within the engineer field—combat engineering, general engineering, and topographic engineering—but they are now in one CMF for ease of management. Information on all Army engineer MOSs will be located in one chapter in the revised DA Pam 600-25.

Additional revisions have linked each engineer MOS and its duty description from DA Pam 611-21, *Military Occupational Classification and Structure*, to DA Pam 600-25. The major duties and responsibilities of each MOS and grade are outlined and a list of professional reading is suggested for each skill level, since some reading may not be appropriate for all skill levels. These revisions will provide soldiers and noncommissioned officers additional direction, guidance, and assistance in managing their professional development.

A career model for each MOS, such as the 21B combat engineer model in the figure on page xx has been included in the draft revision of DA Pam 600-25. The model shows typical career progression and authorized duty titles and grade, according to DA Pam 611-21. The career model will allow soldiers to track their individual progression to see where they are and where they should be at any given time in their career.

The duty positions and titles found in the career model are linked directly to senior noncommissioned officer promotions. Recommendations from the Engineer Personnel Proponency Office are provided to board members concerning leadership

and career-enhancing positions, as well as recommended time in leadership positions.

As the Engineer Regiment transforms to modularity, soldiers in the Regiment must also transform. Soldier transformation is taking place in the form of several ongoing personnel actions within the Engineer Personnel Proponency Office. These include the creation of an additional skill identifier (ASI) for combat engineer soldiers who have successfully qualified as explosive ordnance clearance agents (EOCA). An EOCA is a soldier who has a limited ability to dispose of certain types of unexploded ordnance (UXO). This skill will enhance the ability of engineers to influence mobility on the battlefield, freeing explosive ordnance disposal (EOD) personnel to concentrate on high-payoff targets and further bridge the gap between the engineer and EOD communities.

Consolidation of MOSs 21U topographic analyst and 21L lithographer is in the works, with the end result being an ASI to designate personnel qualified as lithographers. Also ongoing is the consolidation of MOSs 21T technical engineer specialist and 21S geodetic surveyor, resulting in the deletion of MOS 21S and creating a 21T multifunctional surveyor. MOSs 21F crane operator and 21J general construction equipment operator will consolidate in fiscal year 2006, resulting in MOS 21J becoming a general construction equipment operator. Another consolidation under consideration is the combination of MOS 21J with 21E heavy construction equipment operator to create a 21E construction equipment operator. This consolidation is being reviewed by the Engineer School and the US Army Training and Doctrine Command to resolve funding issues.

The Engineer Regiment is changing daily, with the implementation of the new engineer force structure. The consolidations that are currently in progress will greatly enhance the capabilities of the Engineer Regiment for current and future operations.

Sergeant First Class Hatch is an engineer career manager in the Engineer Personnel Proponency Office, US Army Engineer School, Fort Leonard Wood, Missouri. Previous assignments include a tour in Germany and three tours in Korea. He has held numerous leadership and instructor positions, which include platoon sergeant at Fort Polk, Louisiana, and in Korea.

Years	1-2 Years	3-5 Years	6-10 Years	11-15 Years	16-30 Years
Rank	PVT-SPC	SGT	SSG	SFC	MSG/SGM See MOS 21Z
Operational Domain	Combat Engineer	Team Leader	Squad Leader	Platoon Sergeant	
	Vehicle Operator	AVLB Commander	Section Sergeant	Opns/Asst Opns Sergeant	
	Heavy Vehicle Operator	ACE Operator	Drill Sergeant / Recruiter		
	Track Vehicle Operator	Wolverine Commander	Instructor / Writer		
	Armored Combat Earthmover (ACE) Operator		Observer-Controller / Active-Reserve		
Professional Military Education	Wolverine Operator		MCMIS NCO	Intel SGT/Construction Inspector	
			Deception NCO	Project Management NCO	
			Recon SGT / Construction Foreman	Career Manager	
				Master Gunner	
				Engineer Safety LNO	
Functional Training				Asst Team Leader	
				Detachment SGT	
				Advanced Noncommissioned Officer Course (ANCOG)	
Self-Development Domain					
Links					
Promotion					
Retention Control Point					

Legend:

M/CM/S = mobility/countermobility/survivability
FAST = Functional Academic Skills Training

An example of the proposed MOS 21B Career Model

Command and Control of Construction Assets in Iraq

By Lieutenant Colonel Jeffrey R. Eckstein

At a time when construction capability within the Regiment is limited and in high demand, here are some thoughts on different ways to approach future task organizations. During Operation Iraqi Freedom, construction assets—consisting of combat heavy battalions and group headquarters—were equally distributed to the divisions and to the corps. Each division had its organic battalions, an attached group with a combat heavy battalion, and a wheeled battalion. At corps level, there were two group headquarters, a combat heavy battalion, a wheeled battalion, a combat support company, and two combat support equipment companies. This allocation resulted in the inefficient use of forces to accomplish engineer work. During my experience in corps-level combat heavy units, we did work adjacent to other combat heavy battalion areas, but it was usually at a distance from our base. The converse was also true. Divisional units executed missions adjacent to another base, traveling some distance to the mission site. This created a burden on the unit conducting these remote missions, as well as a command and control problem with coordinating movements, security, and logistics support.

