

Of IEDs and MRAPs: Force Protection in Complex Irregular Operations

by

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Executive Summary

Simple solutions to complex problems are inherently attractive and almost always wrong. So it is with the Pentagon's recent decision to enter into "crash" production of Mine Resistant Ambush Protected armored vehicles, or MRAPs. Political and military leaders are currently grappling with this problem, which can be summed up as: How much to invest in a new system that appears to provide enhanced protection for troops against the most common, lethal threat in Iraq, without undermining either the ability of the force to conduct the current mission set before it, or the ability to remain effective across the range of missions and operating environments it will also have to be ready for in the years ahead?

This paper's purpose is not to offer a definitive answer to this question; rather, it seeks to ensure that the issues relevant to arriving at a good decision are given proper consideration. Those readers seeking a specific recommendation regarding the overall mix of armored vehicles in the US military's ground force structure will not find it here. However, those who are interested in how to think about the issue in their efforts to reach their own conclusions will hopefully find what follows to be useful.

THE IMPROVISED EXPLOSIVE DEVICE CHALLENGE

On March 20, 2003, US and British military forces, as the vanguard of a coalition force, executed a classic and militarily decisive invasion of Iraq with the objective of deposing the regime of Saddam Hussein. Within three weeks, Iraqi conventional military forces were defeated, the Iraq government had collapsed, and Baghdad was occupied by the US military. On May 1, 2003, President Bush announced the end of

“major combat operations.” The military defeat of Iraq had been accomplished using the full range of conventional combat power available to US and UK forces—armored formations of tanks, supporting artillery, dominance of the air by US and Coalition air forces, and supporting precision fires from air and naval platforms. It was precisely the kind of war the US military had been organized, trained and equipped—with its platforms, vehicles, and munitions—to win.

Unfortunately, post-May 2003 operations have been a different story.

Soon after the conclusion of “conventional operations,” the US military found itself increasingly confronted by irregular forces employing unconventional tactics in largely urban settings. Unable to match the US in conventional firepower and set-piece battles, the insurgents initially resorted to ambush tactics and the sporadic use of indirect fires (mostly mortars). Insurgent forces soon shifted their tactics to emphasize suicide car bombs and the increased use of improvised explosive devices (IEDs). The complex urban terrain of major cities, towns, and villages provided ample concealment for such attacks, and IEDs provided an ideal means to attrite US forces on patrol at very little risk to the insurgents.

As US troops have discovered, a force optimally equipped for fast-paced, mechanized, combined arms operations within a conventionally configured battlespace is not well-suited for counterinsurgency operations in complex urban terrain. In particular, the standard utility vehicle—the ubiquitous “Humvee”—has come to represent one aspect of the US military’s unpreparedness for the irregular warfare it now wages in Iraq and Afghanistan. Conceived and designed to support operations in relatively benign environments behind the front-line engagement zone, the 1980s-vintage “soft-skinned” Humvee proved highly vulnerable to IED attacks, which are currently responsible for roughly two-thirds of all American casualties.

The Pentagon has been struggling, with limited success, to counter the IED threat through several initiatives: improving tactics; enhancing force education and training; developing technological fixes to jam IED-triggering signals; improving surveillance to detect enemy efforts to emplace IEDs; attacking the IED “supply chain;” and improving armor protection. With regard to the last initiative, early efforts amounted to little more than troops scavenging for steel plate to bolt and weld to

unarmored Humvees. This was succeeded by the dispatch of armor kits to the field and the production of “up-armored” Humvees. While these kits provided greater protection, the enemy has responded to this evolving armor/anti-armor competition by increasing the size and explosive force of the IEDs, and by employing sophisticated “explosively formed projectiles” (EFPs) in the IEDs that are capable of penetrating even the most heavily armored vehicles.

MRAPs: SOLUTION, ILLUSION, OR SOMETHING IN BETWEEN?

In this environment, American field commanders began to question whether greater use should be made of heavily armored vehicles in support of the infantry operations critical to successful application of counterinsurgency doctrine. Mine Resistant Ambush Protected vehicles are specifically designed to protect against blast and shrapnel from mines and mine-like explosive devices. The vehicles have demonstrated a remarkable ability to protect troops from the blast effects of IEDs. Engineered with a v-shaped hull, high ground clearance, and heavy armor, the MRAP design deflects the blast away from the passenger compartment far more capably than the Humvee. Attracted by the MRAP’s obvious benefits, some members of Congress and at least one senior US commander began calling for the wholesale replacement of Humvees with MRAPs. Secretary of Defense Robert Gates has authorized what amounts to the crash production and fielding of MRAPs.

This desire to provide US troops in the field with the best protection available is understandable. Yet the MRAP is not likely to prove a panacea for the IED threat. There are a number of issues that must be considered in determining the proper mix of armored vehicles for the US military’s ground forces.

For example, the protection provided by MRAPs comes at a price. Whereas a latest-generation Humvee costs approximately \$150,000, and its planned successor is estimated to run \$250,000, MRAPs average \$800,000 or more per vehicle.

To those who argue that price is no object when it comes to protecting US troops, there are likely other costs to be incurred as well. For

example, the MRAPs are two- to five-times heavier than Humvees. This translates into greater fuel requirements, which means putting more fuel convoys on the roads—convoys that must risk IED attacks against their thinly armored supply vehicles. Counterintuitively, it may also be that a better way to reduce overall US casualties is to have personnel operate *outside* their vehicles. Successful counterinsurgency (COIN) operations, in particular, require close contact with the local population to provide them with security and to develop a working knowledge of the local environment that, together, produces the intelligence necessary to defeat an insurgent enemy force. This approach is similar to law enforcement techniques that emphasize policemen “walking the beat” in a neighborhood as opposed to merely driving through it in a squad car. Simply put, commanders may have to risk some casualties in the near term, by having their troops dismount, in order to develop the secure environment that yields the intelligence that will reduce the insurgent threat—and US casualties—over the longer term. Given this approach, which is consistent with the military’s new COIN doctrine, the MRAP—at least in this situation—may send the wrong message to troops in the field.

Moreover, to the extent secure areas are created as a consequence of US COIN operations, the threat posed by IED attacks can be expected to decline. As this occurs, the risks to troops moving about in combat vehicles will decline, reducing the need for heavily armored vehicles. As US troops move away from simply driving through unsecured areas (“Driving around Baghdad,” or “dabbing” as the troops call it) and get down to the serious business of executing COIN doctrine by progressively securing one area after another, the need for heavily armored vehicles should decline.

There are also temporal factors that must be considered. There is widespread discussion regarding the reduction of US troop levels in Iraq, beginning perhaps as early as the end of 2007. Some members of Congress, and some candidates running for the presidency, are advocating large-scale US troop reductions over the next few years. If this comes to pass, it may be that just as MRAP production begins rising, US troop levels will be falling.

This leads to the question of the MRAP’s life span, which may easily extend a decade or longer. Consequently, any decision for mass production must be informed not only by the conflict environment in

Iraq, but also the challenges posed by anticipated future contingencies. For example:

- The US military has become increasingly expeditionary since the Cold War's end, meaning fewer forces are permanently stationed abroad and so must be transported to the scene of action. Yet MRAPs are far heavier than the armored vehicles they are replacing. The heavier a force is, the longer it takes to deploy. How does the Pentagon plan on "squaring the circle" here?
- How does the MRAP fare as a member of a mix of ground combat force armored vehicles in addressing emerging challenges at the operational level of war (i.e., the level at which military campaigns, or operations, are conducted)? Do MRAPs provide a good (let alone optimal) capability in power-projection operations against the full range of ground force contingencies?
- What are the opportunity costs involved in the crash production and large-scale fielding of MRAPs? Simply put, since a defense dollar can only be spent one time on one priority, what priorities will not be met as a consequence of the shift to MRAPs?

In summary, there are no easy answers to defeating the IED threat or for protecting American troops from harm in what are inherently dangerous operations. The reality is that US forces will, at times, have to put themselves at risk in order to destroy enemy forces, protect noncombatants, or keep warring parties apart long enough for political solutions to be found and implemented. All the while the enemy will constantly be searching for ways to frustrate these efforts and inflict as many casualties as possible on US troops.

Armored vehicles will almost certainly play a major role in ground combat operations over the foreseeable future, and MRAPs will likely play a significant role in many operations. However, the relative mix of light, medium, and heavy armored vehicles required for the Iraq battlefield, and for other potential contingencies, has yet to be determined. While MRAPs provide increased protection to light infantry forces, the stated intent to improve force protection dramatically by replacing Humvees (and other light utility vehicles) with MRAPs may have negative repercussions on the ability of US ground forces to accomplish their operational objectives, both in Afghanistan and in Iraq, and in future contingencies.

Given the human and materiel costs at stake, a thorough analysis of this issue, one that addresses the factors noted above, should be undertaken at the earliest opportunity in order to better inform the decision to mass produce the MRAP.

I. Introduction

We know that MRAPs save lives...So with that knowledge, *how do you not see it as a moral imperative to get as many [of] those vehicles to theater as rapidly as you can?*...I just see it's absolutely critically important to us to push this vehicle as hard as we can so that we save lives, in the process perhaps convince the American people that we can get after this casualty thing in a real fashion and maybe buy more time on the part of our countrymen to get this thing settled. [Author's emphasis]

Gen. James Conway, USMC, May 17, 2007¹

Today's news that our troops in the field pleaded for Mine Resistant Vehicles as far back as 2003 is deeply disturbing. Those on the frontlines knew they needed better protection against the road-side bombs that were killing their comrades; they knew we had the technology—but their requests were repeatedly ignored by the Pentagon and by a President who has claimed all along that he listens first and foremost to those in the field.

Sen. Joseph Biden, July 16, 2007²

¹ James Conway, General USMC, "DoD News Briefing with Gen. Conway from the Pentagon," DefenseLink News Transcript, May 17, 2007; accessed at <http://www.defenselink.mil/transcripts/transcript.aspx?transcriptid=3965> on August 27, 2007

² Joseph Biden, press release of July 16, 2007, accessed at <http://biden.senate.gov/newsroom/details.cfm?id=279021> on August 27, 2007.

PURPOSE

The purpose of this paper is to highlight the variety of issues pertaining to the current debate on MRAPs, issues that have not otherwise been clearly addressed in the various forums within which the debate is being carried out – in particular, within Congressional deliberations and coverage by the media. On the surface, one would assume the issue is fairly clear-cut: what can be done to enhance the protection of military personnel in Iraq, who are at risk of being killed or wounded by improvised explosive devices (IEDs)? While the threat posed by IEDs is real, and the desire to reduce related casualty levels is understandable, there are implications associated with any decision to field new equipment, such as MRAPs, in large numbers as a response to a specific threat. In addition, there are military planning factors that should be considered prior to making such a decision in the first place. Vehicles represent one aspect of how a military force views its operating environment, the types of missions it believes it will be called upon to undertake, and the requirements for success that pertain to each type of mission. Vehicles also impose conditions on a force: how heavy it makes the force logistically, how maneuverable the force is on any given battlefield, how rapidly it can deploy to that battlefield and by what means, and how effective it will be in carrying out its military tasks. The MRAP debate can also be seen a surrogate for the broader political debate on the rationale for continued engagement in Iraq, and the progress being made (or not) in achieving the goals for which military operations are being conducted. Finally, MRAPs are a useful symbol for the challenges of designing and equipping a force in the present for threats and environments it may not face for years to come. So, it is within the broader contextual space bounded by political, operational, and strategic factors that policymakers and military planners should consider whether, and to what extent, MRAPs should be fielded to address the current IED threat in Iraq; then again, this same contextual space should likewise frame all discussions on military forces and their utility, equipage, and employment.

THE OPENING SCENE

The United States' ground forces, like those that invaded Iraq in March 2003, are optimized to conduct high-intensity, combined arms operations against similar forces in open battle. Army and Marine Corps armor units engage the enemy in 70-ton M1 Abrams tanks. Mechanized

infantry units assault in tracked M2 Bradley infantry fighting vehicles (Army) or AAVP7 amphibious assault vehicles (Marines). Light armor units, like the Army Stryker brigades or Marine Light Armored Reconnaissance battalions, roll toward the enemy in variants of wheeled light armored vehicles. Even “straight-leg” light infantry units ride to a fight in trucks (or helicopters). To keep up with them, artillery units of all types tow or carry their weapons on wheeled and tracked “prime movers.”

As they move to the sound of the guns, these combat vehicles are supported by numerous other wheeled utility vehicles carrying commanders and their staffs, along with a range of personnel, supplies, and equipment. The first, and perhaps most famous, of these vehicles is the World War II quarter-ton, 4x4 “general purpose, personnel or cargo carrier especially adaptable for reconnaissance or command,” known universally as the “jeep.”^{3,4} During the Vietnam War, these jeeps were replaced by the improved M151 family. By the time of Operation Iraqi Freedom, the utility vehicle role was performed by different variants of the High-Mobility Multi-purpose Wheeled Vehicle (HMMWV), or “Humvee” (also known more colloquially as a “Hummer”).

The Humvee was designed during the latter stages of the Cold War, an era in which high-intensity combined arms warfare was defined by “front lines” and “rear areas.” In defensive operations, the Humvee

³ “Jeep,” Wikipedia, accessed at <http://en.wikipedia.org/wiki/Jeep> on August 22, 2007.

⁴ Author’s comment on Wikipedia references: In four instances, this paper makes use of material posted to Wikipedia (http://en.wikipedia.org/wiki/Main_Page). The author is aware that there is some controversy regarding the use of Wikipedia as a reference source. Introduced in 2001, Wikipedia has compiled over 5,000,000 articles in over 100 languages, with nearly 2,000,000 articles in English alone. The controversy over Wikipedia stems from the ability of anyone (over 75,000 active contributors, at present) to post or edit entries, regardless of academic, professional, or experiential credentials. While Wikipedia does maintain editing guidelines, the accuracy of entries is largely a policing function of the community of individuals with an interest in a given topic. In a sense, Wikipedia can be viewed as a self-correcting reference site. The attractiveness of Wikipedia is its ease of use and accessibility by anyone with access to the internet. Articles posted to Wikipedia routinely contain the list of references used to compile the entry and links to resources external to Wikipedia proper. In 2005, the science journal *Nature* published a report favorably comparing Wikipedia to the *Encyclopaedia Britannica*, often thought to represent the “gold standard” in reference material. The report, *Encyclopaedia Britannica’s* response, and *Nature’s* rebuttal can be found at: <http://www.nature.com/news/2005/051212/full/438900a.html>.

would remain to the rear of the forward edge of the battle area, or FEBA.⁵ In offensive operations, it would follow in the trace of more heavily-protected vehicles. Consequently, when they were first built, most Humvees lacked any sort of crew protection from direct or indirect fire weapons, such as rocket-propelled grenades or artillery, respectively. Indeed, of the nearly 20,000 vehicles⁶ comprising the assault echelons of the US Army's V Corps and the US Marine Corps' I MEF that crossed into Iraq in March 2003, only 235⁷ were armored Humvee gunfire support vehicles used by infantry or military police units.

