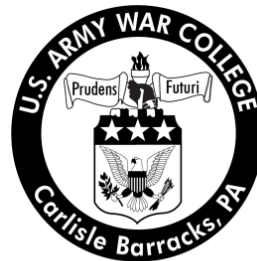


Detecting Improvised Explosive Devices: Enduring Threat Requires Enduring Solutions

by

Lieutenant Colonel Christopher M. Benson
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United States Army War College
Class of 2012

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**DETECTING IMPROVISED EXPLOSIVE DEVICES: ENDURING THREAT REQUIRES
ENDURING SOLUTIONS**

by

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ABSTRACT

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With a new defense strategy, the withdrawal of forces from Iraq and Afghanistan, and looming budget and personnel cuts, the United States has an opportunity to re-evaluate its counter-improvised explosive device (C-IED) strategies and develop enduring strategies to detect and mitigate IEDs in future conflict. IEDs are an enduring, global threat and the weapon of choice for insurgents, terrorists, and other adversaries wishing to oppose a technologically superior force. The United States has spent billions of dollars to develop technologies to detect IEDs, but those efforts have not significantly improved IED find rates. In fact, dogs, humans, and low-tech methods are the best detectors. To effectively detect and mitigate IEDs in the future, the United States must re-evaluate its strategy and export capabilities to its partners and allies to ensure they possess the capability to defeat IEDs within their areas of responsibility. This paper focuses on defeating the device, specifically ground-emplaced (buried or surface-laid) improvised explosive devices.

DETECTING IMPROVISED EXPLOSIVE DEVICES: ENDURING THREAT REQUIRES ENDURING SOLUTIONS

There are no silver bullets¹

—LTG Michael Oates,
Former Director, Joint Improvised
Explosive Device Defeat Organization

The explosion ripped through the market, killing scores of civilians, many of them women and children. Across town, another explosion rocked a local recruiting station, killing nearly two dozen young men standing in line, hoping to improve the local security situation. A third blast killed four U.S. servicemen conducting a mounted patrol on an unimproved road leading to a nearby village suspected of being an insurgent safe haven. In the previous week near that same village, separate incidents killed two coalition soldiers, a humanitarian aid worker, and a district governor.

Each of these incidents were reported by local and international media outlets (CNN, BBC, Reuters, and Al-Jazeera) and broadcast into homes worldwide. Although each was a seemingly disparate event, their ultimate effect was not. Each attack not only accomplished its tactical objective of inflicting casualties on their intended targets and disrupting freedom of movement, but they also achieved their strategic objective by influencing – at every level - the adversary’s intended audience.

The weapon employed in each of these attacks was an improvised explosive device (IED), frequently reported in the media as a “road side bomb.” Improvised explosive devices are the number one killer and casualty-producing weapon in Iraq and Afghanistan, responsible for 47.6% of all hostile fire deaths of U.S. service men and women since 2001. In total, IEDs have killed nearly 2,600 U.S. troops since 2001.²

Although civilian figures are difficult to verify, reports indicate that 60% of all Afghan civilian casualties were caused by IEDs in 2011, resulting in approximately 2,400 Afghan civilians' deaths.³

But besides the devastating casualties, IEDs have the potential to produce strategic and operational effects disproportionate to their tactical impact.⁴ Improvised explosive devices cause fear among the population and the forces involved, spread mistrust and discredit security forces and the government's ability to provide security and protection, and they erode the morale and will of the people. Because these incidents are so dramatic they gain media exposure that psychologically impacts the local population and influences domestic and international opinion that ultimately shapes foreign policy (see Figure 1).⁵