Allocating construction capability across the theater based on assessed work requirements, to include civil-military projects, is a possible solution. Designate group headquarters to facilitate command and control of multiple engineer battalions over a dispersed area. This construction



capability would be subordinate to the theater engineer brigade, not the divisions. The boundaries for the group headquarters would not necessarily match the existing divisional and brigade boundaries. A group provides area support to the units within its boundaries, some of which are the division headquarters. This allows the construction capability in the corps to focus on corps priorities and distributing construction capability throughout the corps area of operations.

The corps-level units could execute the large concrete work, road and airfield repairs, and projects that would improve the local Iraqi communities. If a project exceeds a division's capability, it requests corps assistance. The engineer brigade, as directed by the corps, assigns the mission to the group responsible for that area. With the shortage of combat heavy battalions in the force, combat engineer battalions cannot be allowed to ignore simple engineering tasks, such as filling Hesco® bastions, constructing berms, digging trenches, and constructing simple wood buildings and tent pads. Any type of

engineer unit with the proper equipment can execute these missions.

An alternative to retaining the construction assets at corps level is to allocate the units to the divisions based on estimated work in their area of operations. Corps-level missions are then assigned to the divisions to execute at a higher priority than their own construction missions. This provides the divisions optimal engineer effort for their integration at the lowest level. It also allows the corps the flexibility to assign high-priority missions to the unit that owns the battlespace. The risk with this task organization is that the divisions may redirect engineer units to execute nonengineer missions.

The divisions have their organic engineer battalions. Additionally, during Operation Iraqi Freedom, most divisions have a corps wheeled engineer battalion. This gives the division three to four engineer battalions. If properly equipped with power tools and generators, these engineers can provide a majority of the division's construction needs within a base camp or forward operating base. Large projects on a base are typically executed through local contracts or through the US Army Corps of Engineers® area offices. Combat engineers are fully capable of constructing simple wood-framed buildings and tent pads, constructing berms, and filling Hesco bastions. The wheeled engineer battalions have the capability to do those tasks, as well as haul and spread gravel.

An engineer group headquarters can command and control five to seven task

organized subordinate units. During Operation Iraqi Freedom, most groups controlled no more than four subordinate units. The two groups subordinate to the theater engineer brigade collectively controlled three battalions and two separate companies. Additionally, engineer battalions command and control five to seven subordinate companies or detachments. During Operation Iraqi Freedom, the two divisions each had two colonel-level engineer headquarters. This lends itself to stovepiping of engineer effort: One headquarters deals with certain missions while the other headquarters deals with other missions. One engineer headquarters could synchronize work between all engineer assets within the division and ensure that maximum effort is applied to the division and corps priorities.

Within the Regiment, there is a tendency to think of ourselves as sappers and the other guys. We must realize that there is *one* engineer. Sometimes the focus is on sapper missions, and sometimes it is on construction missions. There are numerous examples from Iraq of the great work engineers are doing outside of their traditional missions while assigned to a specific type of unit. Being flexible enough to execute the mission of another branch is not the road to relevancy. That is the road to manpower reductions in order to buy manning for the other branches. We must always look to execute engineer missions. That is where we add value to the Army. To stay relevant, we must stay focused on *all* engineer missions.



Lieutenant Colonel Eckstein is the commander of the 84th Engineer Battalion (Combat) (Heavy), Schofield Barracks, Hawaii. He has had numerous operational deployments, including Operations Desert Shield and Desert Storm, Somalia, and Operation Iraqi Freedom. He is a graduate of the United States Military Academy and holds a master's in civil engineering from the University of Washington.



CTC Notes



National Training Center

IED Defeat Training

By Captain Andrew Liffing, Captain Jason Railsback, and Captain Matthew Louvet

How is the National Training Center (NTC) adapting to the threats encountered by coalition forces in the Global War on Terrorism? The training center is continuously changing to meet current threats. In the past few years, NTC has evolved and now offers urban and subterranean training areas and a civilian populace on a noncontiguous battlefield with no suspension of battlefield effects.

NTC spirals in lessons learned from theater, feedback from combatant commanders, and observations from the Improvised Explosive Device (IED) Task Force—to name just a few—to develop relevant, threaded rotational scenarios and events. Each rotation is 14 days of continuous operations against a free-thinking and adaptive enemy. This enemy employs current enemy tactics, techniques and procedures (TTP), and each rotation is given a role in which it acts and responds accordingly.

One of the most prevalent and deadly threats on today's battlefield is IEDs. They are replicated at NTC by a variety of means, and NTC provides great opportunities for full-spectrum, multiechelon training to defeat them. From the sensor in the observation post and squad on the ground, to the battalion and brigade battle staffs and their commanders, defeating IEDs requires an integrated approach across the breadth of the organization.

The following paragraphs briefly highlight some of the many initiatives and training opportunities that NTC offers rotational units to assist and train them in IED defeat at NTC.