A CHANGING SCRIPT

The major combat operations phase of Operation Iraqi Freedom⁸ followed the Cold War script. Fast-moving columns, spear-headed by armored and mechanized infantry units, sliced through Iraq units dur-

⁵ The FEBA is but one term of many used to describe elements of a classically configured battlefield featuring readily identifiable boundaries, forward and rear areas, and other control features such as kill boxes, free fire zones, go/no go areas, etc. See FM 101-5-1 *Operational Terms and Graphics*, Headquarters Department of the Army, September 30, 1997.

⁶ V Corps was credited with deploying 10,000-plus vehicles in its attack formations entering Iraq via Breach Point West, exclusive of those vehicles carrying the Corps' Task Force Tarawa (the Second Marine Expeditionary Brigade), while the 1st Marine Division of I MEF, with its 8,000 vehicles, crossed into southeast Iraq via Breach Point North. These figures do not account for the additional logistics convoys streaming into Iraq in the immediate trace of the assault forces. These convoys comprised thousands more vehicles. See Colonel Gregory Fontenot, US Army (Ret) et al, *On Point: The United States Army in Operation Iraqi Freedom* (Ft. Leavenworth, KS: Combat Studies Institute Press, 2004), pp. 88, 111; and Bing West and MajGen Ray L. Smith, USMC (Ret), *The March Up* (New York: Bantam Dell, 2003), p 19. An illuminating note is provided by West and Smith who remark that the 22,200 Marines of the 1st Marine Division and their 8,000 vehicles required a daily resupply of 200,000 gallons of fuel, 35,000 gallons of water, and between 45,000 and 65,000 rations of food; all this provided by the continuous stream of logistics convoys.

⁷ Tom Squitieri, "Army late with orders for armored Humvees," *USA Today*, March 27, 2005, accessed at www.usatoday.com/news/washington/2005-03-27-humvees-cover_x.htm on August 17, 2007.

⁸ For an easy to use, general overview of Iraq war, the Wikipedia entry for "Operation Iraqi Freedom—Iraq War" (see: http://en.wikipedia.org/wiki/Operation_Iraqi_Freedom) provides a fairly concise, readable, annotated overview. It contains a substantial set of notes and reference links for supporting material.

ing a breakneck advance on Baghdad. For a brief time after US forces seized Baghdad, threats against US forces were nearly nonexistent.

By late summer and early fall, 2003, however, various factions within Iraq regained their footing and started to fight back. Patrolling US forces were increasingly taken under fire, primarily within the “Sunni Triangle” connecting Baghdad, Ramadi, and Tikrit. Enemy forces were largely comprised of Ba’ath Party loyalists and marginalized Hussein supporters. The attacks were more opportunistic than organized and consisted of sniper fire, machine gun, and mortar and rocket propelled grenade (RPG) attacks. Army and Marine forces were generally able to counter these attacks by using combined arms fires⁹ and small unit maneuver. Nevertheless, troops in the field began to apply homemade armor to their Humvees to provide themselves with better protection against small arms fire and shrapnel.

IEDs MAKE THEIR APPEARANCE

By the end of 2003, coalition forces were confronted by a growing insurgency. In this environment, there were no truly safe rear areas. Every convoy, regardless of the time of day or location, now found itself potentially at risk of insurgent attack. The situation worsened as other groups—“foreign fighters” from throughout the Middle East, al-Qaeda affiliates and sympathizers, and surrogate forces sponsored by a variety of state and non-state entities—came to Iraq to attack the US “occupiers.” Their weapons of choice were (and continue to be) suicide bombers, with explosives strapped to their bodies, or car bombs—cars and trucks stuffed with explosives and detonated at a time and place selected to achieve maximum casualties and psychological effect. Indigenous insurgent forces increasingly favored IEDs, or improvised explosive devices, constructed from an assortment of materials, emplaced in a variety of ways, and typically used against passing vehicles or as “booby traps” against dismounted troops. Unfortunately for US and coalition forces, the materials for these weapons are readily available in Iraq, which, under Saddam Hussein’s rule, had witnessed the construction of

⁹ The term “combined arms” refers to the use of a mixture of weapons, munitions, and delivery mechanisms to apply destructive power against an enemy target. One can think of a military force using tanks, artillery, rockets, mortars, air-delivered ordnance, and naval surface fires against an opposing enemy force.

numerous ammunition dumps. When US forces failed to move aggressively to secure these munitions following the collapse of Iraq's Ba'athist regime, the way was left open for the country's insurgents to wage a protracted IED campaign. Despite belated attempts to eliminate these munitions stockpiles, thousands or even millions of tons of munitions may remain unaccounted for.¹⁰

Over time, the insurgents began using suicide bombers primarily against "soft" civilian targets, like population concentrations near markets or places of worship, while IEDs became the preferred means to attack US and coalition forces. In this role, the IEDs proved particularly deadly. The numbers tell the story. For the period March 2003 to early August 2007, 1,496 of a total 3,037 deaths due to hostile causes were attributed to IEDs (49.5 percent). From January 2005 to early August 2007, the percentage increased to 65 percent. And from March 2007 onward, the percentage of hostile deaths attributed to IED attacks continued to rise to 72 percent.¹¹ Stated another way, for the conflict as a whole, from March 2003 to August 2007, IEDs have accounted for half of all deaths due to hostile causes.

While some IEDs are large enough to flip armored fighting vehicles (often killing vehicle occupants by blunt trauma), unarmored vehicles are, by their very nature, far more vulnerable to IED attacks. This is especially true for the relatively small Humvee, which originally lacked the armor to protect its occupants from close-in explosions, and whose wide, flat underside has been particularly vulnerable to the upward explosive force exerted by a buried IED. As IED attacks increased, US troops began hanging more and more homemade armor on their Hummers. These "field expedient" efforts by soldiers to "up-armor" their Humvees, combined with the lack of a timely and effective response to this situation by the military establishment, attracted the attention of both Congress and the media. In December 2004, when asked by a soldier why there were so few up-armored Humvees in theater, Secre-

¹⁰ Davi M. D'Agostino, "DOD Should Apply Lessons Learned Concerning the Need for Security over Conventional Munitions Storage Sites to Future Operations Planning", Testimony before the Subcommittee on National Security and Foreign Affairs, Committee on Oversight and Government Reform, House of Representatives, GAO-07-639T, March 22, 2007, p. 8.

¹¹ Figures derived from data accumulated and processed at www.icasualties.org, as of August 7, 2007. Also referenced by Senator Byron Dorgan (D-ND) in his statement on the Senate floor on April 30, 2007, as recorded by the Senate and reported via GovTrack at <http://www.govtrack.us/congress/record.xpd?id=110-s20070430-14>, accessed on June 3, 2007.

tary of Defense Donald Rumsfeld replied, “As you know, you have to go to war with the Army you have, not the Army you want...You can have all the armor in the world on a tank, and it can (still) be blown up.”¹² While to some extent accurate, this seemingly callous remark received much attention and further heightened awareness of the IED threat to US forces.

THE US RESPONDS

In reality, Secretary Rumsfeld’s remark notwithstanding, the Defense Department was well aware of the IED threat, and was moving urgently and aggressively to counter it.¹³ One approach centered on developing technical countermeasures to the various types of IEDs, a mission given to the newly established Joint IED Defeat Organization (JIEDDO). Reflecting the high priority of its mission, the JIEDDO has been provided with substantial funding, receiving over \$7.6 billion in FY06 and FY07 combined, with an additional \$4.5 billion requested for FY08.¹⁴

A second approach, undertaken by the individual Services with the Army and Marine Corps in the lead, centered on developing a better understanding of enemy tactics, techniques, and procedures (TTPs) involving their employment of IEDs with an eye toward modifying and improving US TTPs to counter enemy adaptation. For example, one US response involves using more airlift to reduce the number of US supply convoys, thus leveraging US air supremacy and America’s asymmetric advantage in helicopter capabilities.¹⁵ The purpose of these efforts is to

¹² “Troops put thorny questions to Rumsfeld,” *CNN*, December 9, 2004. Accessed at <http://www.cnn.com/2004/WORLD/meast/12/08/rumsfeld.troops/> on August 29, 2007.

¹³ Clay Wilson, “Report RS22330 Improvised Explosive Devices (IEDs) in Iraq and Afghanistan: Effects and Countermeasures,” Congressional Research Service, Washington DC, Sept 25, 2006. Though a bit dated, given the dynamic character of the IED/counter-IED competition, this report provides a concise, general sense of the nature of the competition. Accessed at <http://www.fas.org/sgp/crs/weapons/RS22330.pdf> on August 8, 2007.

¹⁴ Gordon England, Statement of the Deputy Secretary of Defense, Gordon England, before the House Budget Committee, July 31, 2007; accessed at <http://www.defenselink.mil/speeches/speech.aspx?speechid=1172> on August 14, 2007.

¹⁵ Stewart Powell “Army Turning to Helicopters To Cut Roadside Bomb Deaths,” *San Diego Union-Tribune*, June 17, 2007, accessed at <http://ebird.afis.mil/ebfiles/e20070618522756.html> on June 18, 2007. “U.S. troops in Iraq are

ensure that forces operating in Iraq and those preparing to deploy there are well-educated and trained to deal with this threat.

A third approach for dealing with the IED threat involves identifying and fielding materiel solutions (i.e. new equipment, weapons, or tools) to better protect fielded US forces from IEDs. Toward this end, the Defense Department increased dramatically the production of armored Humvees and rushed armor kits to the field for those Humvees already in theater. By 2007, all of the estimated 21,000 Humvees in Iraq were equipped with some form of upgraded armor protection.¹⁶ However, while this armor provided increased protection against small arms fire, RPGs, and shrapnel, it was not particularly effective against IEDs, especially those that exploded close to or underneath the Humvee chassis. Consequently, the Army and Marine Corps started to look for other materiel solutions, including fielding a substitute for the Humvee in the form of Mine Resistant Ambush Protected vehicles, or MRAPs.

ENTER THE MRAP

Mine Resistant Ambush Protected vehicles are large, heavily armored vehicles, originally designed and fielded for mine clearing and explosive ordnance disposal tasks. Regardless of size, the basic vehicle design incorporates very heavy armor arranged in a v-shaped hull that deflects the blast away from the passenger compartment. A heavy-duty, raised chassis and the use of tires instead of tracks help to create space for dissipating the blast energy from a mine-like explosion. The sheer mass of the vehicle also provides an increased level of protection. MRAP design characteristics have also been incorporated into smaller armored vehicles to better protect military personnel from the hazards of blast and shrapnel.¹⁷

MRAP vehicles come in three sizes: small, medium, and large. Small (Category I) vehicles are designed for small unit combat operations (mounted patrols, reconnaissance, command-control-commu-

shifting from road convoys in vehicles to helicopter-borne assaults and supply deliveries to avoid roadside bombs, a top officer says.”

¹⁶ Sandra Erwin, “Army Predicts Long Life for Humvees,” *National Defense*, July 2007, accessed online at <http://www.nationaldefensemagazine.org/issues/2007/july/armypredicts.htm> on August 7, 2007.

¹⁷ Dorgan, Floor Statement, April 30, 2007.

nications (C3)) in urban environments. Medium (Category II) vehicles are employed primarily for convoy security, combat engineering, ambulance, and troop transportation missions. Large (Category III) vehicles find their principle role in route clearance of mines, IEDs, and other explosives. These vehicles vary in weight from seven to 22 tons (or more).¹⁸

As IED casualties increased during 2004 and early 2005, field commanders took note of the characteristics of MRAPs and sought to have MRAP-like vehicles deployed to Iraq as quickly as possible. The oft-cited request of then-Brigadier General Dennis Hejlik, sent while he was Deputy Commander of the I Marine Expeditionary Force in February 2005, specified a need for 1,169 MRAP-like vehicles to “increase survivability and mobility of Marines” who, at that time, were operating in the very unstable Al-Anbar province.¹⁹

By mid-2006, Service and theater-command level interest in MRAP vehicles was growing. Both the Pentagon and Congress began taking a more active interest in the program. Secretary Robert Gates, who succeeded Donald Rumsfeld in December 2006, is an enthusiastic supporter of MRAPs, stating in his confirmation hearing that he intended to speed the deployment of the vehicles to Iraq. He quickly backed these words up with action. In a memo released May 2, 2007, Secretary Gates stated, “The MRAP program should be considered the highest priority Department of Defense acquisition program.”²⁰ By this time, demand for MRAPs had increased dramatically, reaching a total requirement certified by the Joint Requirements Oversight Council of 7,774 vehicles.²¹ At various times, general discussion and unofficial

¹⁸ John Young Jr., Statement before the House Armed Services Subcommittee of Seapower and Expeditionary Force and Air and Land Forces, on July 19, 2007, p. 4. Accessed on August 8, 2007 at http://armedservices.house.gov/pdfs/JointALSPEF071907/Young_Testimony071907.pdf.

¹⁹ See *USA Today's* extensive and interactive/multimedia coverage of the MRAP issue at their website <http://www.usatoday.com/news/military/troopsatrisk/default.htm> as one example of media reporting of this topic. BGen Hejlik's request was quoted at http://www.usatoday.com/news/military/2007-07-22-mrap-defense_N.htm, among other sources.

²⁰ “Gates Designates MRAP Pentagon's ‘Highest Priority’ Acquisition Program,” *Inside Defense*, May 8, 2007, accessed at <http://ebird.afis.mil/ebfiles/e20070509511952.htm> on May 9, 2007.