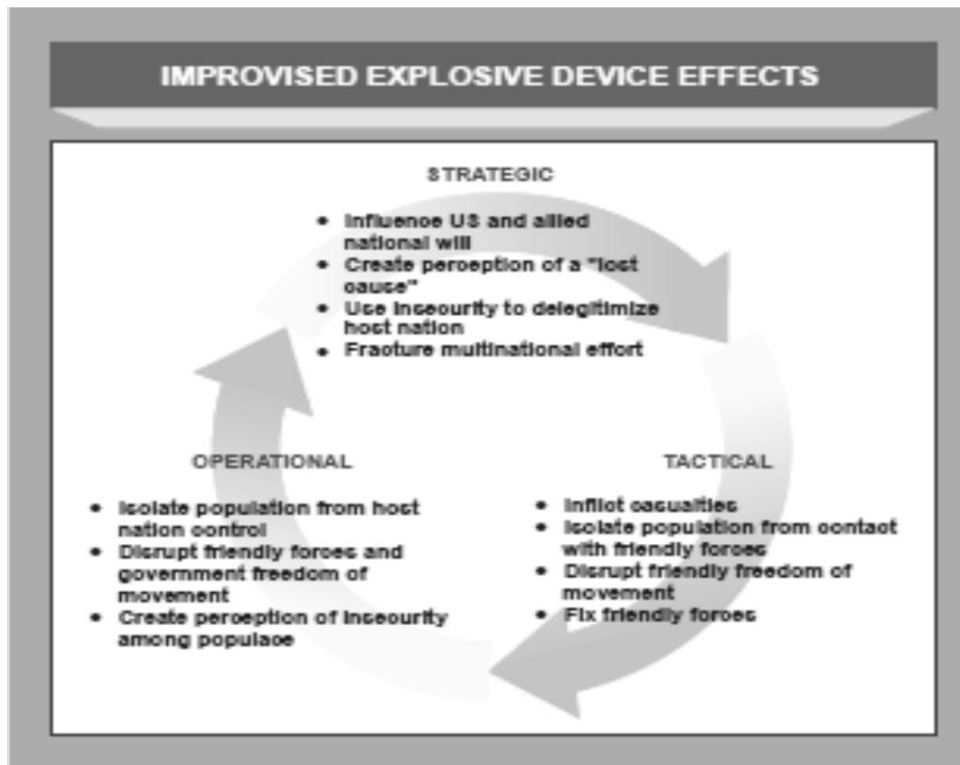


Figure 1: Improvised Explosive Device Effects⁶

As U.S. forces are withdrawn from Iraq and Afghanistan, the direct threat of IEDs diminishes. However, more than 500 IED-related events are reported each month in locations other than Iraq and Afghanistan.⁷ Employing IEDs to achieve their objectives, drug cartels in Mexico, insurgents in Malaysia, and warlords in Sudan perhaps provide a snapshot of at least one characteristic of modern war in what Sir General Rupert Smith calls Wars Amongst the People. In these wars, similar to Iraq and Afghanistan, all the people, anywhere, are the battlefield. Military engagements can take place anywhere – in the presence of civilians, against civilians, or in defense of civilians. Civilians are the targets; they are objectives to be won, as much as an opposing force.⁸ In modern war the enemy lives, operates, and conceals themselves among the people, and the enemy draws its support from the people. The familiar adage “winning the hearts and minds” of the people is paramount to success, and the will of the people – not the enemy combatants – is the objective. Perhaps most powerful, the media brings the war into millions of people’s homes around the world on a daily basis. Though they may not be directly involved in the conflict, these people possess the power of public opinion and, as such, have substantial influence on policymakers.⁹

Improvised explosive devices are inexpensive, have ubiquitous and easily obtained materials, are easy to construct, transport, and emplace, and most importantly, are very effective at the tactical, operational, and strategic levels. For these reasons, IEDs are the weapon of choice among insurgents and other actors determined to undermine more powerful opponents. As a result, the United States and its partners and allies will continue to encounter this enduring, global threat in future conflict.

Initially, the decisive victory over the Iraqi Army in 2003 seemed to validate the Revolution of Military Affairs concept, because it demonstrates that the United States' technologically superior forces could rapidly defeated one of the world's largest armies with a smaller-than-expected force.¹⁰ However, the subsequent insurgencies in both Iraq and Afghanistan and the difficulty of the U.S. in achieving its political objectives demonstrate how over reliance on technology in lieu of human capabilities has resulted in messy, protracted wars.¹¹ Likewise, to date the U.S. has focused extensively on developing high-tech solutions to defeating the improvised explosive device. Unfortunately, these efforts have not significantly improved the ability of forces to detect IEDs prior to detonation, and the U.S. is unable to defeat this threat alone. To effectively detect and mitigate IEDs in the future, the United States must re-evaluate its strategy and ensure its partners and allies possess the capability to defeat IEDs within their areas of responsibility. This paper will briefly describe the improvised explosive device threat, the United States' response to this threat, then recommend strategies the United States should emphasize to improve ground-emplaced (surface laid and buried) IED detection and mitigation in future conflict.

The IED Threat

Joint Doctrine defines an improvised explosive device (IED) as a weapon that is fabricated or emplaced in an unconventional manner incorporating destructive, lethal, noxious, pyrotechnic, or incendiary chemicals designed to kill, destroy, incapacitate, harass, deny mobility, or distract. IEDs may incorporate military munitions and hardware, but are generally constructed from components that are nonmilitary in nature.¹² Unconventional explosives have been employed in conflict for centuries, but the term "IED" did not originate until the 1970s. Prior to then such devices were

commonly called jerry-rigged bombs or some form of booby trap. History provides several examples of early forms of IEDs. In 1605, conspirators in the so-called Gunpowder Plot placed 36 barrels of gunpowder under the House of Lords in a failed attempt to assassinate King James I of England.¹³ During World War I, T. E. Lawrence placed bombs on railroad tracks and roadways to disrupt Turkish supply routes, and in World War II, Belarusian guerillas derailed thousands of German trains in one of the first examples of using both command-detonated and time-delay fused IEDs in a coordinated, large-scale operation. Many guerilla leaders, including Che Guevara, invented and employed various improvised devices in their struggles¹⁴ and in Vietnam, booby traps and other explosive devices caused one third of all US casualties.¹⁵ Afghan Mujahedeen routinely used command-detonated mines and other explosives in an improvised manner during the Soviet-Afghan War from 1979-1989, including detonating buried 55-gallon drums of thickened gasoline-oil mixture to create a flame weapon against Soviet vehicles and personnel.¹⁶ However, it was the British Army who actually coined the term “IED” in the 1970s when the Irish Republican Army “first demonstrated the level of havoc that homemade bombs could create in a sustained campaign” and transformed them from “simple, crude devices into....sophisticated devices.”¹⁷