IED Training Aids

The Opposing Force (OPFOR) at NTC attempts to replicate current enemy TTP in the manufacture and emplacement of IEDs. The OPFOR has the capability to initiate IEDs by either hardware or by remote control. IEDs are divided into two main subcategories—detonating and nondetonating.

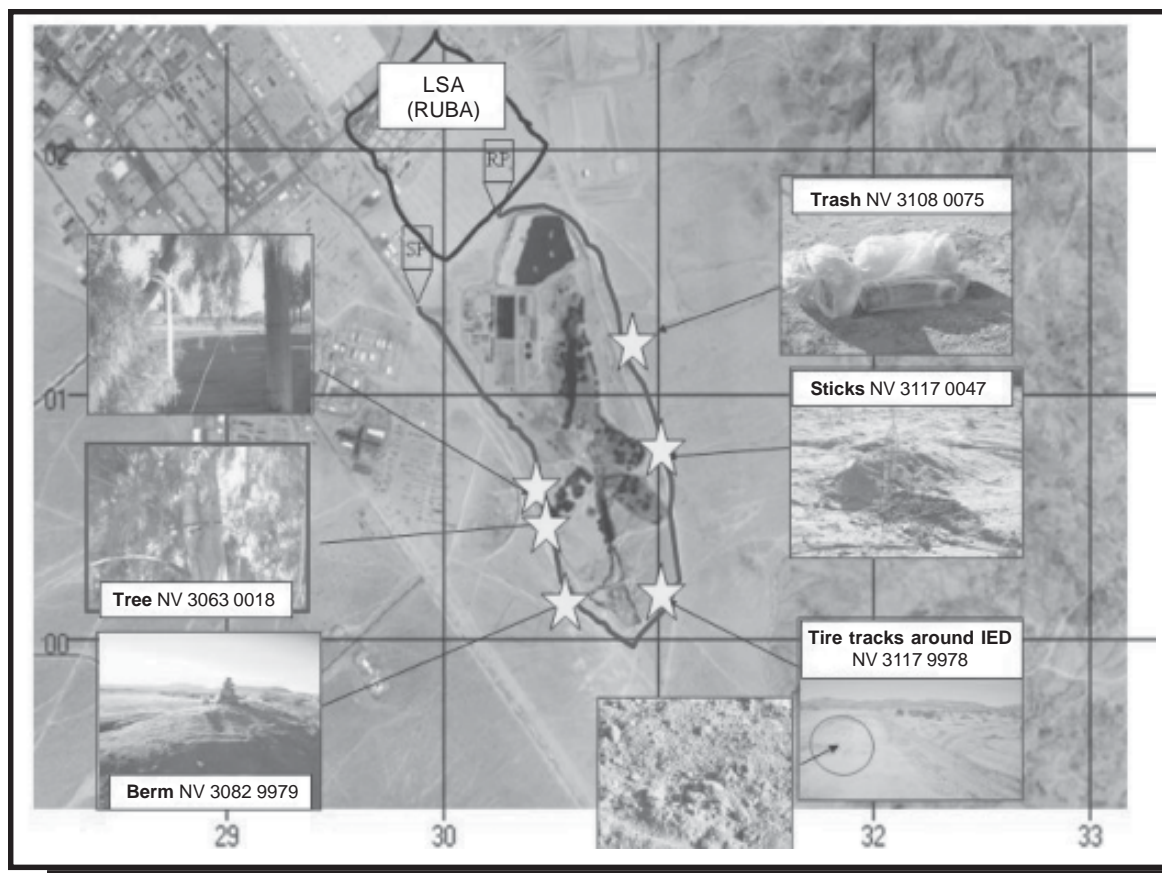
- *Detonating IEDs* are simply constructed and designed to test the unit's battle drills, reporting procedures, and casualty evacuation and vehicle recovery operations.
- *Nondetonating IEDs* are more complex and have all the components of an actual IED. They are designed to provide a more realistic and sophisticated device to train render-safe procedures to EOD technicians, as well as better replicate visually what is found in theater. During each rotation, EOD personnel have the opportunity to use all their tools, including live demolitions, to neutralize explosive hazards.

Vehicle-borne improvised explosive devices (VBIEDs) are also replicated on the NTC battlefield. They consist of a vehicle, a smoke signature (such as a smoke generator or smoke pots), and an artillery simulator. Units have the opportunity to interdict, destroy, or react to the blast. Once a VBIED is detonated, postblast analysis or evidence collection may be conducted to determine the components and other characteristics that may be tied to an intelligence thread.

IED Indicators Lane

NTC offers an IED indicators lane that a unit is able to negotiate beginning on reception, staging, onward movement, and integration (RSOI) Day 1. This lane is set up by observer-controllers using indicators seen in theater. The lane is approximately 3 miles long and contains five to eight IEDs. It is designed to show participants signs that might indicate an IED along the route.

The brigade is issued a sample order and an answer key that shows the indicator and location of each IED along the route. The unit executes the lane at its discretion. The lessons learned from this lane are taken and used throughout the rotation. Units that take advantage of this opportunity show a greater likelihood of detecting IEDs and taking appropriate action before they detonate.