²¹ John Castellaw, Statement of Lieutenant General John Castellaw, Deputy Commandant of the Marine Corps, Programs and Resources, before the House Armed Services Subcommittee on Seapower and Expeditionary Forces and Air and Land Forces on The Mine Resistant Ambush Protected

pronouncements have indicated some desire to replace every Humvee in Iraq with an MRAP-style vehicle (approaching 17,000-plus vehicles for the Army alone). By mid-July 2007, a total of \$3.8 billion in FY 2007 Bridge and Supplemental Funds for MRAP vehicles had been approved by Congress and the Department, with an additional \$4.1 billion planned for FY 2008. What had been a peripheral DoD program drawing upon a niche market operating at a production capacity of “less than ten vehicles per month” in December 2006 has rapidly grown to a major procurement effort seeking to achieve an MRAP production rate of “more than 1,000 per month by the end of the [2007] calendar year.”²²

AN EMOTIONAL DEBATE

These moves toward a surge production of MRAPs have only heightened attention on the force protection issue. For some, the MRAP surge is long overdue. It is almost an article of faith among the American public and Congress that the US armed forces are the best equipped in the world, armed with weapons and combat systems designed to overmatch anything a potential enemy might bring to a battle. As a result, during wartime, perhaps no issue captures more attention than charges that the US armed forces are being equipped with anything less than the best the nation has to offer. In the Vietnam War, for example, charges that the new M-16 rifle was prone to jamming caused a political uproar and led to rapid improvements to the rifle that made it a more effective and reliable battlefield weapon.²³

In the ongoing war in Iraq, the modern day equivalent of the M-16 jamming problem is the charge that US troops are riding into battle in vehicles that cannot protect them from the enemy’s weapon of choice, the IED. Worse, the critics say, while new Mine Resistant Ambush Protected Vehicles have been readily available, they have not been aggressively pursued by either the Department of Defense or the Services. As

Program, July 19, 2007, p. 4, accessed at http://armedservices.house.gov/pdfs/JointALSPEF071907/Castellaw_Testimony071907.pdf on August 8, 2007.

²² John Young Jr., Statement before the House Armed Services Subcommittee of Seapower and Expeditionary Force and Air and Land Forces, on July 19, 2007, p. 4. Accessed on August 8, 2007 at http://armedservices.house.gov/pdfs/JointALSPEF071907/Young_Testimony071907.pdf, p. 3.

²³ “M16 rifle,” Wikipedia.org, accessed at http://en.wikipedia.org/wiki/M16_rifle on August 29, 2007.

of today, only 1,000 MRAPs travel the roads of Iraq nearly four years after IEDs began making their appearance.²⁴ Arguably, American servicemen and women are suffering casualties at excessive levels because of a bureaucratic requirements and acquisition system that has been too slow to react to changing conditions on the battlefield.²⁵ As Senator Joseph Biden recently asked, “How is it possible that with our nation at war, with more than 130,000 Americans in danger, with roadside bombs destroying a growing number of lives and limbs, were we so slow to act to protect our troops?”²⁶

No one would argue against trying to protect the men and women fighting in defense of the nation. However, given the resources involved, the decision to mass produce the MRAP warrants careful thought and consideration. Among the many issues pertaining to such a decision are:

- Are conventional, light utility vehicles still viable on the current (and future) battlefield?
- Will US forces be able to operate at acceptable risk in environments characterized by intensive IED use?
- How might the large, unplanned investments in MRAP capabilities affect other defense programs?

²⁴ Sandra Erwin, “Army Predicts Long Life for Humvees,” *National Defense*, July 2007, accessed online at <http://www.nationaldefensemagazine.org/issues/2007/july/armypredicts.htm> on August 7, 2007.

²⁵ This is a frequently heard criticism and there is probably a measure of truth to it. But force commanders and personnel across the Services typically go about their duties with the purpose of supporting troops that are engaged in battle or preparing for combat. One of the struggles facing all commanders and force providers is how quickly to respond to an emerging situation, particularly when dealing with great uncertainty. Is a new threat likely to be passing, or enduring in its character? If there are multiple ways to address it, what is the best mix of methods? For example, is a materiel solution the most timely and effective or are other (better) solutions available across the other elements of “DOTMLPF” (doctrine, organization, training, materiel, leadership, personnel, facilities)? Arriving at an acceptable solution often requires time. That said, the three-plus years it has taken to arrive at the MRAP decision seems, in light of the clear threat posed by IEDs, excessive.

²⁶ Joseph Biden, press release July 16, 2007, accessed at <http://biden.senate.gov/newsroom/details.cfm?id=279021> on August 27, 2007.

- How might the large-scale employment of these vehicles alter US forces' ability to deploy and operate effectively across a range of potential scenarios?
- What are the implications of the military's current emphasis on "force protection?" To what extent might MRAPs, for example, actually hamper US forces in accomplishing their missions?
- How quickly should the US make significant investments in a specific capability when the competition between the US and the enemy is ongoing and rapidly evolving? In other words, when is a capability investment counterproductive and what factors should be considered prior to making the investment?

The sections that follow will address aspects of these questions and, hopefully, bring to light considerations that have, so far, been missing from the MRAP debate.

II. Force Protection, Casualty Avoidance, and Armor

Threat forces may gain an advantage against superior friendly forces by capitalizing on a perceived weakness of many Western nations: the inability to endure continuous losses or casualties for other than vital national interest or losses for which they are psychologically unprepared . . . Threats may attempt to weaken US resolve and national will to sustain the deployment or conflict by inflicting highly visible, embarrassing, and if possible, large losses on Army forces.

FM 3-06 Urban Operations, June 1, 2003²⁷

“Force protection”—protecting one’s own forces from the effects of enemy weapons and tactics—has been a concern of military commanders throughout the ages. In any war, commanders must send troops into highly dangerous situations in order to accomplish the mission for which they were created. The commander is, nevertheless, motivated to protect those troops (as permitted by the situation and subordinate to the demands of accomplishing the mission) for several reasons, among which are the values of the society from which the commander (and his troops) is drawn, the practical need to preserve the combat capability manifested by those troops, and the protection of the institutional investment reflected in those troops in terms of cost and difficulty to recruit, the time and money spent to educate and train, and the operational and combat experience they amass over time.

²⁷ FM 3-06 *Urban Operations*, (Washington, DC: Headquarters, Department of the Army, June 1, 2003), para. 3-13.

In March 2006, the Defense Science Board (DSB) issued a report on “Force Protection in Urban and Unconventional Environments.”²⁸ The report offered some remarkable insights on the tension that exists between employing and protecting military forces in the types of operational environments now confronting US forces in Iraq and Afghanistan. The Board observed:

Force protection is not an end in itself . . . [it must be examined] within the context of the range of missions and problems associated with adaptation to cultural and political contexts. Throughout the range of military operations, U.S. commanders have confronted, and will continue to confront, the dual responsibilities of (1) accomplishing the mission and (2) ensuring the safety of those under their command, while continually making decisions about the risks to each. These two responsibilities are inextricably linked, because the political objectives, for which the United States government has and will employ its military forces, depends [sic] on the support of U.S. citizens for success. Consequently, the safety of its men and women in uniform will remain a primary concern of a democratic state, whatever the military or political circumstances.²⁹

The Board went on to explain the complex relationship between mission accomplishment, force protection, and limiting casualties:

As a result, there is both tension and synergy between these responsibilities. Force protection is crucial to the creation of the circumstances that facilitate military forces executing their operational missions. It may well be – as was the case during the conventional military operations in April 2003 – that exposing both combat and supporting forces to greater risk will result in a more rapid achievement of the mission and thus fewer casualties in the long run. However, public support has

²⁸ Defense Science Board Report, *Force Protection in Urban and Unconventional Environments*, (Washington, DC: OUSD (ATL), March 2006).

²⁹ DSB, *Force Protection*, p. 3.

consistently proven crucial to success in war; and significant casualties will inevitably affect that support.³⁰

The major problem captured by this straightforward logic is that the definition of what constitutes “significant casualties” changes with the circumstances surrounding each war. The American public has historically shown a high tolerance for casualties when it perceived the stakes were important enough, and that progress was being made toward achieving the nation’s war objectives. During the US Civil War, a conflict over the very future of the Union, 2,213,363 Americans took part. Of that number, 364,511 were recorded as killed in action (KIA)³¹, or 16.4 percent of the forces fielded over the course of the war.³² In World War I, the US suffered 116,516 KIA out of 4,734,991 participants (2.5 percent); in World War II, the numbers were 405,399 KIA out of 16,112,566 (also 2.5 percent). Given the stakes involved, however, in none of these cases did the high absolute number of casualties cause a major political reexamination of the war’s aims or purposes.³³

As observed by the DSB, however, “casualties suffered in longer endeavors when the mission is more open-ended and the enemy more elusive can have a greater political impact than casualties suffered in those operations where the US military is pursuing a defined mission

³⁰ DSB, *Force Protection*, p. 3

³¹ Only killed in action (KIA) figures are cited in this paper. “Casualties” can certainly be more broadly defined to include wounded in action. Comparing differences in casualty levels between wars is difficult given the advances in medical care, the conditions of various battlefields, the evolution of tactics and weapon systems, and the level of competency of the military force. Casualty comparisons in this paper are used to illustrate that simply referring to soldiers killed in action in absolute numbers or as a percentage of the force employed are not necessarily a sole or primary determinant for the willingness of a country to sustain military operations.

³² Hannah Fischer et al, “American War and Military Operations Casualties: Lists and Statistics,” CRS Report for Congress RL32492, June 29, 2007, accessed at <http://www.fas.org/sgp/crs/natsec/RL32492.pdf> on August 14, 2007. Statistics for the Civil War, WWI, WWII, and Vietnam were obtained from this source.

³³ Perhaps an exception to this broad statement could be made in the case of President Lincoln, leading up to the Presidential election of 1864. During the early stages of his campaign defense against General George McClellan, the country was wearied by the war. But Sherman’s march across the south and Grant’s siege of Richmond gave Lincoln ammunition in his argument to continue the fight. He ended up winning the election with a substantial electoral majority (212 to 21).

and a clear opponent.”³⁴ For example, US casualty rates during the Vietnam War were extraordinarily low by historical standards—58,209 KIA of 8,744,000 participants (0.67 percent). However, because the war’s objectives were less clear to the American public than those of World War II and there seemed to be no “light at the end of the tunnel”— the conflict appeared to be dragging on with no end in sight – even these historically low casualty rates became unacceptable, and ultimately became a major contributing factor leading to US withdrawal from the conflict.

Combat losses in US operations in Iraq and Afghanistan are only a third the loss rate of those experienced in Vietnam. Out of the 1,400,000 troops deployed to those two countries,³⁵ 3476 have been killed³⁶, a loss rate of 0.25 percent. At current casualty rates, the US would have to remain involved in Iraq for over half a century to experience losses similar to those suffered in Vietnam.³⁷ Nevertheless, the war’s open-ended commitment, the seemingly intractable political challenges, and the debate over the length and magnitude of continued US involvement have magnified the relative importance of every individual casualty and have caused many Americans to question whether the ends justify the means, even if they have not triggered a national upheaval like the one

³⁴ DSB, *Force Protection*, p. 3

³⁵ Lawrence Korb, et al, “Beyond the Call of Duty: A Comprehensive Review of the Overuse of the Army in Iraq,” Center for American Progress, August 2007, p. 6, accessed at http://www.americanprogress.org/issues/2007/08/readiness_report.html on August 14, 2007. A single source for the number of US military personnel who have served in Iraq since the invasion in 2003 proved to be difficult to find. However, Lawrence Korb and colleagues have collected information on the total number of personnel deployed in support of OIF and OEF. Their figure of 1.4 million individuals involved in operations in Iraq and Afghanistan was used to compare total KIA counts for the combined operations in order to arrive at a ratio that could be compared with the preceding figures for other wars. The total of 1.4 million accounts for individual soldiers, of whom 420,000 have deployed more than once to either Iraq or Afghanistan.

³⁶ Casualty figures were taken from the Iraq Coalition Casualty Count website: <http://icasualties.org/oif/> and <http://www.icasualties.org/oef/>. Initially accessed on August 7, 2007.

³⁷ It is also interesting to note that casualties in Vietnam were born by a US population two-thirds the size of the current total. According to statistics maintained by the US Census Bureau, the US population in 1970 was 202,302,000. The latest estimate for the US, as of July 2007, is 302,633,421. the 1970 figure was obtained from <http://www.census.gov/satab/hist/hs-02.pdf>. The 2007 estimate can be found at: <http://www.census.gov/popest/NA-EST2006-01.html>.

seen in Vietnam. Essentially, tolerance for casualties is a function of public support for the rationale for war, the perception of progress in achieving the goals established for the war, and the extent to which it seems the war is being managed well.³⁸

[The] U.S. public's tolerance for the human costs of war is primarily shaped by the intersection of two crucial attitudes: beliefs about the rightness or wrongness of the war, and beliefs about a war's likely success. The impact of each attitude depends upon the other. Ultimately, however, we find that beliefs about the likelihood of success matter most in determining the public's willingness to tolerate U.S. military deaths in combat . . . Indeed, the public forms its attitudes regarding support for the war in Iraq in exactly the way one should hope they would: weighing the costs and benefits. U.S. military casualties stand as a cost of war, but they are a cost that the public is willing to pay if it thinks the initial decision to launch the war was correct, and if it thinks that the United States will prevail.³⁹

The issue of casualty levels in Iraq, therefore, regardless of the cause (e.g. IEDs, snipers, or mortars), is important not so much for the absolute number they represent but as a reflection of the overall debate on the war as a whole. Consequently, the Administration and commanders in the field will have a variety of motivations to reduce casualties (protecting the force for very practical reasons, reflecting the value placed on the lives of fellow Americans, and reducing the negative impact high casualty levels might have on the political debate), while critics of the war will emphasize casualty levels to reinforce their argument that the cost of the war surpasses any rationale for continuing the engagement.

³⁸ Christopher Gelpi, "The Cost of War," *Foreign Affairs*, January-February 2006, accessed at <http://www.foreignaffairs.org/20060101faresponse85114/christopher-gelpi-john-mueller/the-cost-of-war.html> on September 15, 2007. In this *Foreign Affairs* article, Gelpi briefly addresses the multitude of factors influencing public opinion of casualties as a cost of war, drawing from a larger paper he co-authored with Peter D. Feaver and Jason Reifler, "Success Matters," *International Security*, Vol. 30, No. 3, Winter 2005/06, accessed at <http://www.duke.edu/~gelpi/success.matters.pdf> on September 15, 2007.

³⁹ Gelpi, Feaver, and Reifler, "Success Matters," p. 8.

The president has cast US objectives in Iraq in the starkest of terms. In his 2007 State of the Union Address, the president declared:

Our goal is a democratic Iraq that upholds the rule of law, respects the rights of its people, provides them security, and is an ally in the war on terror . . . [America] must not fail in Iraq...the consequences of failure would be grievous and far-reaching. If American forces step back before Baghdad is secure, the Iraqi government would be overrun by extremists on all sides . . . A contagion of violence could spill out across the country -- and in time, the entire region could be drawn into the conflict. For America, this is a nightmare scenario. For the enemy, this is the objective. [Iraq] would emerge an emboldened enemy with new safe havens, new recruits, new resources, and an even greater determination to harm America. To allow this to happen would be to ignore the lessons of September the 11th and invite tragedy. . . [Nothing] is more important at this moment in our history than for America to succeed in the Middle East, to succeed in Iraq and to spare the American people from this danger.⁴⁰

And yet even within this framework, the issue of casualties, at such low levels as to be unparalleled in US history relative to the number of troops involved, has fueled the political debate in Washington regarding the cost being borne by the country to achieve the security objectives set by the President. Commanders in Iraq are certainly aware of the importance being placed on preventing casualties to US forces. No wonder, then, that such attention is being given to MRAPs as a near-at-hand “solution” to the casualty problem.