Since then these “sophisticated devices” have continued to evolve as adversaries adapt to advances in Western technology and ever-changing tactics, techniques, and procedures. As a result, IEDs come in many shapes, sizes, and variants often classified by their method of employment, either suicide or non-suicide. Despite the many variations, IEDs usually share several common components: a main charge utilizing high-yield explosives such as C4 or TNT, or low-yield explosives such

as black powder or fertilizer; a power source such as batteries, alternating current, or recoiled springs; a command-, time-, or victim-operated switch; an initiator, such as electric or non-electric blasting caps; and a container which may be a vehicle, shell casing, pipe, plastic jug, or even an animal carcass. Some IEDs additionally contain enhancements such as fuel, fragmentation, or contamination hazards.¹⁸

Improvised explosive devices are reasonably inexpensive - components for a typical IED cost approximately \$30 – and relatively easy to construct with materials that are widely available. They are also easily transportable, can be emplaced virtually anywhere, and can be adapted for a variety of targets, circumstances, and environments.¹⁹ The combination of two factors – its low-cost effectiveness and its’ potential to produce strategic and operational effects makes the IED an attractive asymmetric option for the foreseeable future.²⁰ Indeed, “[The IED] will grow in sophistication and frequency as more enemies of peace realize the potential psychological, social and political impact a weapon like this provides. There is no other widely available terror weapon that provides the mass media focus, sheer panic and strategic influence than the IED.”²¹ This weapon, although relatively simple, is very difficult to defeat since “we have a thinking, innovative, and agile enemy making the IED fight very difficult. Within weeks if not days or sometimes hours, [the bad guys] change the manner in which they deploy [IEDs].”²²

The United States’ Response

In October 2003, in response to the escalating use of IEDs in Iraq, the United States Army established the Army IED Task Force. Its initial success allowed it to become a joint task force, allowing it to leverage experience and expertise of warfighters from across the services, increase procurement of tools to defeat the

device, and build a robust set of IED-specific force training operations.²³ Then in February 2006, a Department of Defense Directive established the Joint IED Defeat Organization (JIEDDO) with the mission to “focus (lead, advocate, coordinate) all Department of Defense actions in support of the Combatant Commanders’ and their respective Joint Task Forces’ efforts to defeat Improvised Explosive Devices as weapons of strategic influence.”²⁴ Through fiscal year 2011, Congress appropriated over \$18 billion to JIEDDO to address the IED threat. Meanwhile, other Department of Defense organizations spent billions of their own funds to develop counter-IED capabilities²⁵ For example, the Mine Resistant Ambush Protected Task Force received over \$40 billion from fiscal years 2005 through 2010 to produce and field specially designed armored vehicles to protect troops against IEDs and other threats.²⁶

To accomplish their mission, JIEDDO established three approaches, or lines of operation - Attack the Network, Defeat the Device, and Train the Force. All three are equally important to defeating the IED threat and are worth explaining in some detail. **Attack the Network** enables offensive operations against the complex network of IED financiers, suppliers, recruiters, trainers, transporters, bomb makers, and emplacements and their supporting infrastructure. This information and intelligence fusion capability is vital to attacking the network and is JIEDDO’s number one priority. Since being established in 2006, JIEDDO has spent more than \$5.4 billion on activities and technologies designed to attack the network, such as providing intelligence, surveillance, and reconnaissance platforms and information operations, counter-bomber targeting, biometrics, and weapons technical intelligence assistance and capabilities to the warfighter.²⁷ JIEDDO also established and operates many programs, centers, and

labs designed to integrate and share information and intelligence among the many counter-IED organizations. In addition, JIEDDO researches, analyzes, and exploits information, material, and forensic evidence collected from IED incidents, bomb maker factories, or other nodes within the enemy's IED network.²⁸

Defeat the Device consists of activities to detect, neutralize, or defeat the IED prior to detonation and is accomplished primarily through tactics and technology. Defeat the device includes standoff detection capabilities, armor protection, and other counter-IED technologies designed to detect, neutralize, or defeat one or more components of the device. These activities are facilitated by the rapid identification, development, acquisition, and delivery of capabilities in areas such as route clearing, device and explosive detection, robotics, and vehicle and personnel protection systems.²⁹ Through fiscal year 2010, JIEDDO obligated over \$9.4 billion on technology and programs such as robots, radio frequency jamming systems, change detection and directed-energy technologies, ground penetrating radar, specialized detection and interrogation vehicles, and many other devices and technologies designed to detect some aspect of the device or to mitigate the effects of a blast.³⁰