IED Indicators Lane at NTC

Route Reconnaissance/Combat Patrol Force-on-Force and Live-Fire Lanes

There are two specific training events in which rotational units are guaranteed an opportunity to react to an IED: the combat patrol force-on-force lane and the combat patrol live-fire lane. During each of these lanes, the combat patrol encounters a myriad of events requiring actions and decisions, including enemy contact and react to an IED. The element can put to use its IED detection skills from the indicators lane, as well as exercise its IED battle drills, casualty evacuation, and reporting procedures.

During the live fire, units conduct similar tasks, but do so using live rounds. This trains and stresses to the unit the importance of, among other things, direct-fire planning, fire control and distribution, muzzle awareness, and risk management.

For engineers, these lanes are an opportunity to conduct IED-focused route reconnaissance. They are able to hone their unique skills and tools because the lanes are specifically designed to increase repetitions and provide a higher density of IEDs for the engineer element to encounter.

Free Play/Mission Rehearsal Exercise

During each rotation, the unit's tactical operations center (TOC) is provided with detailed intelligence and data of past

enemy activity to allow them to develop patterns to predict future enemy activity. Before a unit's 14-day training rotation, the staff is given information on enemy activity with respect to—among other things—IEDs. As the rotation plays out, units will further develop enemy patterns, allowing the unit to predict future OPFOR IED placement methods and locations and prevent these placements by either interdicting the construction, setup, or initiation of the IED.

New Equipment

Recently, NTC acquired the MATILDA I robot that units can draw and employ during their rotation. Units can request to have classes taught during RSOI on its operation, capabilities, and limitations. This device will then be available for issue to rotational units.

The MATILDA's primary use is for reconnaissance, and it can be employed in urban environments or on route reconnaissance when identifying possible IEDs. The color and black-and-white cameras allow for remote-control use, increasing standoff and allowing for quick identification of objects. The manipulator arm allows the operator to move objects, and the attached zoom camera allows for even more standoff when identifying suspected explosive devices.

NTC also offers rotational units the opportunity to improve force protection and project planning using HESCO® bastions,

New Jersey barriers, Class IV supplies, and other materials that are available to units in theater.

EOD Integration

Typically, the rotational brigade is augmented by one explosive ordnance disposal (EOD) company. This usually translates to a headquarters/operations section and one to two EOD teams, each consisting of two to three EOD technicians. While the EOD team is given an opportunity to train its military occupational specialty (MOS)-specific skills with respect to IEDs on the battlefield, the brigade hones its ability to integrate this critical combat multiplier into its formation. Since this may be the first time the brigade has worked with EOD, perhaps one of the most difficult lessons learned is the need to provide dedicated security for the EOD team(s). NTC attempts to show cause and effect so the hard lessons are learned before arriving in theater.

Another unique opportunity at NTC is live demolitions for all EOD operations. While EOD renders safe or neutralizes explosive hazards throughout the brigade's area of operation, the brigade is trained on all the coordination, management, and procedures required to perform live demolitions in its maneuver space.

IED Defeat Seminar

NTC—along with the Army Engineer Association—will host an IED Defeat Seminar at Fort Irwin from 13 to 17 June 2005. There will be briefings, guest speakers, vendors, live demonstrations, and breakout sessions—all focused on defeating IEDs. NTC will showcase some of the tools and training that rotational units receive when deployed to the training center. POC for this event is Captain Railsback at <sw12@irwin.army.mil>.



Captains Liffing, Railsback, and Louvet are currently serving as engineer company trainers at the National Training Center. All three are former engineer company commanders, are advanced course graduates, and have led combat engineer units during deployments for Operation Iraqi Freedom. For further information, contact them via email at—<Andrew.Liffing@us.army.mil>; <Jason.Railsback@us.army.mil>; <Matthew.Louvet@us.army.mil>

Endnote

¹ HQDA Improvised Explosive Device (IED) Task Force Training Advisory Team "Commander and CSM Seminar," dated 27 November 2004.