Moreover, the current wars in Iraq and Afghanistan are the first prolonged wars fought by an all-volunteer American force. The cost to train, equip, and maintain men and women in uniform, and to maintain the medical infrastructure that supports them, is higher than at any point in US history. Force protection thus has a very practical fiscal calculus:

⁴⁰ George W. Bush, “State of the Union 2007,” Office of the Press Secretary, The White House, January 23, 2007, accessed at <http://www.whitehouse.gov/news/releases/2007/01/20070123-2.html> on September 7, 2007.

In purely dollars and cents terms, each casualty costs the Pentagon at least \$500,000, according to Lt. Col. Roy McGriff III . . . “This means,” he says, “that the average *unarmored* vehicle with one officer and three enlisted personnel is protecting \$2 million of the (Pentagon’s) budget.”⁴¹ [Author’s emphasis]

Putting all of the above statistics into the context of this discussion on force protection, it appears that the American public has been willing to sustain fairly high casualty rates when it believes the cause worth the sacrifice. Conversely, when the American public does not believe in the cause or when it believes the war is being badly managed and the outcome is far from clear, public support can rapidly erode to the point where the political leadership is forced to reduce US involvement or withdraw altogether from the conflict.

Public and political sensitivity to casualty levels, as but one factor impacting the costs of the war and the debate to continue fighting or withdraw from the conflict, can be thought of as the “canary in the coal mine.” When the stakes are high, the rationale for war is understood and supported, the conduct of the war appears to be well-managed, and the public senses that progress toward success is being made, casualties even at high levels will be tolerated. But when the rationale for war is deeply doubted, when progress is problematic, and it seems the effort is being badly handled, even low numbers of casualties can become a lightning rod for debate, criticism, and questionable investment decisions.

Advocates and supporters of the war are taking pains to emphasize both the continuing importance of efforts in Iraq, as they pertain to US security interests, and progress being made in security and political venues in that country. Opponents of the war take every opportunity to highlight set-backs, lack of progress toward stated goals and objectives, and the mounting costs of the conflict. Reducing the number of

⁴¹ Tom Vanden Brook and Peter Eisler, “Reluctance about MRAPs costly by many measures,” *USA Today*, July 16, 2007, accessed at http://www.usatoday.com/news/military/2007-07-15-ied-losses-usat_N.htm?loc=interstitials_kip on August 13, 2007. LtCol McGriff was accounting for the value of each individual in terms of recruiting, educating, and training to a given level of effectiveness. When a servicemember is lost, a replacement must be found and brought to the same level of military “value.” Thus, efforts to protect such an investment can be viewed as reasonable expenses relative to the cost of replacement.

US casualties on the battlefields in Iraq and Afghanistan is, therefore, a political and military goal far more important than the historically low casualty rates might suggest. If casualty rates can be reduced, supporters of US actions can mitigate some of the arguments of those who oppose the war and, perhaps, gain more time to make the progress the public needs to see in order to sustain their support as directly implied by General Conway's statement, quoted at the beginning of Section II. It should come as no surprise, then, that military and civilian leaders are looking to "armor" as one way to protect forces deployed to those battlefields. The potential consequences of such an option, however, may actually be to the detriment of accomplishing the mission . . . addressed in more detail, below.

ARMOR AND FORCE PROTECTION

The knight adapted himself [to the crossbow] by shifting from mail to armored plate, and by using the crossbow himself. As his armor became heavier, the demand increased for bigger and stronger horses. But the horse too was vulnerable, and had to be given armor plate as well as the rider; this meant still bigger horses. Meanwhile the knight became so heavily armored that he was helpless in fighting except when mounted. Eventually the whole development became a gigantic absurdity, which was fully recognized by many. James I of England was later to say ironically that armor provided double protection—first it kept a knight from being injured, and second, it kept him from injuring anybody else.

Bernard and Fawn Brodie, 1962⁴²

We understand the services face a difficult task in balancing the need to protect soldiers and Marines while at

⁴² Bernard Brodie and Fawn Brodie, *From Crossbow to H-Bomb* (New York, N.Y.: Dell, 1962), p. 37.

the same time not adding so much weight as to inhibit their mobility and effectiveness. Just as adding armor to vehicles has a down-side by creating roll-over potential, adding body armor can reduce personal mobility and increase the danger to the individual.

Representative Curt Weldon, June 15, 2006⁴³

Armor has been used to protect the individual combatant against the blows of his opponent throughout recorded history. Beginning at the earliest stages of warfare, thick hides, wooden and metal shields, helmets, coverings for arms and legs, etc., have all been used to deflect or absorb the impact of clubs, spears, arrows, swords and anything else that could be used in an attack. As modes of transport were introduced—horses, for example—they, too, were given protection so that the soldier being transported and his means of conveyance could arrive on the battlefield, survive the attacks of the enemy, and wield his own weapons with effect. Over time, the advances of industrialization enabled forces to field more destructive weapons and heavier armor to counter similar improvements in an opponent's capabilities. Suits of armor might have protected against a sword, but once firearms were introduced, knightly armor afforded little security. More capable firearms and cannon were introduced over time and heavier fortifications designed to withstand cannon-shot and provide soldiers some level of protection against rifle fire were constructed. Toward the end of World War I, tanks were introduced as a means of providing a form of mobile artillery that could move forward with the infantry and provide direct fire support in the attack. Both sides developed heavier guns, often armored, as a counter to the tank. And so it went, each side developing new ways to apply combat power against an opponent and, in turn, having to develop counters to those advances. This iterative and highly interactive contest shows no sign of letting up. New weapons are made possible by advances in technology; explosives, for example, are made more efficient and therefore more effective against a target. There are a number of options available to counter such improvements: improved tactics, techniques, and procedures that reduce the chance of being hit, asymmetric or novel counters

⁴³ Curt Weldon, Opening Statement of Chairman Curt Weldon, Hearing on Combat Helmets, Body and Vehicle Armor in Operation Iraqi Freedom and Operation Enduring Freedom, House Armed Services Subcommittee on Tactical Air and Land Forces, Washington, DC, June 15, 2006, p. 1, accessed at <http://www.operation-helmet.org/documents/testimony/6-15-06WeldonOpeningStatement.pdf> on August 10, 2007.

that effectively nullify or make moot the new weapon altogether, and, of course, improving physical protection from the effects of a weapon.

In addition to its protective quality, armor carries with it psychological effects, both positive and negative. On the positive side, a force protected by armor gains confidence and reassurance when faced with the otherwise daunting task of wading into battle. Troops encased in armor typically operate more aggressively since they are less concerned about their physical safety and are more confident in their ability to “take the fight to the enemy.”⁴⁴ Armor also has the benefit, at least initially, of intimidating your opponent, particularly when he lacks similar protection. In these circumstances the enemy has (all other factors being equal) less ability to inflict casualties and must account for the increased freedom of movement and aggressiveness of the armored force attacking him.

On the other hand, the same menacing quality of armor in the attack also inhibits establishing relationships with the local civilian populace. Counterinsurgency operations like those being conducted in Afghanistan and Iraq, rely very heavily on acquiring local intelligence on enemy forces, information that is usually available only from the local civilian population. Armor has the effect of creating “distance” between the soldiers and the civilian population. As the DSB report on force protection notes, field commanders are constantly weighing the benefits and costs of employing armor at varying levels. Nowhere is this more complicated, or perhaps more important, than in irregular operations against insurgents or guerrilla forces. The DSB addressed the counterintuitive aspects of “force protection” in such environments, noting that:

⁴⁴ An example drawn from the ongoing conflict in Iraq is provided by Gunnery Sergeant Timothy Colomer, USMC, in a video interview available at *USA Today*, <http://www.usatoday.com/news/graphics/ied-deaths/flash.htm?tabNum=tab2>. Similar comments were provided to the author by Colonel Steve Davis, USMC, Commanding Officer of Regimental Combat Team 2, operating in Anbar Province, Iraq, during 2006. In a series of telephone and personal interviews with the author from April-June 2007, Col Davis repeatedly provided his opinion on the importance of traveling in armored vehicles while in Iraq. Given the potentially lethal nature of the operating environment regardless of time of day or location, he and his Marines were extremely reluctant to travel in non-armored vehicles for any significant distance. Armor afforded protection and increased the overall levels of confidence of his force. The author received similar comments from Brigadier General John Wissler, USMC, formerly Commander of 2d Force Service Support Group (Forward) in Iraq during 2004-2005.

Force protection in unconventional and urban environments is much more dynamic with a broader range of challenges than those involved in conventional warfare. Inevitably, force protection will find itself inextricably linked to a combination of political, economic and strategic factors. These include the political objectives of the United States, the culture and religion of the area in which U.S. forces find themselves involved, and the stability and homogeneity of the society, as well as the state of the existing economy and infrastructure . . .” Additionally, “[Force] protection must begin with the ability of U.S. forces to establish a relationship with the local community while denying the enemy such access. . . Crucial to success at the tactical level of force protection will be the ability of U.S. forces on the ground to influence and shape the local population in order to undermine the ability of the enemy to exist within the sea of the population.⁴⁵

Armor can also work to the detriment of the force itself if not employed wisely and judiciously. Paddy Griffith, author of “Forward Into Battle”, observed that in Vietnam, the US preference for (and, ultimately, reliance on) its overwhelming advantage in firepower had the consequence of developing an attitude in the force that caused soldiers to become overly passive. Since soldiers, upon making contact with the enemy, could call in supporting fires, there was little need to voluntarily expose themselves to close combat situations. But this has the effect of creating distance between the soldier and the population with whom he needs to interact, and protect. It can also lead to a debilitating passivity within the force that gradually cedes initiative to the enemy.⁴⁶

⁴⁵ DSB, *Force Protection*, pp. 2, 13-14.

⁴⁶ Paddy Griffith, *Forward Into Battle* (Navato, CA: Presidio Press, 1991), p. 156-157. “In the conditions of Vietnam there was perhaps only one way in which American infantry could have been expected to manoeuvre under fire; and that was by riding in armoured vehicles. Inside a tank or an armoured carrier the soldiers enjoyed a relative immunity from fire, and their mobility was restored... The significance of the new tactics is that they assigned a purely passive or defensive role to infantry in the firefight. When they made contact, American troops almost always adopted a position of all-around defence, firing outwards and waiting for their supporting arms to become effective. . . The onus of manoeuvre was handed to the enemy.”

Armor, therefore, can potentially inhibit mission accomplishment in counter-insurgency operations. Force commanders in Iraq and policy makers in Washington must continually balance the protective value of armor with the demands of the mission when determining appropriate levels of force protection.

Armor is found in US forces at varying levels, often referred to as light, medium, and heavy. Light armor is generally effective for forces not actively engaged in combat operations or for units whose missions preclude high degrees of mechanization, such as airborne, light infantry, and combat service support units. Heavy armor is found in units that, by design, are intended to engage heavily armored enemy units directly. These units typically operate mobile artillery, direct fire, and counter-armor platforms. Medium armor,⁴⁷ as the term implies, occupies the area between light and heavy armor. Here force planners seek to balance force protection with other requirements (e.g., deployability, mobility, sustainability, etc.) Generally speaking, MRAPs are medium-weight armored vehicles. By comparison, the armored Humvee is a light vehicle, while the Abrams main battle tank is a heavy armored vehicle.

When considering MRAPs and their value in providing increased protection for forces, one needs to consider the physical and operational environments they are expected to operate in (both now and in the future), the types of missions they will support (and the TTPs most directly associated with successful accomplishment of those missions), the logistical implications of their introduction into the force in large numbers, and the iterative nature of the competition between the US and its competitors (weapons and tactics change over time in the measure/countermeasure competition). MRAPs will have both intended and unintended consequences on mission effectiveness and accomplishment of operational and strategic objectives. Careful consideration of environmental, operational, and logistical factors will amplify the intended and mitigate the unintended consequences. Further, consideration should be given to where they fit within the portfolio of armor capabilities possessed by US forces. As currently structured, armor in the various weight categories supports respective sets of mission capa-

⁴⁷ Daniel Gouré and Kenneth Steadman, *Medium Armor and the Transformation of the U.S. Military* (Arlington, VA: Lexington Institute, September 2004). Gouré and Steadman have produced a very readable and informative paper on “medium armor” that discusses the issue in general and provides context for Stryker, the Future Combat System (FCS), and the Expeditionary Fighting Vehicle (EFV). It can be accessed at <http://lexingtoninstitute.org/docs/320.pdf>.

bilities that provide a force with an ability to perform a range of tasks. While MRAPs provide increased protection to light infantry forces, the stated intent to dramatically improve force protection capabilities by replacing Humvees (and other light utility vehicles) with MRAPs may have negative repercussions for the ability of the Joint force to accomplish operational objectives in the long-run.

III. Iraq, Irregular Warfare, and Force Protection

When there are no front lines, all forces are at risk and logistic convoys, like merchant ship convoys in World War II, become 'movements to contact,' or are targets for loosely organized enemy actions.⁴⁸

Defense Science Board Task Force,
Force Protection in Urban and
Unconventional Environments,
March 2006

THE OPERATING ENVIRONMENT IN IRAQ

Iraq contains a wide variety of terrain. US forces must contend with a mixture of open and broken terrain, ranging from sparsely populated to heavily urbanized. Not surprisingly, some armored vehicles are better suited to some terrain than others. For example, tracked armored vehicles are valued for their ability to traverse nearly any type of off-road terrain, while wheeled armored vehicles are extremely well suited to roads and urban environments. The Army's eight-wheeled Stryker, a medium-weight armored vehicle, has exceptional road mobility, but can also keep pace with a tracked, armored force. MRAPs were originally designed for de-mining and route clearance operations—something normally done on roads and relatively unbroken terrain at comparatively slow speeds. They are not optimized to support rapid maneuver or movement-to-contact operations against enemy forces, or to keep pace with mechanized forces traveling at significant speeds (15 miles per hour and greater) across difficult terrain.

⁴⁸ DSB, *Force Protection*, p. 4.

Much of Iraq is comprised of densely populated urban “islands” separated by sparsely inhabited desert “oceans.” Most enemy attacks, and therefore most combat, occur in built-up urban areas. In congested cities and towns, narrow streets that offer little room for maneuver are generally the rule. Engagement distance – the space available to identify, target, and engage enemy forces – is dramatically reduced, putting a premium on maneuverability and situational awareness. Moreover, owing to the population density and the high concentration of defensible terrain (e.g., buildings), comparatively large numbers of troops are often needed to secure a given area.