Train the Force supports the development and improvement of counter-IED training initiatives that enable warfighters to organize, plan, and conduct counter-IED operations. JIEDDO continually assesses joint and service counter-IED training requirements, provides training opportunities and capabilities, and ensures counter-IED equipment is properly employed.³¹ Between fiscal year 2006 and 2010, JIEDDO spent over \$2 billion facilitating the training process by monitoring and analyzing the latest threats and investigating and investing in systems and technologies to meet those

threats.³² When devices, products and systems are ready to be distributed to military forces, JIEDDO transfers them to the appropriate training organizations within the services. JIEDDO also develops, resources, and exports various training capabilities to the various services, installations, or units. Examples of training capabilities include surrogate training devices, virtual training, mobile training teams, interactive trainers, and providing assistance to units during their home station and pre-deployment training events. These events may incorporate counter-IED lane training, and training on robots, intelligence, surveillance, and reconnaissance assets and other tools Soldiers can expect to utilize in theater.³³

Consistent with notions of the Revolution in Military Affairs, technology has always been at the forefront of JIEDDO initiatives and a significant emphasis on technology supports all three approaches to the problem. JIEDDO was mandated to lead, advocate, and coordinate counter-IED initiatives, and they work in conjunction with various national laboratories, the Department of Energy, the private sector, academia, the defense industry, and other services and agencies on technologies and counter-measures to the IED threat.³⁴ In total, there are more than 100 different groups, organizations, and initiatives inside and outside the Department of Defense whose efforts are focused on counter-IED activities.³⁵

Inadequate Detection Capabilities

There is no doubt that despite the complexity and difficulty of its mission, JIEDDO has made significant contributions to the counter-IED effort.³⁶ Furthermore, there is no question that many Soldiers' lives have been saved due to the technologies and efforts of JIEDDO and the many others who have diligently worked to defeat IEDs. But while some of the technologies have proven successful, none of them have been

able to reverse the increasingly grim IED statistics. Between 2007 and 2009, the number of IED attacks in Afghanistan has tripled while deaths caused by IED attacks among U.S. soldiers have quadrupled.³⁷ While larger numbers of IEDs may result in a larger number of deaths regardless of how effective U.S. countermeasures may be, the dramatic rise in IED incidents demonstrates that insurgents have not been deterred by U.S. countermeasures. Most importantly, IED countermeasures have failed to positively change two of the most important statistics: the IED detection rate and the rate of “effective incidents” — those that injure or kill coalition forces.³⁸ The detection rate, or find rate, has remained around 50 percent, despite billions of dollars in counter-IED and detection technologies to improve it.³⁹ In Afghanistan, where unimproved roads are the norm, the percentage of effective incidents increased from 7.7 percent in 2007 to 10.0 percent in 2008 and 2009 to 10.7 percent through May 2010, the latest this information is available.⁴⁰ This evidence suggests that JIEDDO’s countermeasures have been unable to successfully mitigate the effects of IEDs. Contributing to the higher effective incident rate is the technical inability of the United States and its allies to detect IEDs from a safe stand-off distance. Safe stand-off distance is the distance required to minimize the effects of an IED blast; the more powerful the IED, the greater the desired stand-off distance. Currently, the most effective detection capabilities require personnel be in close proximity to the device.

By JIEDDO’s own admission, the best bomb detectors are low-tech means.⁴¹ Of the approximately 50 percent of IEDs that U.S. forces detect, 80 percent of those are detected by soldiers or Marines using their senses and just 20 percent are found using technology.⁴² Meanwhile, bomb-sniffing dogs are the most efficient method of detecting

IEDs, capable of locating 80 percent of IEDs when paired with trained handlers.⁴³ Additionally, dismounted troops find IEDs better than mounted troops. According to declassified military data, the IED find rate of mounted troops during the reported period was 41%, but dismounted troops found 79% of the IEDs prior to detonation.⁴⁴ These higher find rates can be attributed to the fact that dismounted operations provide soldiers better situational awareness and observation capability. Furthermore, dismounted operations encourage interaction with the local populace, which can be extremely beneficial in finding IEDs. It is clear that technology alone will not win this battle. Instead, technology “will be *part* of a complicated and variable set of responses that reduce the lethality” – and effectiveness – of IEDs.⁴⁵ JIEDDO’s goal is to make employment of IEDs an inherently dangerous, high-risk business with little return on investment.⁴⁶