THEATER ENGINEER TRANSFORMATION

By Colonel Gerald Lago

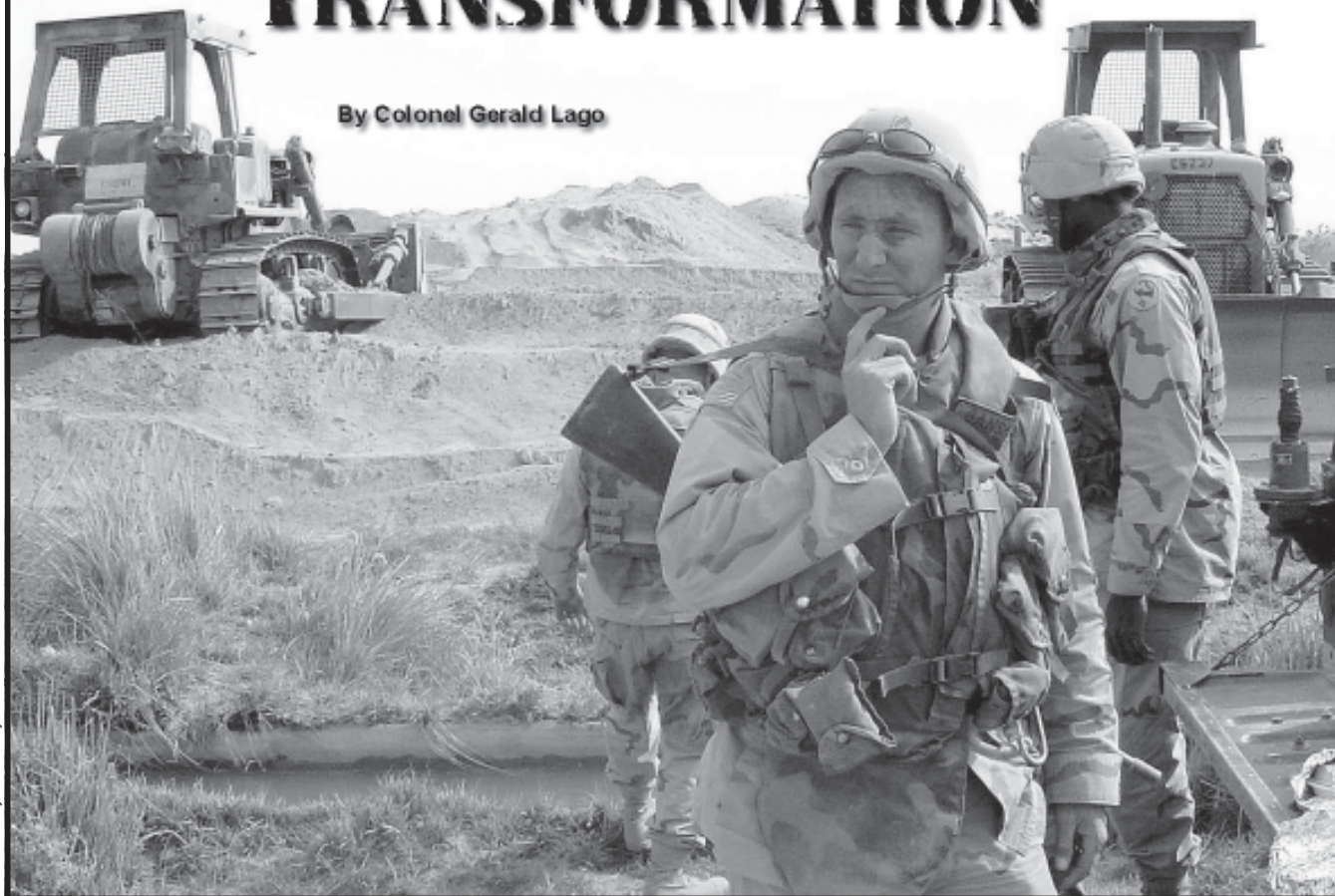


Photo courtesy of US Army

The Future Force is quickly transforming into the Current Force. Throughout this transformation, engineer support has not been a primary consideration for Army modularity. Over the past year, new Army concepts and organizations have regarded engineer requirements as little more than an afterthought. From the brigade combat teams through the unit of employment-operational (UEy), the Army has been left with stripped-down organic engineer units and minimal engineer staffing. Fortunately, the Engineer Regiment has been successful in complementing the Army modularity efforts with its own modular-designed engineer units and command and control (C2) structure (also known as the Future Engineer Force) and addressing these underresourced requirements in support of the warfight. The Engineer Regiment has successfully integrated the vast array of engineer disciplines throughout the battlespace, except in one key area—the theater.

There are still wide engineer staff, C2, and technical gaps at the UEy and the Regional Combatant Command (RCC) that need to be satisfied. The US Army Corps of Engineers (USACE) and the existing Engineer Commands (ENCOMs) can possibly fill these gaps. However, they need to be organized in such a way that they are not only responsive to the commander's changing needs, but also so they can add value effectively

and efficiently. This author proposes that a new organization be designed to leverage the existing capabilities and provide the much-needed synergy to the theater-level engineer support effort.

Future Force Environment

Based on the concepts under development, the UEy has an assigned sustainment, network, intelligence, and civil affairs headquarters. But that is it! All additional requirements are drawn from available units out of a force pool. Within the UEy organization, 37 of the 50 engineer staff members reside in its sustainment directorate. With the scope and volume of engineer-related responsibilities assigned to the UEy, these engineer staffs are too severely undermanned to handle such a diverse load.

In the joint environment, we continue to experience a lack of synergy in planning, prioritizing, managing, and executing the joint commander's operational and strategic missions. No joint functional engineer headquarters exists for orchestrating theater-assigned units and activities throughout the region. Given the wide spectrum of tasks required, joint doctrine does not adequately assign responsibility to engineer theater-level operations. Not unlike the UEy, much of the theater-level

engineer missions become the responsibility of the logistics staff section (J-4), which is fundamentally different and impractical from what is demanded of engineer support through the various phases of contingency operations.