FM 3-06 Urban Operations and a companion document, Joint Urban Operations Joint Integrating Concept (JUO JIC) (Draft), offer some insights into the challenges of operating effectively under these conditions:

- “The physical characteristics of the urban environment support...ambush techniques. Light infantry or insurgents with readily obtainable, hand-held antiarmor weapons can effectively attack armored vehicles and helicopters, no matter how sophisticated, in an urban area.”⁴⁹
- “The close-in nature of urban areas, large populations, and high volume of vehicle traffic provide a good environment for target reconnaissance, explosives positioning (conventional and high yield), and cover for an attack.”⁵⁰
- “Urban areas provide a casualty-producing and stress-inducing environment ideally suited for using specific urban threat tactics. Moreover, urban areas provide threats with an unmatched degree of cover and concealment from friendly information and firepower systems.”⁵¹
- “[Urban] terrain tends to restrict operations by counteracting most technological advantages in range, mobility, lethality, precision, sensing and communications . . . The highly compartmented geography of urban terrain limits observation, communications, fires and movement. Urban terrain tends to favor the defender over the attacker and the ambusher over the

⁴⁹ FM 3-06 *Urban Operations*, para. 3-13.

⁵⁰ FM 3-06 *Urban Operations*, para. 3-15.

⁵¹ FM 3-06 *Urban Operations*, para. 3-19.

active patroller. It provides an attractive environment for guerrilla warfare.”⁵²

- “[Urban] combat tends to devolve into brutal, small-unit engagements at close range, and tends to inflict significant casualties on both combatants and civilians. It is unusually hard on equipment and consumes high levels of ammunition and other supplies—to the degree that it typically becomes impossible to sustain continuous activity. Urban combat operations thus tend to be bloody, episodic and prolonged, with the costs of achieving a decision running unusually high.”⁵³

As challenging as urban warfare operations are when confronting a conventional enemy, in some respects they become an even greater challenge when the enemy is engaging in insurgency operations and other forms of irregular warfare. In conventional combat, a force commander has relatively wide latitude in applying the destructive force necessary to seize terrain or attrite enemy forces. “Collateral damage” is largely accepted as a consequence of general warfare. But battling an insurgency or engaging irregular opponents constrains a conventional military force because the key struggle is not so much to destroy the enemy force, as it is to win the support of the indigenous population. The goal in counterinsurgency operations, such as those being conducted in Iraq, is not to outfight the enemy, but rather to out-govern him. Consequently, current operations in Iraq are greatly constrained by such overarching objectives. The result is an effort to minimize the use of force in order to help establish a stable, peaceful, civil order. To the extent that armored fighting vehicles (AFVs) protect the military force engaged in counterinsurgency operations, they preserve combat power for the commander that he can use against the enemy. However, by using large numbers of AFVs, the commander undercuts his primary mission of enabling better governance of the people and inhibits his ability to connect with the population. Thus, the increased use of AFVs actually assists the enemy in accomplishing *his* objectives.

⁵² *Draft Joint Urban Operations Joint Integrating Concept, Version 0.5*, (Suffolk, VA: U.S. Joint Forces Command, March 1, 2007), p. 11.

⁵³ *Draft JUO JIC*, p. 11.

“A WAR OF IMAGES”

Any use of force produces many effects, not all of which can be foreseen. The more force applied, the greater the chance of collateral damage and mistakes. Using substantial force also increases the opportunity for insurgent propaganda to portray lethal military activities as brutal.

FM 3-24 Counterinsurgency, December, 2006⁵⁴

Irregular warfare in the form of stability operations, particularly in an urban environment, is exceedingly stressful, complex, and messy. Dangers to US forces seem to lurk around every corner and can emerge, suddenly and unexpectedly, from the most “normal” of conditions—markets, traffic, the ebb and flow of daily living. Yet success in these operations requires that a military force operate within and through the local population, so as to provide for their security and (hopefully) gain access to intelligence crucial to identifying and defeating the insurgents. By default, this means US allied and indigenous forces must move among the civilian population. Doing so means soldiers must, in many instances, abandon their armored vehicles and patrol on foot, much like a “cop on the beat.” Given dangers that threaten at every turn, it is not surprising that soldiers and Marines are tempted to retreat into large, protective armored vehicles that offer safe-haven. Such “hunkering down” cedes the initiative to the enemy and [undermines] the ability of U.S. forces to interface successfully with the population in order to understand their needs, gather intelligence, and, above all, shape local opinion.”⁵⁵

The Defense Science Board notes:

[It] is important to remember that the most effective force protection measure in Iraq has been constructive ‘engagement’ with the local population. This view was underscored by virtually all of the recently returned brigade and battalion commanders who discussed their personal ‘lessons learned’ with the task force. *Many technologies, however, have tended to create barriers*

⁵⁴ FM 3-24 *Counterinsurgency* (Washington, DC: Headquarters Department of the Army, December 2006), p. 1-27.

⁵⁵ DSB, *Force Protection*, p. 13.

between U.S. military personnel and the local population, especially individual passive technologies (e.g. body and vehicle armor, protective glasses, etc.). In that sense, they may be counterproductive in certain settings. The most important technologies will be those that can bridge the gap between protection and de facto isolation.⁵⁶ [Author's emphasis]

In fact, urban environments magnify the potential for mistakes by US forces, while conveying significant advantage to irregular enemy forces.⁵⁷ To be successful, US forces often have to operate from positions of vulnerability — conducting dismounted foot patrols, living and working amongst the local population (away from the relative safety of fortified US compounds), and operating in partnership with arguably less capable local forces (“capable” as defined by materiel capabilities and professional training, as opposed to detailed knowledge of the local people, culture, and area). Urban environments provide continual opportunity for irregular forces to position themselves in close proximity to attack US troops or vulnerable civilians, whose support is necessary to defeat the enemy.

In a war of images—used very effectively by insurgents⁵⁸—a picture does, indeed, convey a thousand words. Where FM 3-24 cautions that excessive use of force can be counterproductive in a COIN environment, so, too, can an overtly aggressive posture—as reflected in the types of equipment employed in COIN operations. A menacing, aggressive, armored posture, can undermine efforts to establish relationships with the civilian population, local law enforcement and military forces, and disrupt efforts to portray US operations in a positive light in the contest for local, regional and global influence.

Writing in *Der Spiegel*, Ullrich Fichtner artfully captured the challenge facing US commanders and troops in Iraq with regard to gaining the initiative in the propaganda war. Following an extensive interview with General David Petraeus, commander of the multinational force operating in Iraq, Fichtner wrote:

⁵⁶ DSB, *Force Protection*, p. 40.

⁵⁷ FM 3-24 *Counterinsurgency*, para. 1-148.

⁵⁸ For an interesting discussion of how Al Qaeda uses the internet to recruit, train, and communicate its message, see “A world wide web of terror,” *The Economist*, July 12, 2007, accessed at http://www.economist.com/world/displaystory.cfm?story_id=9472498 on July 18, 2007.

General Petraeus deals with this public skepticism on reports of progress in Iraq day after day, and he is losing the battle for public opinion. Whenever the terrorists score another major victory, when they successfully bomb their way into their own “CNN moments,” the television images seem more powerful than hundreds of reports coming in from his senior military staff that they have arrested thousands of terrorists. It is a war of images, and each new attack seems to trivialize the US military’s efforts—especially when reporters, their faces lit up by nearby flames, ask how many more American soldiers must die in the merciless war.”⁵⁹

General Petraeus is faced with the challenge of conducting military operations in a complex environment against an insurgent force that is actively seeking opportunities to showcase US casualties, while at the same time needing to show progress in counterinsurgency operations and while minimizing casualties of both US military and Iraqi civilian personnel. On the one hand, successful counterinsurgency operations require forces to operate amongst the people. But such tactics provide enemy forces the targeting opportunities they desire to feed their propaganda efforts. MRAPs, with a good track record of protecting forces from the most common and effective tactic employed by the enemy, would seem to mitigate the propaganda problem addressed by Fichtner. But they potentially complicate the problem of successfully operating against the insurgency.

Force commanders are routinely faced with this dilemma, but perhaps even more so in irregular operations. Insurgents attempt to inflict casualties on the government or occupying forces and to use images and reports of casualties to convey an image of insurgent effectiveness, hopefully leading to a loss of will on the part of the government or people to continue operations against the insurgency. Counterinsurgent force commanders know that armor protects forces in the field; so, to mitigate the effects of enemy action and reduce casualties, commanders are drawn to increase the armor in their force. But heavily armored forces in a COIN environment are made less effective in accomplishing the tasks necessary to prevail.

⁵⁹ Ullrich Fichtner, “Hope and Despair in Divided Iraq,” *Spiegel Online*, August 10, 2007, accessed at <http://www.spiegel.de/international/world/0,1518,druck-499154,00.html> on August 15, 2007.

Then-Lieutenant General Petraeus made this point as co-author of the widely read Army-Marine Corps Field Manual FM 3-24, *Counterinsurgency*, wherein he writes of the “paradoxes” of counterinsurgency operations:

Sometimes, the More You Protect Your Force, the Less Secure You May Be. Ultimate success in COIN is gained by protecting the populace, not the COIN force. If military forces remain in their compounds, they lose touch with the people, appear to be running scared, and cede the initiative to the insurgents. Aggressive saturation patrolling, ambushes, and listening post operations must be conducted, risk shared with the populace, and contact maintained.⁶⁰

LTG Raymond Odierno, Commanding General of the Multinational Corps in Baghdad, conveyed much the same sentiment in his recently issued guidance to forces under his command.

*Get out and walk – move mounted, work dismounted. Vehicles like the up-armored HMMWV limit our situational awareness and insulate us from the Iraqi people we intend to secure. They also make us predictable, often obliging us to move slowly on established routes. These vehicles offer protection, but they do so at the cost of a great deal of effectiveness. HMMWVs are necessary for traveling to a patrol area, conducting overwatch, and maintaining communications. But they are not squad cars. Stop by, don't drive by. Patrol on foot to gain and maintain contact with the population and the enemy. That's the only way to dominate urban terrain.*⁶¹ [Author's emphasis]

Despite the intent of leaders like General Petraeus and LTG Odierno, concerns about “force protection” can overwhelm “mission effectiveness” if troops and commanders are not careful. As the Defense Science Board notes:

⁶⁰ FM 3-24 *Counterinsurgency*, pp. 1-27.

⁶¹ LTG USA Raymond Odierno, “Counterinsurgency Guidance,” Headquarters Multi-National Corps–Iraq, Baghdad, Iraq, June 2007, accessed at <http://smallwarsjournal.com/documents/mncicoinguide.pdf> on August 10, 2007.

[Force] protection must not interfere with the accomplishment of the mission or negatively impact on the political ties that bind the American people to their military. *Above all it must not lead to a garrison mentality or to a belief that hunkering down behind concertina wire and armor represents a serious effort to achieve mission completion.* To do so would invariably rob U.S. forces of the ability to shape their battlespace and understand how the enemy is operating. It would rob them of the capacity to perform effective counterinsurgency operations, which inevitably must involve operating in close contact with the civilian population.⁶² [Author's emphasis]

Summary

Within the specific context of Iraq, US forces must stay focused on the tactics, techniques, and procedures most effective in conducting COIN operations within complex, urban environments if they are to succeed in supporting the overarching political objectives for Iraq. Urban operations against an irregular enemy are difficult, dangerous, and stressful. Enemy forces will exploit every opportunity to inflict casualties on US forces for both tactical and propaganda purposes. Faced with the challenge of waging counterinsurgency while minimizing casualties for US domestic reasons, force commanders and troops alike may, understandably, find MRAP-like vehicles of value in attempting to accomplish the latter objective. But this should not compromise the reason US soldiers and Marines are in Iraq in the first place: to accomplish their mission.

But there is more to consider with regard to MRAPs than their relative effectiveness in dealing with modern urban insurgency warfare. America's armed forces must also be effective against an array of threats and in a variety of environments. The MRAP, whose life span may be measured in decades, must also be assessed with an eye toward their prospective effectiveness in contingencies other than the one now confronted in Iraq.

⁶² DSB, *Force Protection*, p. 4.

Toward this end, the next section explores some of the implications of threats, environments, and logistical considerations on mobility and armor considerations for the US Joint Force.

IV. Implications for Utility Vehicles in the Future Joint Force

Recognizing that our enemy is constantly evolving and changing his tactics, we are looking toward the future of vehicle armoring not just to combat his current capabilities, but also to prepare ourselves for future adaptations in the enemy's tactics.

Gen. William Nyland, USMC, June 21, 2005⁶³

DESIGNING FOR FUTURE THREATS

Acting Army Secretary Pete Geren's statement that the Army was considering replacing all Humvees in Iraq with MRAPs, some 17,000 plus vehicles, caused a flurry of excitement within the Army, the Marines and the media.⁶⁴ One "knee-jerk" conclusion was that the Humvee—or the class of light utility vehicles in general—was no longer relevant to the modern battlefield. But if MRAPs are a "mixed blessing" for those forces engaged in COIN operations, what is to say they represent the best possible use of resources in addressing other contingencies for which US forces must be prepared? Consider, for example, that:

⁶³ General William Nyland, USMC, Statement of General William L. Nyland, Assistant Commandant of the Marine Corps & Major General (Select) William D. Catto, Commanding General Marine Corps Systems Command, before the House Armed Services Committee on Marine Corps Vehicle Armoring and Improvised Explosive Device Countermeasures," June 21, 2005, p. 13 accessed at <http://armedservices.house.gov/comdocs/schedules/ACMCTestimonyJune21FINAL.pdf> on September 5, 2007.

⁶⁴ Gina Cavallaro, "Army to Request 17,000 MRAPs," *Army Times*, May 12, 2007; accessed at http://www.armytimes.com/news/2007/05/army-humvee_070509w/ on August 15, 2007.

- There is little certainty that future threats will mirror current ones. The Services are routinely criticized for “fighting the last war” yet some MRAP advocates seem to presume that the current enemy is a template for all future enemies. The military services must account for a range of environments, threats, and operating conditions when planning for the future. The current conflict is but one of many.
- The underlying argument for MRAP replacement of Humvees (light vehicles), expounded upon at length earlier in this paper, implies that protection of the force trumps mission accomplishment. In fact, the opposite should be the case, and planning for future capabilities should take this into account. Trades between protection, battlefield mobility, deployability, and operational effectiveness must constantly be weighed when considering available alternatives. While MRAPs possess many desirable characteristics, they also possess mission-inhibiting characteristics, and the Services will have to take all of these into consideration.