Future Strategies and Recommendations

The 2012 United States defense strategy shifts from focusing on persistent irregular warfighting to a more sustainable, full spectrum concept that addresses a wider range of threats. The capability to conduct long term stability operations, such as those in Iraq and Afghanistan, is no longer acceptable as the planned budget and force structure cuts will result in smaller and leaner forces. This strategy, of course, will require more prudent decisions on when, where, how, and toward what end U.S. military power will be employed.⁴⁷ These circumstances and this strategy will force the U.S. to decide whether military force is required and whether it will be employed for wars of necessity or for wars of choice. With a reduced budget and a new defense strategy, and as U.S. military forces withdraw from Iraq and Afghanistan, there is opportunity to re-evaluate the counter-IED strategy. Improvised explosive devices are

an enduring, global threat that the United States is not capable of defeating by itself. This threat requires an enduring, yet simple and effective, strategy that incorporates the United States' partners and allies, enabling them to assist in global counter-IED efforts. Using doctrine, organization, and training as a framework, the following analysis and recommendations may assist the Department of Defense in developing or pursuing a strategy to better detect and help mitigate the effects of IEDs in future conflict.

Doctrine

General Robert W. Cone, Commander of the U.S. Army Training and Doctrine Command, says doctrine "is really the Army's way of establishing a foundation for training, educating, and equipping through a common professional language"⁴⁸ According to U.S. Army doctrine, U.S. forces will increasingly face hybrid threats, which are a diverse and dynamic combination of regular forces, irregular forces, criminal elements, or a combination of these forces and elements all unified to achieve mutually beneficial effects.⁴⁹ The enemy is smart, innovative, unpredictable, and ever adaptive, using increased technological capabilities as they hide or fight within the population.⁵⁰ Meanwhile, full spectrum operations combines offensive, defensive, and stability or civil support operations simultaneously and are embedded in Army doctrine to address the types of operations that its forces will conduct across the spectrum of conflict, regardless of the operating environment.⁵¹ Full spectrum includes conventional and irregular, as well as lethal and non-lethal operations. Yet while the U.S. Army has doctrine that addresses full spectrum operations, the operating environments of Iraq and Afghanistan shifted the Army's mindset from focusing on high-intensity conflict to counter-insurgency (COIN) and stability operations.

During counter-insurgency and stability operations, many maneuver units responsible for a geographic area of operations become over-extended due to the size and/or complexity of their battlespace, limited resources or capabilities, and the myriad tasks, duties, and responsibilities COIN/stability operations require. For example, a battlespace owner may perform clear-hold-build operations simultaneously with its battlespace as it attempts to create a secure physical and psychological environment, establish firm government control of the populace and area, and gain the populace's support. They conduct these operations either independently, with allies, or combined/partnered with the host nation's security forces. Clear operations require the removal of all enemy forces and organized resistance within the designated area. Hold operations are designed to secure the people and separate them from the insurgents; (re)establish a government presence; recruit, organize, equip, and train local security forces; and assist in establishing institutions. During build operations U.S. forces assist in nation building and building host nation capability and capacity.⁵² The variety and scope of responsibilities usually requires commanders to accept risk in certain areas of their operations. Frequently, one such area is route clearance operations which, by doctrine, are combined arms operations and the responsibility of the maneuver commander. However, in both Iraq and Afghanistan, many maneuver commanders chose to accept risk by allowing essentially independent route clearance operations be conducted by engineers using specialized route clearance equipment designed to detect and investigate – or interrogate - IEDs and other explosive hazards.⁵³ The fielding of specialized route clearance equipment and the protection afforded by mine-resistant, ambush-protected vehicles led many commanders to believe that a “route clearance

package” could perform its mission independently. Depending on the situation and environment, independent route clearance utilizing specialized route clearance equipment may be suitable. However, in areas not yet cleared or held, offensive combined arms breaching operations utilizing combat vehicles and explosive or mechanical breaching capabilities may be more appropriate (see Figure 2).