In both of these cases, there is also a significant shortfall in the technical capability to conduct ongoing, constantly changing, and sometimes unique theater missions, particularly in the areas of major construction, infrastructure revitalization, real estate activities, and environmental support. Such expertise is usually brought from various sources, creating ad hoc entities and theater-wide gaps and redundancies with no central control or interface.

Alternatives

The following paragraphs offer several alternatives to the problem:

Engineer Brigade

A simple fix would be to augment the UEy and the joint headquarters with an engineer brigade to take care of this shortfall. However, the engineer brigade is an entity with a tactical, rather than an operational and strategic, focus. Nor is it designed with the technical capacity (breadth and depth) to plan and execute the disparate UEy infrastructure-enabling missions, whether in battle or in peacekeeping. There is also the issue of understanding and executing missions involving multiple services, contractors, other agencies, and the host nation. Clearly, we are talking about a totally different operating environment.

Engineer Command

Although originally designed as a C2 headquarters in support of a full-scale major contingency operation (MCO), ENCOMs, over the years, have developed unique and essential capabilities that have ensured theater-level success to ongoing operations. During both Operations Desert Storm and Iraqi Freedom, the 416th ENCOM led theater-level engineer efforts and are continuing the reconstruction support today. Based on the ENCOMs' long-standing planning efforts and habitual relationships with the unified commands, their unique ability to leverage and apply high-demand civilian/commercial engineering skill sets to military situations, and their senior-level breadth and experiences, they have emerged as invaluable force providers of specialized skills to support the operational commander in war or peace.

The ENCOM table(s) of organization and equipment (TOE) already charters them as the headquarters that commands and controls all Army engineer assets (to include other services and allied/coalition and contract construction) and provides engineer operational-level planning, supervision, coordination, and technical services supporting Army Service Component Command (ASCC) or joint task force (JTF) headquarters requirements. However, as has been seen elsewhere, missions and capabilities do not always match.

First, the ENCOM currently is an Army-only organization. Second, not all of the stated missions are covered with enough depth to successfully execute (for example, contract construction and topographic support). Third, it is organized and deployed based on a conventional war scenario, starting with a cross-disciplined early-deployment cell that later becomes overlaid with more of the same, but expanded, capabilities as the conflict escalates. In each phase, the ENCOM maintains its one-location, jack-of-all-trades posture. Any deviations on the employment requirements necessitates ad hoc task organizing: stripping out disciplines from existing teams. This organizational-employment pattern is not conducive to modularity and getting the right capabilities to the right place at the right time.

Field Force Engineering

On the other side of the coin are the USACE field force engineer (FFE) teams, who through recent events have brought invaluable technical engineering expertise into numerous situations, solving local- and national-level contingency problems. During both Operations Enduring Freedom and Iraqi Freedom, their forward engineer support teams (FESTs) have been materially involved supporting stability operations and support operations, as well as making significant contributions to combat operations. Through their experiences and expertise in national infrastructure engineer planning, design, and management, FESTs were responsible for the assessment, design, and planning of numerous base camps, logistics-base facilities, and transportation nodes and networks. They have the unique ability not only to work with outside agencies and other governments to accomplish their mission but also to reach back and tap into an immense intellectual pool of engineering experts throughout our nation to produce engineering solutions to any problem, no matter how obscure.

Although the USACE FFE teams have been working side by side with the military at numerous levels, they have not been a formal component of a unified effort. Technically, they are not a military organization. Many of the FFE teams are made up primarily of USACE volunteers who are assembled, as required, for deployment. There are no preestablished tables of distribution and allowances or TOE FFE organizations. The FFE support structure is basically taken out of hide to meet contingency requirements.

The Solution

Together, the ENCOMs and the USACE FFE teams have much of the capability needed to fill the wide-and-deep capability gap requirements that are necessary to run theater-level operations. They complement each other in the capabilities and skills required to achieve the engineer support aspect of the joint commander's overarching objectives.

This author proposes creating a theater-level engineer organization that not only merges the unique existing capabilities of the ENCOM and USACE FFE organizations but also enhances the structural mix with joint-capable staffing