Background

The Humvee began entering the operating forces in the mid-1980s. Since then it has undergone substantial redesign and improvement, to the point that current production models (excluding outward appearance) have little in common with their ancestors.⁶⁵ When a platform or weapon is conceived, designers certainly take into consideration current operational requirements, as well as trends in the threat environment projected by military planners and trends in the development of future US military capabilities. With some weapon system life cycles spanning three decades, many assumptions have to be made regarding how the character of conflict may change over time. Designing the future light, medium, and heavy tactical vehicle fleets is no exception.

⁶⁵ The most recent production versions of the HMMWV series have incorporated substantial improvements in armor protection, mobility, and payload capacity. Upgrades to the vehicle’s powerplant, suspension, and drivetrain systems have essentially reclaimed payload and mobility losses that resulted from adding additional armor to older versions of the vehicle not originally designed to carry such weight. Specific information on current models and capacities can be found on the manufacturer’s website at http://www.amgeneral.com/vehicles_hmmwv.php.

Currently, all the Services have documented the Joint Force requirement for a replacement light tactical wheeled vehicle fleet, as captured in the Ground Combat Forces Light Tactical Mobility Initial Capability Document of November 2006. This document was refined and published as the JLTV Capability Development Document in December 2006, defining requirements for the long-term Humvee replacement.⁶⁶ The JLTV is intended to incorporate the various design factors mentioned above into the vehicle. It reflects a continued operational requirement for a family of vehicles that are easily transportable and have utility across a wide range of operational environments and mission requirements. In contrast, the MRAP family of vehicles appears, at least in terms of its justification to date, to be optimized for a particular threat in a specific theater. That said, there are indications that at least some MRAP design characteristics are being considered for inclusion in current armored vehicle programs—such as heavier armor and v-shaped hulls.⁶⁷

LOGISTICS AND PROCUREMENT

Decisions on planning for future force capabilities must focus primarily on mission effectiveness, which implies taking into account the logistical implications of any proposed solution, often referred to as a weapon systems' sustainability.

From a logistical perspective, a vehicle fleet optimized for force protection—e.g. a fleet comprised of medium- and heavy-weight armor vehicles and lacking any meaningful number of light utility vehicles—will place significant demands on air- and sealift, as well as supporting maintenance, supply, and sustainment systems. Conversely, an all-light vehicle fleet, while far easier to deploy and support, would fall short in terms of its lethality and survivability in a wide range of combat contingencies. Thus, force planners must balance competing requirements when considering any vehicle alternatives.

⁶⁶ Gen USMC James T. Conway, Statement of General James T. Conway, Commandant of the Marine Corps, before the Senate Armed Services Committee on Marine Corps Posture, March 29, 2007. p. 19, accessed at <http://armed-services.senate.gov/statemnt/2007/March/Conway%2003-29-07.pdf> on July 2, 2007.

⁶⁷ Megan Scully, "Lawmakers eye redesign of Marine land-sea vehicle," *Government Executive*, July 5, 2007, accessed at <http://www.govexec.com/dailyfed/0707/070507cdpm2.htm>.

Cost

Vehicles possess dimensional characteristics (i.e., height, width, depth), fuel consumption rates, and maintenance requirements that add to the complexity of projecting forces and sustaining operations abroad. The general trend in US armored vehicle fleet design has been to reduce the number of variants and maximize the commonality of variants within a given class of vehicle.⁶⁸ The greater the number of models, the more complicated and costly sustainment efforts become. A hypothetical example might better illustrate this point. For instance, if the government were to purchase commercially available pick-up trucks from Ford, Chevrolet, Toyota, and Mercedes-Benz, four different parts inventories would have to be accounted for, and maintenance personnel would have to learn the peculiarities of four different vehicle systems. The supply system would be more complicated than would be the case if just one vehicle model had been selected with a training program for mechanics expanded accordingly. It is also likely that each platform would handle slightly differently, so operator training would also have to be adjusted. This all adds to the expense of maintaining the vehicle fleet at a given standard of readiness.

Alternatively, the Defense Department might specify certain design requirements so that, regardless of the manufacturer, all platforms would use a common parts block and operate within a very narrow range of variation. If this can be accomplished, the tools and skills needed to maintain the fleet would be reduced. This latter approach results in greater efficiencies in the support system, reduced costs, and more effective, responsive support to the operator. The HMMWV, FMTV, JLTV, and FCS programs have all emphasized maximizing common platform components within their respective vehicle classes. This approach simplifies maintenance and sustainability issues that, in turn,

⁶⁸ This observation is based on the author's twenty-year career in transportation and logistics in the US Marine Corps. In general, the Services attempt to reduce the overall number of type, model, or series of platforms (whether ground, maritime, or air) in an effort to gain greater efficiencies in production and sustainment; the greater the variety of vehicles, the larger and more complex the supporting supply chain. Usually, the cost per platform is higher, too. Once a production line is established, the relevant start-up costs (research, development, establishment of production facilities, etc.) can be defrayed over a greater number of vehicles across a longer period of time. This results in lower per-unit costs. Additional efficiencies can be gained by maximizing the number of parts that are applicable across a family of platforms, e.g. alternators, transmissions, axles, etc.

translate to increased operational availability and reduced cost over the lifetime of the program.

Fiscal considerations come into play, too, when considering the acquisition of large numbers of vehicles. As implied above, an unavoidable consequence of placing large, unplanned purchase requests, like the MRAP, against a limited manufacturing base is a mixed fleet of vehicles with few parts in common. The Army and Marine Corps are handling this situation via contracted service and support agreements with each separate manufacturer (there are currently MRAP production contracts with seven different manufactures, each producing their own model of vehicle) but long-term support arrangements have yet to be worked out.⁶⁹ The baseline expense, however, of procuring an unplanned-for fleet of vehicles represents an opportunity cost to the Services, that may have to be accounted for in other procurement initiatives. Will the funding allocated for MRAP procurement detract from the JLTV program?⁷⁰ If so, then the future force will potentially be operating with a vehicle fleet not well-matched to the set of capabilities it is intended to have. But if the MRAP buy is viewed as a “cost of doing business in Iraq,” paid for by supplemental appropriations, then funding for the JLTV program would remain largely intact. Having said that, supplemental funding for the war still involves opportunity costs. A dollar spent on an MRAP is a dollar not available for individual soldier protection, enhanced training,

⁶⁹ John Castellaw, Statement of Lieutenant General John Castellaw, Deputy Commandant of the Marine Corps, Programs and Resources, before the House Armed Services Subcommittee on Seapower and Expeditionary Forces and Air and Land Forces on The Mine Resistant Ambush Protected Program, July 19, 2007, p. 7, accessed at http://armedservices.house.gov/pdfs/JointALSPEF071907/Castellaw_Testimony071907.pdf on August 8, 2007.

⁷⁰ The JLTV Program is currently estimated at \$13+ billion for the 52,571 vehicles planned for the Army and Marine Corps, 2012-2020; 38,421 vehicles for the Army and 14,150 vehicles for the Marine Corps, as reported by Harold Kennedy, “Army, Marines to Acquire 50,000 New Trucks to Replace Humvees,” *National Defense Magazine*, accessed at <http://www.nationaldefensemagazine.org/issues/2007/February/ArmyMarines.htm> on August 7, 2007; with a per unit cost of \$250,000 as provided at “JLTV INDUSTRY DAY Questions & Answers,” May 25, 2006; see: http://www.onr.navy.amount/events/docs/76_JLTV%20Q&A.doc, accessed on August 15, 2007. There have been a variety of estimates on the potential cost of the MRAP program, depending entirely, of course, on the total number of vehicles acquired. If 20,000 plus vehicles are purchased, as some have suggested, the program cost could exceed \$20 billion, something not planned for in Service acquisition plans. Potentially, the Services might have to reduce their planned purchase of JLTVs (or other vehicle programs) to compensate for the unplanned MRAP bill, unless Congress increases overall funding.

etc. Current drive-away costs for an M1151 armored Humvee approach \$150,000. In contrast, MRAP unit costs range from \$700,000 to \$1.2 million each, or between four and eight times the cost of an up-armored Humvee. The JLTV program cost estimates for the Humvee replacement range from \$200,000 to \$250,000.⁷¹ To be sure, most of today's weapon systems cost substantially more than those that they replace. This is because they offer a level of combat effectiveness superior to that of their predecessors that justifies the increased expense.

Mission Relevance

Lieutenant General John Castellaw, USMC, in recent testimony on the MRAP Program before the Seapower and Expeditionary Forces and Air and Land Forces Subcommittees of the House Armed Services Committee, observed:

While sustainment funding [for maintenance, supply, and on-site technical support of MRAPs] will be required beyond fiscal year 2008; the Marine Corps views the MRAP vehicles as mission and theater specific and are not intended to become a program of record or retained in the permanent inventory.⁷² It is not a replacement for the HMMWV or the future Joint Lightweight Tactical Vehicle (JLTV) mission. The size and weight of the MRAP precludes its use for many of

⁷¹ "JLTV INDUSTRY DAY Questions & Answers."

⁷² John Castellaw, Statement of Lieutenant General John Castellaw, Deputy Commandant of the Marine Corps, Programs and Resources, before the House Armed Services Subcommittee on Seapower and Expeditionary Forces and Air and Land Forces on The Mine Resistant Ambush Protected Program, July 19, 2007, p. 7. LtGen Castellaw, USMC, is the Deputy Commandant of the Marine Corps for Programs and Resources. As such, he oversees all acquisition programs managed by the Service. The Marine Corps is the "lead agency for procurement...of MRAP vehicles," acting on behalf of all the military services. See: <http://www.marines.mil/marinelink/mcn2000.nsf/0/BOF54EEACB8B05B78525726F007D6048?opendocument>, the announcement by Marine Corps Systems Command on the initial MRAP contracts. While speaking primarily on the Marine Corps' view of MRAPs, his comments related to sustainment funding and the relationship between MRAP, HMMWVs, and the JLTV program are applicable across the Services acquiring MRAPs.

the expeditionary missions of the Marine Corps where transportability must be considered.⁷³

This indicates that the Services are taking a measured approach in their procurement of MRAP vehicles, mindful that Iraq is a current problem for which MRAPs provide a partial solution, but also aware of the need to maintain a balanced portfolio of capabilities (particularly in major vehicle fleet acquisitions) that maximizes overall force effectiveness across a broad range of operational requirements.⁷⁴

Deployability

Shifting toward more heavily armored vehicles also has implications for the ability of US ground forces to deploy over great distances within relatively short timelines, a factor that is increasingly important as the Army and Marine Corps emphasize expeditionary operations over forward deployed forces. If light utility vehicles are supplanted by more heavily armored MRAP-style platforms, US force planners will have to make fairly dramatic revisions to lift and force closure planning requirements. As currently configured, MRAPs weigh-in at two to five times the weight of current production Humvees. While the M1151 Humvee model has a gross vehicle weight rating of 12,000 lbs. (6 tons), most MRAPs range between 14 and 25 tons. Defense Department requirements for the JLTV program state a desired vehicle weight in the 12,000 lbs. category. Moreover, requirements documents for the JLTV and Army Future Combat System (FCS) programs both desire that their systems be transportable by the current fleet of inter- and intra-theater

⁷³ John Castellaw, Statement of Lieutenant General John Castellaw, Deputy Commandant of the Marine Corps, Programs and Resources, before the House Armed Services Subcommittee on Seapower and Expeditionary Forces and Air and Land Forces on The Mine Resistant Ambush Protected Program, July 19, 2007, p. 8.

⁷⁴ LtGen Castellaw was specifically speaking on behalf of the Marine Corps in the preceding quote, but his point about viewing the MRAP as a mission and theater specific solution to a current problem has been echoed by other officials. Mr. Geoff Morrell, a Pentagon spokesman, recently addressed a revised Army request for 10,000 MRAPs, clearly indicating that MRAP procurement plans would be influenced by varying force levels and future changes to conditions in theater. "If U.S. troop levels in Iraq drop below the planned 130,000 next July, 'we can always off ramp this and end up buying fewer.'" Rowan Scarborough, "Pentagon Increases Orders for Armored Vehicles," *Washington Examiner*, September 21, accessed at <http://ebird.afis.mil/ebfiles/e20070921546416.html> on September 21, 2007.

lift aircraft. For the JLTV, for example, this means it must be externally transportable by heavy lift helicopters and internally transportable by C-130s.⁷⁵ But MRAPs generally exceed the cargo bay dimensions and payload ratings of a C-130, and must therefore be carried by a C-17 aircraft or deployed by maritime transport.⁷⁶ Within a theater of operations, MRAPs are typically transported from the air- or seaport of debarkation to their area of operation via heavy equipment transporters (HETs) — truck trailers specially designed to carry very heavy equipment (e.g., tanks, cranes, earthmoving equipment). In short, moving aggressively toward a more heavily armored inventory of combat vehicles has significant implications for ground force deployability and for air and sealift requirements.

The increasing weight of US forces has raised another problem now confronting future force planners. Until very recently, Marine Corps and Navy planners were primarily concerned with limitations in available “cube,” or volume, when planning for embarkation of a force aboard amphibious shipping. But with the introduction of MRAPs, planners are now, for the first time, confronted with loading-weight limitations of amphibious ships and space restrictions that limit the height and width of vehicles that can be stowed on lower vehicle decks within a ship. If US forces commit to routine use of larger armored vehicles across the range of scenarios for which military planners must account, there will be implications for the design of ships used by the Marine Corps and the Army for amphibious operations and afloat storage of prepositioned equipment.

⁷⁵ A C-130 has a normal cargo payload of 36,000 lbs, with a maximum allowable limit of 42,000 per US Air Force Fact Sheet for the C-130 Hercules, accessed at <http://www.af.mil/factsheets/factsheet.asp?id=92>. In comparison, the C-17 Globemaster III has a cargo payload limit of 170,000 lbs., see the USAF Fact Sheet at <http://www.af.mil/factsheets/factsheet.asp?fsID=86>.

⁷⁶ There are increased costs associated with rapid (air) movement of such heavy vehicles. Current estimates run upwards of \$150,000 per vehicle to ship MRAPs by air versus \$19,000 if shipped to Iraq by sea. See “Pentagon Seeks \$1.5 Billion Boost for MRAP,” *Inside Defense*, July 17, 2007, accessed at http://insidedefense.com/secure/defense_docnum.asp?f=defense_2002_ask&docnum=7172007_july17a on July 30, 2007, and “Mine-Resistant Ambush Protected Vehicle Production Speeds Up,” *Mideast Stars and Stripes*, July 28, 2007, accessed at <http://ebir.afis.mil/ebfiles/e20070728532516.html> on August 1, 2007.