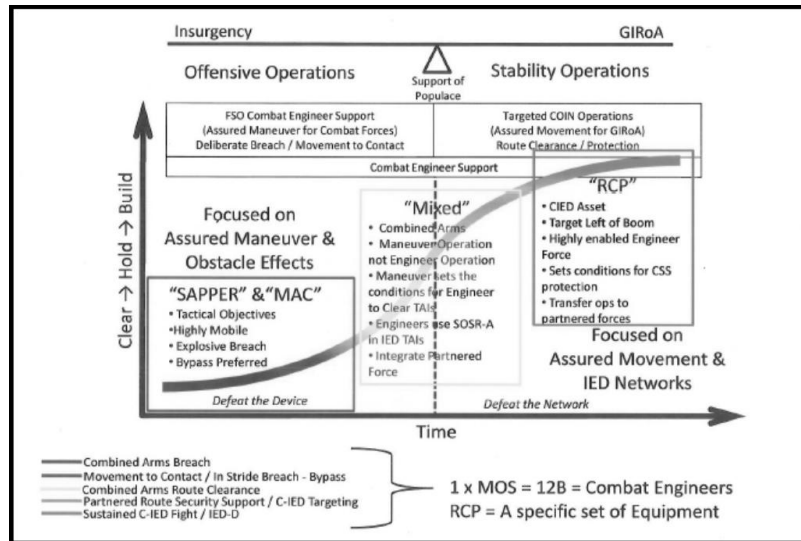


Figure 2: Full Spectrum Engineer Support⁵⁴

Combined arms route clearance and combined arms obstacle breaching operations are similar in organization (assault/security force, breach/sweep force, support/support force), incorporate the same fundamentals (suppress, obscure, secure, reduce, and assault) and require extensive planning, coordination, and synchronization.⁵⁵ But after a decade of COIN and stability operations, “common professional language” and practical experience among U.S. forces with respect to combined arms route clearance and obstacle breaching is virtually non-existent. Tactics, techniques, and procedures developed by various units for their specific situation and/or environment have been passed from one unit to the next, who modify them for their particular situation, with little understanding of the doctrinal tenets of route

clearance. As a result, understanding both the art and science of combined arms route clearance and obstacle breaching have greatly diminished.

Fortunately, the U.S. Army Training and Doctrine Command is preparing for the challenges of future conflict and re-emphasizing full-spectrum, combined arms operations through training and education at Army institutions. For example, the National Training Center recently redesigned their rotational framework to include a Decisive Action Rotation Design.

A Decisive Action Rotation focuses on Combined Arms Maneuver and Wide Area Security operations, and includes joint, interagency, intergovernmental, and multinational integration and asset synchronization, such as obstacle breaching fundamentals and Attack the Network methodology.⁵⁶ During Decisive Action rotations, leaders are trained on engagement area (where the enemy chooses to engage his target) development and obstacle integration, which is beneficial to understanding how the enemy also develops and integrates his obstacles (IEDs) in his engagement area. Units also receive training on route clearance, robotics (for IED detection and interrogation), and search and tactical site exploitation (for detection and evidence collection). Additionally, maneuver units will conduct an attack against a hybrid threat which requires a combined arms obstacle breach - potentially against conventional (wire and mines), unconventional (IEDs), or situational (scatterable/self-destruct mines) obstacles – in a scenario where the population is key terrain.⁵⁷ Decisive Action rotations provide the primary rotation format while the COIN scenario that most units deploying to Iraq and Afghanistan experienced the past several years will gradually be reduced.⁵⁸ Interestingly, doctrine that was effective against explosive hazards, both conventional

(mines) and unconventional (IEDs), was taught and exercised in the years prior to the conflicts in Iraq and Afghanistan, but the emphasis on COIN and stability operations in those wars has not allowed for the effective utilization of forces to employ that doctrine. Returning to proven combined arms maneuver doctrine will enhance the ability to defeat IEDs and meet the challenges of hybrid threats in future conflict.

Organization

The primary units tasked with defeating the improvised explosive device have been engineers and explosive ordnance disposal (EOD) units. Engineers use specialized route clearance vehicles and equipment and specialized tools (ground penetrating radar, mine detectors, robots, optics suites, etc...) to detect IEDs. Once detected, if the engineers are not capable of neutralizing the device, EOD is called to neutralize, render safe, and/or collect evidence. Unfortunately, there are only so many route clearance engineer and EOD units in the Army inventory. In 2010-2011, Afghanistan had a requirement for 75 route clearance packages.⁵⁹ The U.S. Army has only 12 Route Clearance Companies, each consisting of three route clearance platoons and one area clearance platoon.⁶⁰ Clearly, the demand did not meet the supply. As a solution, the Army re-missioned other combat and construction engineer units and units from other branches (such as field artillery) to fulfill this requirement. Many of these re-missioned units had no training on route clearance prior to deployment.⁶¹ The utility of such units performing a highly specialized and dangerous task is questionable, and given the construction and non-engineer units' general lack of understanding of route clearance and obstacle breaching fundamentals, it is also extremely dangerous. No specific data on unit find rates, casualties, or effectiveness were available for this paper. However, if these non-route clearance units were deemed successful at conducting

route clearance operations with minimal training or prior experience, it calls to question whether specialized route clearance units should be a permanent part of force structure. This author believes an engineer is an engineer and all engineers should understand the fundamentals of combined arms route clearance and combined arms obstacle breaching operations either in theory or in practical application. Specialized units limit flexibility and utility of the force. The detection tools (i.e. visual, mine dog, mine detector, ground penetrating radar) and the delivery means (dismounted or mounted) are merely considerations and options that should be part of a coordinated plan that incorporates the tenets of these operations.