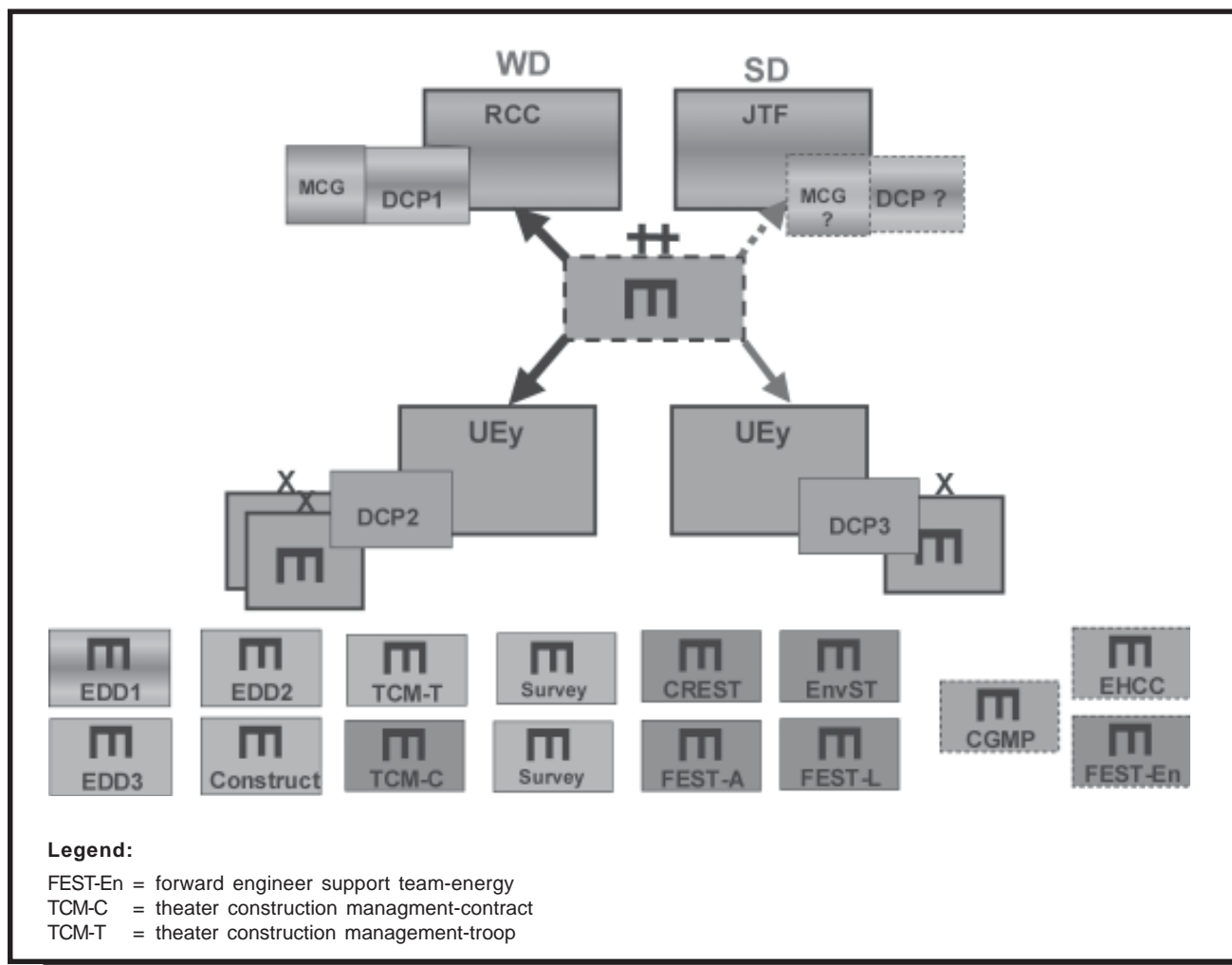


Figure 1. A Concept of Theater Engineer Contingency Support

and a modularized organization. This organization would be capable of supporting both a joint and an Army headquarters simultaneously, and perhaps independently, while providing the right technical expertise as the situation dictates. A single military organization, integrated with other services and organized in a modular fashion, could provide a powerful engineer multiplier to the theater commander.

The Organization

Rather than combine the two entities and then tweak the results, a deliberate bottom-up approach needs to be taken to build a new organization. This consists of articulating the gaps, applying required capabilities to fill these gaps, and organizing these capabilities to ensure that the right amount of ordinance is delivered with a fair amount of precision.

Much of this work has already started. Gaps and capabilities have been documented. The personnel resources have also been broadly identified. However, what joint assets are needed to round out this new organization and to ensure that decision superiority that positively impacts all services can be achieved? How will they be integrated? And most importantly,

how does this new theater-level organization employ during contingencies to meet the changing requirements of a joint operation and an Army UEy operation at the same time or more than one operation, if required?

Having a working knowledge of the capabilities of the engineers of the other services is paramount. Also, understanding how the other services operate is vital to orchestrating theater-level missions. Making decisions and planning the design of an air base, executing a logistics-over-the-shore operation, or effectively repairing a port requires firsthand experience that can only be achieved by embedding the right service skill sets into the organization, not as augmentation upon deployment, but as an ongoing practice. In other words, the organization needs to be joint from the start. Joint staffing of this organization must also be robust enough to cover any situation.