Sustainability and Second Order Effects

The greater fuel consumption rate of more heavily armored vehicles is another important logistical concern. Fuel consumption normally increases as vehicle weight rises. MRAPs have a fuel consumption rate of 5-10 miles per gallon, depending on the model,⁷⁷ while Humvee mileage ranges from 10-15 mpg. Logistics planners must account for the availability and means of transporting ever-increasing quantities of fuel if US forces grow heavier in response to increasingly lethal threat environments. This directly translates into higher operating costs for a given force in order to cover more fuel transport and storage systems (refueler trucks and fuel storage bladders) that, in turn, increase the size of the sustainment force needed to support more heavily armored formations. The widespread introduction of heavier vehicle classes—such as a one-for-one replacement of Humvees with MRAPs—could have the unintended consequence of increasing the overall size of the force needed to conduct and sustain operations, thus *actually increasing the number of US personnel deployed into theater and placed at risk*. Increasing armor protection across the board for the force as a whole may further enlarge and complicate the force protection problem! The US military employs about 3,000 trucks per day in Iraq to supply operations.⁷⁸ Moving to a more heavily armored force could increase requirements for fuel and a wider variety of spare parts, as well as the general logistical support associated with any increase in maintenance personnel. This would lead to an increase in the number of convoys required to sustain the force at a given level of combat readiness – effectively resulting in a force protection-force sustainment spiral that would be untenable and mission-defeating if allowed to run unregulated.

Mission Effectiveness

While matters of cost, deployability, sustainability, and mission relevance should indeed be factored into the debate, the issue of “mission effectiveness over time” should be the reference against which these others issues are related in order to determine their relative merit. As noted at length in the preceding discussions on armor, force protection,

⁷⁷ Roxana Tiron, “Firm guards niche in armored vehicles,” *The Hill*, July 24, 2007, accessed at <http://thehill.com/business--lobby/firm-guards-niche-in-armored-vehicles-2007-07-24.html> on July 24, 2007.

⁷⁸ Jim Michaels, “Attacks Rise on Supply Convoys,” *USA Today*, July 9, 2007, accessed at <http://ebird.afis.mil/ebfiles/e20070709527954.html> on July 9, 2007.

and the challenges of irregular warfare, the US can choose to deploy troops to Iraq to conduct counterinsurgency operations “buttoned up” in heavily armored vehicles rather than closely interacting with the indigenous population. However, such a decision may actually *reduce* the overall effectiveness of US forces and thereby protract the conflict or even lead to mission failure. Consequently, the answer to the debate over Humvees versus MRAPs in Iraq is likely to fall somewhere between the current armored vehicle mix and wholesale replacement of Humvees with MRAPs, depending on the relative importance placed on protecting the force or accomplishing the COIN mission.

V. Observations

In practice, however, ‘fire and manoeuver’ was rarely used in Vietnam. There turned out to be both carrot and stick which tended to lead commanders in a rather different direction. The carrot was the unprecedented weight of supporting firepower which was now available to even the smallest unit; while the stick was the political requirement to avoid casualties. Taken together, these two factors inevitably encouraged the idea of substituting heavy supporting fire for the costly assault phase of an attack.⁷⁹

Paddy Griffith, 1981

One conclusion we can infer upon reviewing the evidence and analysis presented above is that the challenge of protecting a force in combat should be viewed holistically, within the context of the overall conflict environment. It does little good, for example, to field MRAPs that can protect against IEDs if the net effect is to further isolate US troops from the indigenous population they are ordered to protect. Nor may it make sense to field combat vehicles that provide protection against a specific kind of enemy weapon (e.g., current IEDs), but which may prove wholly ineffective against a range of others (e.g. advanced IEDs or antitank guided munitions).⁸⁰

⁷⁹ Griffith, *Forward into Battle*, p. 156.

⁸⁰ Author’s comment: US planners should assume that non-state actors such as the irregular forces battling US and coalition forces in Iraq and Afghanistan will likely possess advanced capabilities in the future, particularly given the recent history of proxy wars and state-sponsorship of belligerents. A good case-in-point is the Second Lebanon War of July-August 2006, involving Israel Defense Forces and Hezbollah forces. Though Israel entered the conflict with an assumed advantage in advanced weaponry, it was fought to a standstill by Hezbollah units armed with weapons provided by Iran, Syria, and others that were sufficiently capable of offsetting Israeli systems. In particular, Israeli offensive penetrations with armor formations led by Merkava tanks were

Time has always been an important factor in war. Temporal and conditional factors must be accounted for in any decision to field a new capability. Consider, for example, that while MRAPs are being rushed to the field to counter the immediate threat posed by IEDs in Iraq, the threat itself may change significantly, and perhaps even dramatically, by the time the vehicles arrive. For example, if the use of explosively formed penetrators (EFPs) becomes widespread, any advantage the MRAPs have against earlier forms of IEDs may be irrelevant. Or consider a broader, strategic issue. American political and military leaders are currently reviewing the size and duration of the military's involvement in Iraq. If US policymakers decide to begin reducing force levels appreciably over the next year or so, the surge production of MRAPs may prove "too little, too late" to have an effect on the war. In short, it may be that by the time significant numbers of MRAPs are going "in" to Iraq, US forces may well be coming "out."

If MRAPs are fielded too late to have an effect on the war in Iraq, the question then arises as to whether the widespread use of IEDs is unique to Iraq or a growing trend in warfare. If, as seems likely by virtue of their demonstrated effectiveness, IED warfare is a "growth industry," a more heavily armored US force, one that includes large numbers of MRAP vehicles, may prove valuable. However, the case has yet to be made. This leads to the conclusion that any MRAP procurement decision should take into account both the short-term force protection mission in Iraq as well as the long-term ground force requirements.

EVOLVING COMPETITIONS

While the MRAP offers increased armor protection as a means of addressing the growing IED threat, it is hardly a panacea. Moreover, in warfare, threats change and evolve, sometimes quite rapidly. Enemy

seriously blunted by an "impressive" Hezbollah arsenal of anti-tank munitions. See Adrian Blomfield, "Israel humbled by arms from Iran," *Telegraph*, August 16, 2006, accessed at <http://www.telegraph.co.uk/news/main.jhtml?xml=/news/2006/08/15/wmid15.xml> on September 8, 2007; Andrew Macgregor, "Hezbollah's Creative Tactical Use of Anti-Tank Weaponry," *The Jamestown Foundation*, August 15, 2006, accessed at <http://www.jamestown.org/terrorism/news/article.php?articleid=2370105> on September 5, 2007; and Richard Bennet, "Hezbollah digs in deep," *Asia Times Online*, July 25, 2006, accessed at http://www.atimes.com/atimes/Middle_East/HG25Ak03.html on September 5, 2007 as just a few examples of reporting on this issue.

forces have countered US armor enhancements by increasing the size of IEDs (e.g., by using larger military munitions and “daisy chaining” several smaller pieces of ordnance together), developing innovative placement and triggering options, and employing shaped-charge weapons known as explosively formed penetrators (EFPs)—a weapon that uses an explosive charge to form and propel a molten slug of copper that is capable of piercing the heaviest armor.⁸¹ An EFP can be effective even against the Army’s heavily armored M1A2 Abrams tank.⁸² In response, the Defense Department has initiated an effort to develop an “MRAP II”, capable of defending against EFPs.⁸³ And if past experience is any guide, one can presume that an MRAP II would likely be even more expensive than its just-being-fielded predecessor. Yet, IEDs are inexpensive, easy to assemble, plentiful, and extremely effective,⁸⁴ while the US response is quite expensive⁸⁵ and seems to lag enemy adaptations on the battlefield.

⁸¹ Peter Eisler, “Insurgents Adapt Faster Than Military Adjusts to IEDs,” *USA Today*, July 16, 2007, p. 11, accessed at <http://ebird.afis.mil/ebfiles/e20070716529400.html> on July 16, 2007. The Wikipedia entry on EFPs provides informative graphics and some links to additional material on the subject; see http://en.wikipedia.org/wiki/Explosively_formed_penetrator. MSNBC.com/Newsweek magazine has also produced an informative graphic on the IED threat, accessible at <http://www.msnbc.msn.com/id/20219367/site/newsweek/>.

⁸² Julian Barnes, “EFPs’ a Big Threat to U.S. Forces in Iraq,” *Los Angeles Times*, June 22, 2007; accessed at <http://ebird.afis.mil/ebfiles/e20070622524132.html> on June 22, 2007.

⁸³ DoD Solicitation M67854-07-R-5082, Mine Resistant Ambush Protected Vehicle II, July 31, 2007, accessed at <http://www1.fbo.gov/spg/DON/USMC/M67854/M6785407R5082/listing.html> on August 1, 2007.

⁸⁴ Evan Thomas and John Barry, “Can American Military Stop Deadly IEDs?” *Newsweek*, August 20, 2007; accessed at <http://ebird.afis.mil/ebfiles/e20070813536154.html> on August 13, 2007. This article can also be found at <http://www.msnbc.msn.com/id/20226446/site/newsweek/page/0/>.

⁸⁵ It is interesting to note as a reference point that an old 175mm HE artillery round, for the Vietnam-era M107 self propelled artillery piece, cost approximately \$200 while an MRAP vehicle averages \$800,000, not forgetting the \$12 billion being committed to JIEDDO itself. The artillery munition cost estimate was obtained from John S. Brown, BG USA (Ret), “Historically Speaking: The Continuing Utility of Dumb Munitions”, *Army Magazine*, July 2006, accessed at <http://www.ausa.org/webpub/DeptArmyMagazine.nsf/byid/KHYL-6QLQL7> on August 27, 2007. As referenced in other places in this paper, insurgents in Iraq make frequent use of old artillery rounds (looted from Iraq Army ammunition storage sites) to create the large IEDs employed against US forces. This competition represents a cost advantage of nearly a million-to-one in favor of the insurgents who attack at no-cost (the munitions/explosives are essentially free to them) while the US responds with million-dollar armored vehicles, in addition to the billions being spent by JIEDDO to

Put another way, the MRAP must be viewed as part of a larger military contest between US armored vehicles and Iraqi insurgents: an armor vs. anti-armor competition. At the moment, the anti-armor side of this contest appears to have the advantage. But the contest will likely continue as long as US forces remain in Iraq and insurgent forces have access to IED materials. If, in fact, the enemy maintains (or even expands) his advantage or the trends in casualties resulting from IEDs worsen – i.e. if the US effectively loses the competition – MRAPs may not help as much as is hoped, regardless of the large investment being made (although, to be fair, any use of MRAPs could mitigate, to some extent, such worsening conditions).

Again, future force planning must consider this array of competitions, their intensity and duration, and the rate of change occurring within any given competition. So when it comes to selecting a specific type of vehicle, airplane, or naval vessel, planners seek to find a solution that offers maximum flexibility while combining, the best it can, the attributes of mission enablement, deployability, supportability, force protection, and overall cost. In a world of constantly evolving competitions, flexibility and adaptability, even in vehicles, becomes critically important.

It is important to note that, in at least one significant way, Iraq represents an unusual case in which the enemy had unrestricted access to an enormous supply of military grade explosives and munitions that could be used in their existing, finished form, or mined for the explosives contained within them for other uses (as explosive filler for EFPs, for example). The senior US military command (USCENTCOM) was subject to extensive, and arguably quite valid, criticism, following the completion of major combat operations during the Summer of 2003, for failing to secure the numerous (and large) stockpiles of munitions assembled by Saddam Hussein over decades. Left unguarded, these ammunition storage points provided Iraqi insurgents with the raw materials they needed to initiate their IED campaign against US and coalition forces.⁸⁶ Whether future opponents will have similar access

develop other counter-IED technology solutions. In effect, a by-product of the adaptability of the threat is a cost imposing strategy favoring the enemy.

⁸⁶ Davi M. D'Agostino, "DOD Should Apply Lessons Learned Concerning the Need for Security over Conventional Munitions Storage Sites to Future Operations Planning", Testimony before the Subcommittee on National Security and Foreign Affairs, Committee on Oversight and Government Reform, House of Representatives, GAO-07-639T, March 22, 2007, p. 2. "Conventional munitions storage sites were looted after major combat operations and some

to such large quantities of explosives is doubtful, but given the success of IED attacks against first-rate military forces, planners should expect that potential enemies will attempt to incorporate the use of IEDs and EFPs against US forces in the future. Therefore, some measure of protection against such threats will be important. But force commanders will have to balance that desirable trait against the higher need to accomplish the mission handed to them.

If Iraq is viewed as a largely unique situation, then the character and form of enemy operations, the impact they are having on US forces, and the mixture of actors and issues at play within the borders of the country will pass away once the US withdraws substantially from the Iraq theater (or at least should not impact future planning for US forces). The ambush tactics, suicide bombings, widespread use of IEDs/EFPs, and the need for protracted counterinsurgency operations in congested urban environments will NOT characterize future conflicts. Post-Iraq, the battlefield, in general, will retain its classic geometry, with fairly well defined sectors of combat and relatively secure rear areas. US combat forces and their equipment can likewise be categorized by their expected employment and the environment in which they will operate—that is, some specifically designed for combat operations in high-threat areas and others for lower-threat, semi-permissive areas. Current investments being made in MRAPs and the expansion of our foot-soldier population are one-time costs that should be written off as a “cost of doing business” in Iraq; they should be paid for with Congressional “supplementals” rather than becoming a portion of the baseline Defense budget. With regard to ground equipment, MRAPs address the overarching concern for force protection in Iraq (perhaps even at the expense of mission effectiveness) and, correspondingly, Humvees/light vehicles will remain a relevant feature of “FEBA warfare.”

An opposing view could be that the tactics and capabilities being developed by both sides in Iraq—US forces and the confusing mixture of enemy forces—and the conditions in which operations are being conducted—complex, irregular warfare in urban environments—will survive the immediate conflict in that country to become expected features of contingencies across an array of scenarios for the foreseeable future. In

remained vulnerable as of October 2006...Not securing these conventional munitions storage sites has been costly, as government reports indicated that looted munitions are being used to make improvised explosive devices (IED) that have killed or maimed many people, and will likely continue to support terrorist attacks in the region.”

this view, investments being made in force protection (MRAPs, vehicle redesigns, improved body armor); education and training of forces; organizational redesign and employment (advisors and trainers, inter-agency teams, heavy reliance on Reserve and National Guard units); and expansion of baseline forces are long-term investments that will remain relevant and necessary in future conflicts. Traditional battlefield geometry will essentially collapse into zones or areas of operational responsibility, with ephemeral coordination and control measures employed only as necessary for a specific action. Irregular forces will rise in prominence and effectiveness and will employ, to great effect, guerrilla, insurgent, and “terrorist” tactics, using all means available with little regard for collateral damage to civilian populations or the infrastructure of dense, urban settings. In this kind of world, the tension between continuous force protection and the employment of tactics shown to be successful in counterinsurgency operations will continue to cause great consternation for force commanders faced with the lethal threats posed by IEDs, urban ambushes, snipers, and booby-trapped buildings and the need to employ dismounted infantry amongst large urban populations.