As U.S. forces are spread thinner, they must be ready to perform a wider array of missions. General David Rodriguez, Commander of U.S. Army Forces Command, said “I don’t think we can afford to have a bunch of tailored forces for different things. We’re going to have to be able to operate across the full spectrum of conflict and use the tools and apply them in the right way.”⁶² Unfortunately, the current modular design of engineer forces renders these specialized units less flexible and less adaptable, the very characteristics that are necessary in future conflict. Due to their specialized equipment and training, route clearance platoons are ill-suited for engineer missions other than route clearance in relatively stable environments (refer to Figure 2) primarily because their big, heavy, armored vehicles lack maneuverability and off-road capability and are vulnerable in combat environments where the enemy is able to emplace large, deep-buried IEDs.⁶³

Currently, Brigade Combat Teams (BCTs) lack the required engineer command and control and baseline organic gap crossing, construction and route clearance

capabilities.⁶⁴ This capability gap contributes to the lack of understanding and employment of combined arms mobility support. In an effort to provide more flexibility and agility, the Army is proposing adding a maneuver battalion as well as additional engineers to the BCT structure.⁶⁵ The additional engineers may come in the form of the proposed BCT Engineer Battalion (BEB). The BEB provides critically needed baseline engineer capabilities to BCTs enabling them to conduct full spectrum operations with organic assets. The combat engineer company that currently resides in BCTs receives additional personnel and equipment to address gap crossing capability shortfalls. A second construction engineer company is added to meet route clearance and horizontal/vertical construction requirements.⁶⁶ While not the optimal solution, the BEB addresses the need for full spectrum engineering capabilities to reside in the BCTs, and provides organic capability to conduct mounted and dismounted route clearance and manual, mechanical, and explosive obstacle breaching capabilities.

Regardless of the structure, the United States must train and equip its forces for the full spectrum of conflict. The U.S. cannot afford tailored or specialized forces that are only capable of conducting a handful of mission sets. Route clearance companies that only have route clearance equipment designed for on-road stability-type operations have limited flexibility to perform other engineer-related missions. Engineer forces must be engineers first, with route clearance as one of many tasks they can perform, and they must be equipped to conduct full spectrum operations, including off-road maneuver and combined arms breaching operations with appropriate equipment such as mechanical and explosive breaching, assault gap crossing, and combat trail construction capabilities. The inability to provide such mobility support to the maneuver

commander at any given time renders engineer support inadequate. A well-trained force is able to mitigate IEDs through sound tactics, techniques and procedures based on proven obstacle breaching and route clearance fundamentals and doctrine.

Training

Training the force is an essential element of the overall counter-IED strategy and complements efforts to defeat the device and attack the network. However, JIEDDO concedes that stand-off detection of IEDs with technological solutions remains elusive and its former commander states the “greatest return on the dollar has been training soldiers to detect (IEDs).”⁶⁷ Since Defeat the Device is primarily accomplished through tactics and technology, and high technology has been ineffective, the United States should focus its training efforts, and the efforts of its partners and allies, on tactics and personnel using low-technology methods. The individual soldier and the squad, the foundation of the decisive force, are those most likely engaged by the enemy and must have the tactics, training, tools, and knowledge to effectively detect and defeat IEDs.

Training is the base of all Army units and proper training is the foundation for all other enabling technologies.⁶⁸ But the current Director of JIEDDO, Lieutenant General Michael D. Barbero, says the emphasis on technology has provided soldiers a “dizzying array of high-tech devices, ranging from miniature robots to sensors mounted on balloons and unmanned drones, to handheld detectors, ground-penetrating radar and explosive-sniffing dogs.” And the stumbling block is that soldiers and Marines are not well trained in using these technologies. “We have focused on pushing these equipments (sic) and enablers and detectors out to the theater...but that creates a challenge of training.” In some cases, he said, the first time soldiers and Marines see the new equipment is when they show up for duty in Afghanistan.⁶⁹

Soldiers are overburdened with technological solutions that do not provide results, and such a burden has major disadvantages. Soldiers of today must master an ever-expanding array of high-tech intelligence, surveillance, communications, and other equipment.⁷⁰ For example, to counter the threat dismounted forces face, JIEDDO's latest defeat the device efforts provided IED detection dogs, handheld detectors and a variety of intelligence, surveillance and reconnaissance capabilities to improve the warfighters ability to identify networks and find emplaced devices and processing locations.⁷¹ But as units are provided the latest gadget designed to detect or neutralize a specific component of an IED, each gadget comes with its own set of requirements that may prevent that operator from performing his assigned duties and responsibilities within his team, squad, or platoon. Each new gadget also requires maintenance support, which usually requires a different contractor for each gadget. For example, an engineer platoon operating in Afghanistan in 2010 had *19 different contractors* responsible for maintaining its suite of route clearance equipment, requiring an inordinate amount of coordination just to maintain its equipment for each mission. This engineer platoon had 28 personnel assigned, each of whom had specific responsibilities within the platoon to ensure mission success. However, each new gadget required they operate that tool instead, or in addition to, their other duties degrading their capability to perform other assigned and required responsibilities.⁷²

Other disadvantages related to new technology involve training. When tools are fielded, soldiers are designated to attend specialized operator training. Many times, only the operator receives this training. If available, unit leaders may receive an overview, but the days of NCOs and small unit leaders knowing everything about all

their equipment lie in the past. How to effectively employ and integrate the device during combat operations may or may not be trained – or even understood - by the contractor providing the training. In many instances, the only person in the unit with any real knowledge of the device may well be the junior soldier who attended the five day operator's course. This training framework can lead to improper employment and/or integration of the device during mission execution. Additionally, the development of the junior leader is often degraded as the onus for training, knowledge, and proper employment of the device is now on the contractor and the operator, respectively, not the non-commissioned officer.