In order to provide the right engineer support at both the RCC and the UEy, while ensuring response to a second contingency, this author believes that this new engineer headquarters could be organized around three modules. These modules would consist of a joint mobile command group (MCG)

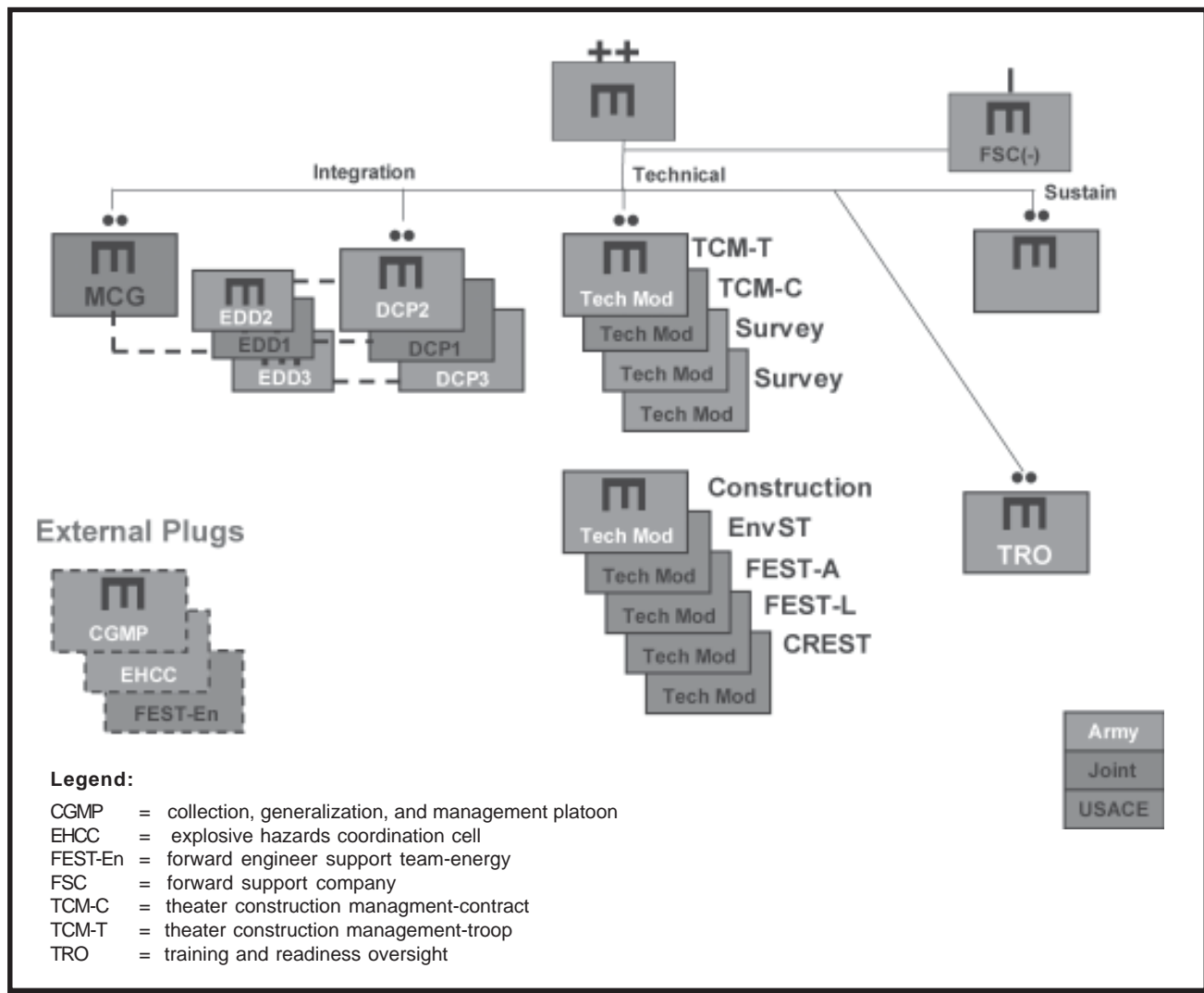


Figure 2. A Modularized Headquarters Organized for Support

and a joint deployable command post (DCP) for RCC support and two ASCC-/UEy-oriented DCPs. One DCP would support a win-decisively (WD) campaign, and the other would be used for a swiftly defeat (SD) campaign (or as a rotational asset). Technical modules from this organization would also be employed and moved to whatever level necessary to deliver engineering capabilities. In addition, already established military, USACE, and civil organizations could be plugged in for augmentation on a temporary basis, if required (Figure 1, page xx).

Within this organizational structure would be embedded technical USACE FFE modules as stand-alone entities, performing specific functions. Examples include contingency real estate teams (CRESTs), forward engineer support teams-advance (FEST-A), and environmental-support teams (EnvSTs). Other FFE capabilities and personnel would be absorbed into various staff elements throughout the organization, such as the forward engineer support teams-light (FEST-L) personnel becoming part of the early-deployment detachment (EDD) of the DCPs. Members from

other services would be incorporated into key and working-level staff positions throughout the organization. They would be heavily assigned in the MCP and RCC DCP and have a lighter presence throughout the rest of the organization, depending on the function (Figure 2). For those organizations where augmentation is likely, training associations would be encouraged.

Conclusion

This author suggests this proposal as a starting point for further evaluation and analysis. All of the components that are discussed are necessary to solve the theater-level engineer capability gap. Is there a better solution? Probably. For the sake of the future, is this worth pursuing? Definitely!

Colonel Lago has had three ENCOM assignments, totaling almost eight years. He is the Deputy Assistant Commandant, US Army Reserve, for the US Army Engineer School, Fort Leonard Wood, Missouri.