Clearly, these new devices can easily become a burden to a smaller and leaner force, as the Soldier essentially becomes the operator and caretaker of the new device and is unavailable for any other task while performing this role.⁷³ Additionally, the fact remains that this technology only finds a small fraction of IEDs prior to detonation⁷⁴ and industry will develop, and Congress will fund, only so many technologies and systems. Additionally, due to security concerns, those systems will likely only be provided to and operated by U.S. forces.

Recommendations

The United States must improve its effectiveness against IEDs. IEDs are a global threat that requires a global response. Future conflict will likely be against hybrid threat and amongst the people. The United States needs to focus its efforts on a global strategy that emphasizes areas that are most cost-effective, and areas where its partners and allies can contribute. Therefore, while continuing to develop, refine, and provide high-tech capabilities and stand-off detection technologies, the U.S. needs to develop a strategy that focuses on success – low-tech and human detection capabilities

and sound doctrine and tactics. Individual training should continue to focus on integrating and improving capabilities in such areas as basic IED indicators and component identification, employing mine detection dogs with handlers, utilizing visual and change detection techniques, identifying soldiers with cognitive expertise in detecting IEDs, improved robotics, employing successful low-tech tools such as the Holly Stick⁷⁵ and other simple yet effective tools, and interacting with the populace. Collective training should emphasize the sound fundamentals of route clearance and obstacle breaching operations. This type of training emphasizes sound doctrine and tactics, not tools, and puts the onus back on the leader, not the contractor, to train and develop his unit. The leader, in turn, is afforded the opportunity to develop professionally himself and his soldiers. Leadership, development, acquiring and sustaining skills and expertise, and building and maintaining trust are key attributes of a professional and of the profession of arms.⁷⁶ Allowing leaders to practice their profession enables them to be lean, adaptive, and agile – traits necessary for future conflict. Equally important, the United States must share information, collaborate, and export counter-IED capabilities to its partners and allies. A positive step toward that end is the recent authorization allowing U.S. allies in Afghanistan limited access to a classified website called the JIEDDO Knowledge and Information Fusion Exchange, the U.S. military's premier storehouse of information. This site stores data on how insurgents use IEDs, techniques to defeat IEDs, and how both threats and responses change.⁷⁷

The term "Building Partner Capacity" is perhaps more important now than ever in the IED fight. Partners and allies of the United States must have the ways and means

to defeat – or at least manage – IEDs. The U.S. must export its Defeat the Device and Attack the Network training, methodologies, and capabilities to its partners and allies because this is critical to increasing their counter-IED capability. “The stronger our coalition is in [using] a global tactical network,” says Gary Carlberg, a top JIEDDO official, “the quicker we can stop a global strategic weapon.”⁷⁸ When building partner capacity, the U.S. must emphasize sound doctrine and the fundamentals of combined arms breaching and clearance operations. Allies must have this capability since the U.S. does not, and will not have the resources to continually clear routes in the manner in which they’ve done in the past. Additionally, partners, and potentially allies, of the United States know and understand the population and their networks better than U.S. forces do. Establishing relationships and determining criminal networks takes significant time and effort. If the new defense strategy is more decisive action and less long-term stabilization operations, then U.S. military forces may not be able to effectively provide that capability. Therefore, the U.S. must export Attack the Network capabilities to law enforcement and security forces of its partnered and allied nations.

Conclusion

Improvised explosive devices are an enduring global threat. The enemy will continue to adapt to counter its’ adversary’s technologies, tactics, and tools. Despite spending billions of dollars on detection technologies, the United States has yet to develop an effective long range stand-off detection capability and find rates prior to detonation have remained at around 50 percent. The best methods of detection remain mine detection dogs, humans, and low-tech tools. Budget and force structure reductions, coupled with a defense strategy that emphasizes combined arms maneuver and wide area security while de-emphasizing long-term stability operations requires a

renewed focus on combined arms maneuver doctrine. To mitigate the effectiveness of IEDs in future conflict, the United States must re-emphasize the fundamentals of combined arms route clearance and combined arms obstacle breaching operations utilizing proven doctrine and tactics. Soldiers using sound doctrine and tactics, not high-tech tools, will render this threat to more manageable levels. However, the United States cannot defeat IEDs alone. It must export its Defeat the Device and Attack the Network training, methodology, and capabilities to its partners and allies in order to be effective. Failure to develop an effective strategy will result in continued engagements against this tactically lethal and strategically effective weapon.

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