Depending on their view of the future security environment and what it will take, not only to survive, but to succeed, in the types of military operations likely to be called for, the Services will need to determine whether adjustments to their current programs of record for ground equipment are necessary, whether or not evolving counterinsurgency doctrine (and the organizational implications of that doctrine) takes a prominent position in Service thinking about warfare, and whether the cultural view of operational and tactical “risk” within the Defense establishment needs to be explicitly addressed. Political leaders will need to determine whether the national objectives to be obtained in Iraq (or any other conflict) are worth the cost being imposed on the Nation and its military, and whether there are more effective and less costly means to achieve those same objectives.

FORCE PROTECTION AND MISSION REQUIREMENTS

As recognized by the DSB, force commanders have an overwhelming incentive to protect the young men and women under their command,

because they represent his “combat power” and are the means by which he accomplishes his mission, and also because they represent expensive human resources that are difficult to replace. Finally, commanders feel a moral imperative to protect the lives of those entrusted to them. In COIN and stability/security operations⁸⁷, military personnel must often work in close proximity with the civilian population in order to develop the personal relationships and trust critical to acquiring information that will lead to defeating the enemy. In order to do that, they must get out of their vehicles. Foot-mounted patrols are the “bread and butter” of life in an urban environment. To be sure, vehicles increase general mobility and provide the wherewithal to converge larger forces in response to an unfolding situation. Light vehicles provide the maneuverability and responsiveness demanded by urban operations and facilitate maintaining situational awareness in congested environments; but light vehicles are vulnerable to the threats posed by enemy forces in Iraq. MRAPs have a proven ability to protect troops, from the deadly affects of many types of IEDs, as they are transported from one point to another, but they do not seem to be as appropriate as light vehicles in supporting tactical operations in an urban environment. In line with US COIN doctrine, a key factor in success against insurgents is improving security. As security in an area improves, it becomes both possible and desirable for troops to move about in more lightly armored vehicles, both to maintain that close connection with the local population, and to free up the far more expensive heavier armored vehicles for more dangerous missions. Consequently, force commanders will likely employ a mix of armored vehicles, tailored to the situation at hand, rather than tilting toward a “single-point solution” of relying heavily on one type of vehicle. Simply stated, one should not assume that the days of light armored vehicles are over, or that MRAPs, in their current form, are a panacea for all the threats confronting US forces in Iraq.

⁸⁷ Irregular warfare is a broad term that encompasses several different types of operations, to include counterinsurgency (COIN), stability, security, transition and reconstruction (SSTR), and unconventional warfare, among others.

TIMELY ADAPTATION – BETTER “GOOD ENOUGH” NOW THAN “PERFECT” TOO LATE

Though the sudden incorporation of several different types of MRAP vehicles introduces complexity into the military’s supply and maintenance systems, and runs counter to the general trend of “necking down” the variety of vehicles in the military’s inventory, it is not (or should not be) a completely unexpected development. As repeatedly addressed in this paper, war routinely gives birth to new technologies and devices, as each combatant struggles to master his opponent. Weapons are developed to defeat protective measures, and counters to those weapons are developed to regain the advantage. Insurgent use of formidable, improvised weapons such as the IED and the EFP, was driven by US superiority in conventional weapons systems. Although development plans for the JLTV and FCS programs both seek MRAP-level protection in vehicles of Humvee and medium-armor weight, substantial technical challenges abound in meeting that goal. Faced with a “now” threat, it is completely reasonable for forces in the field and actively engaged with the enemy to seek immediately available solutions that can be quickly deployed. The challenge for future force planners is to account for the “now” when planning for the future.⁸⁸

EMERGING TRENDS IN CONFLICT

Urban. An array of studies⁸⁹ produced over the past few years addressing the potential challenges of the future security environment generally conclude that urbanization will continue to increase (with migra-

⁸⁸ Gen USMC James T. Conway, Statement of General James T. Conway, Commandant of the Marine Corps, before the Senate Armed Services Committee on Marine Corps Posture, March 29, 2007. p. 19, accessed at <http://armed-services.senate.gov/statemnt/2007/March/Conway%2003-29-07.pdf> on July 2, 2007, “The MRAP is an example of [adapting] to evolving threats. It is an attempt to acquire the very best technology available in the shortest amount of time...”

⁸⁹ Such studies are almost too numerous to mention, but a fewer number are quite representative, among them: “Mapping the Global Future” from the U.S. National Intelligence Council (part of their Global 2020 Project); DoD’s 2006 Quadrennial Defense Review; “New World Coming” from the Hart-Rudman Commission, and the UK Ministry of Defence’s “Global Strategic Trends Programme 2007-2036.”

tion from rural to urban areas the norm),⁹⁰ and that conflicts will generally trend toward the messy, complex, and protracted form of irregular warfare, like that underway in Iraq than keep the Cold War paradigm of high-end, state-on-state conventional warfare. Not that either form will disappear, but that irregular warfare in and around urban environments will dominate the engagements in which US ground forces should expect to be involved over the next several years. If this is the case, U.S. forces will be called upon to engage in operations similar to those ongoing in Iraq, and against opponents employing tactics similar to those inflicting such costs on U.S. and Coalition forces. Enemy combatants will be irregular in form and method, but they will be armed with advanced capabilities, particularly if acting as surrogate forces for a state-sponsor.

Irregular. US dominance in conventional operations will continue to drive potential opponents in one of two directions: toward acquisition of weapons of mass destruction and very “high end” conventional capabilities (e.g., submarines, missiles, and integrated anti-access defensive systems), or toward irregular warfare operations conducted by proxy forces within the complexity of urban environments – urban settings infused with cultural and values frameworks markedly different than our own. Engagements between US forces and non-state, irregular forces will be problematic for the US because US operations will be bounded and limited by its own framework while enemy forces will likely operate according to their. US forces will have to straddle the gap between engaging local populations in ways that build relations (and put US forces at risk of enemy attack), and adopting force protection measures that create distance between the force and the population with which it needs to interact. Enemy forces will make every effort to exploit this gap, inflicting casualties by any means available to break our will to continue the fight, if not inflicting actual tactical defeats on the US, while US forces will have to act with restraint that corresponds to the types of operations being undertaken.

High Tech. Irregular forces will be enabled to a high degree by the outcome of the revolution in guided weapons,⁹¹ a revolution that

⁹⁰ FM 3-06 *Urban Operations*, para 1-1.

⁹¹ Barry Watts, *Six Decades of Guided Munitions and Battle Networks: Progress and Prospects* (Washington, DC: Center for Strategic and Budgetary Assessments, March 2007). The general theme of this work is that warfare has fundamentally changed as a consequence of the advances made in improving the accuracy and range of munitions; where precision has displaced mass. What this means for the irregular force is that modern, guided munitions provide a

favors offense over, defense and “fires” over force protection. Technological advances have made modern weapons not only more effective but also more available to non-state actors. (The guided weapons revolution also suggests that smaller, lighter, more dispersed forces are more survivable and effective on modern battlefields. If true, flexibility, mobility, maneuverability, and responsiveness take on even greater importance.) US forces would normally counter an increase in combat capability in an enemy force with more effective employment of its own firepower (in the simplest of terms). However, an irregular warfare environment makes this approach difficult. Whereas firepower can normally be used to neutralize enemy capabilities, raw “firepower” can be counterproductive in irregular warfare conditions.

Together, guided weapons, dense urban environments, and the restrictive nature and competing demands of irregular operations will increase the complexity of warfare for US forces.

The explosive mixture of urbanization, irregular warfare, and non-state actors with advanced capabilities will test the US military to the fullest extent. FM 3-06 Urban Operations addresses this challenge succinctly, using, as an example, the advantages conferred to Chechen insurgents as they battled first-line Russian forces:

“Leaders of the defeated Chechen conventional forces recognized that fighting in the urban area provided them their best chance for success. The complexities of urban combat and the perceived advantages of defending an urban area mitigated their numerical and technological inferiority. The urban area provided the Chechens protection from fires, resources, interior lines, and covered and concealed positions and movement. Given such advantages offered by the environment, smaller or less-sophisticated military forces have similarly chosen to fight in urban areas.”⁹²

firepower equivalency that was only possible with very large and well armed forces in the past. Whereas two decades ago it took a significant concentration of men and materiel to confront and engage top-ranked, professional military forces, modern guided weapons provide small and irregular forces the means to attack and inflict tactical defeats on professional, well trained and equipped forces many times their size. The Israel Defense Forces experienced the effects of this condition in their short war with Hezbollah forces in Southern Lebanon during the Summer of 2006.

⁹² FM 3-06 *Urban Operations*, para 1-7

“The clutter of the physical structures, electromagnetic radiation, and population diminishes Army capabilities. This clutter makes it difficult for Army forces to acquire and effectively engage targets at long ranges. In urban areas, the terrain often allows a threat to operate in closer proximity to friendly forces. Therefore, the threat may “hug” friendly forces to avoid the effects of high-firepower standoff weapon systems and degrade their ability to gain or maintain a thorough common operational picture.”⁹³

Army and Marine Corps vehicle fleets will have to afford sufficient protection to preserve and enable combat power, while also mitigating the effects of the conditions imposed on ground forces by irregular forces that are armed with advanced weapons, and operate in complex urban environments.

OPERATIONAL SCENARIOS AND IMPLICATIONS FOR MOBILITY

The Department of Defense uses a portfolio of defense planning scenarios to guide its thinking about capabilities and employment of forces. The scenarios range from high-end conventional warfare to “non-combat” situations, where military forces could be called upon to support civil authorities in crisis situations (e.g., pandemics and natural disasters). Since the future cannot be known with certainty, assumptions have to be made and policies developed that guide planners to create a balance of capabilities across the joint force. Some scenarios or specific missions require very specialized equipment that has little utility outside its narrowly defined purpose. Other equipment is truly multipurpose and contributes to force capabilities across the range of potential scenarios. Airlift is one such multipurpose capability, without which very few missions would be possible. A heavy lift aircraft, such as the C-17, can carry humanitarian rations as easily as a main battle tank. Vehicles, as a category, are also largely multifunctional, although some have more discretely defined value. A tank, for instance, is not very good at transporting large quantities of supplies or personnel from one place to another. Then again, a cargo truck usually makes a poor assault

⁹³ FM 3-06 *Urban Operations*; para 3-9

vehicle in an armor battle! But when considering operational requirements in a theater across a range of potential scenarios, some vehicle characteristics, especially in support vehicles, come to the fore: cross terrain/off-road mobility, the ability to keep pace with a mechanized force, some level of protection from the most likely threats (e.g., small arms, shrapnel, and blast), maneuverability in an array of environments (e.g., flat, open, hard-packed terrain; wooded and marshy areas, sandy deserts, and urban population centers), and multi-functionality (able to transport troops or cargo and able to serve as a provisional weapons platforms). Investing too heavily in several narrowly defined platforms optimized for specific tasks reduces overall flexibility in the force. The challenge is to determine vehicle characteristics that provide value to the force across the widest range of potential operating environments and mission profiles.

TIMELINESS

There is some reason to be concerned about fielding new systems (especially when substantial costs are involved) “at the end of the curve,” if it is not clear that the capability will be needed in future operations. This concern exists in any area where a large capital investment is probably needed to maintain a given level of capability, but the investment would grossly outlast the perceived need; for example, putting an expensive new roof on a ramshackle old building. In the case of MRAPs, the requirement for them in large numbers is a direct result of conditions found in Iraq and the tactics developed by enemy forces – tactics that have proven very effective against US forces. Yet it is not clear that the Iraq-like threat environment will displace all other threat environments that US forces need to consider. That said, aspects of the current environment will likely translate to others, and the Services are accounting for this in current vehicle procurement programs-of-record, although these programs were initiated prior to Operation Iraqi Freedom.

VI. Conclusions

Armies have notoriously short memories for the realities of warfare, and despite various attempts to codify or disseminate 'lessons learned', they often become fixated on one particular aspect or procedure and institutionalise it rigidly, while neglecting a broad band of other considerations.⁹⁴

Paddy Griffith, 1981

The rationale for MRAP can be briefly summarized thusly: **It promises to reduce casualties.**

If this proves to be the case, there are several clear benefits:

- It satisfies the "moral imperative" of doing everything reasonably possible to protect our soldiers and Marines.
- It helps to maintain a better environment for recruiting and retention, a matter of growing importance, especially to the Army, given the constraints of operating with a volunteer force.
- It helps to relieve the military of the high cost incurred not only to recruit replacements to refill the ranks depleted by casualties, but also to cover the substantial cost of training these replacements.
- It denies the enemy successes that he can tout in the war to win over the population.

⁹⁴ Paddy Griffith, *Forward Into Battle* (Navato, CA: Presidio Press, 1991), p. 173.

- MRAPs are part of a multifaceted effort to defeat the IED threat, a threat likely to be seen at varying levels on other battlefields. Combined with other efforts (e.g., technological, operational), MRAPs may contribute to producing a synergistic effect that enhances overall US force capabilities and effectiveness.

But there are a number of outstanding issues that must be addressed, both for validation of the MRAP's perceived advantages in the Iraq environment, as well as for its value in other contingences our ground forces may have to contend with in the near- and longer-term future. Among these issues are the following:

- MRAPs seem to run counter to US counterinsurgency doctrine, which encourages soldiers and Marines to “get out and walk” to establish close relationships with the population, rather than to engage in “dabbing” (“driving around Baghdad”) or “commuting” from main bases to the areas they are trying to secure. In short, MRAPs may provide better protection for troops at the expense of accomplishing the mission. But if MRAPs undermine the doctrine, it may take longer to accomplish the mission at an overall higher cost in casualties, or the mission may not be accomplished at all. If the latter occurs, US casualties would have been suffered in vain.
- Assuming the US military's COIN doctrine proves effective, operations will result in a gradual expansion of the areas secured by indigenous, allied, and US forces. As this occurs, the threat of IEDs will diminish. As the IED threat diminishes, it will be less risky to operate in light vehicles, like the Humvee and the JLTV. Moreover, operating in these kinds of vehicles will encourage soldiers and Marines to continue maintaining close relationships with the center of gravity in COIN operations: the indigenous population.
- The second-order effects of large-scale MRAP deployment may also lead to an increase in casualties. The increased logistics support required to sustain the much greater rate of fuel consumption over that of the Humvees they would replace could require a significant increase in US convoys, which would require additional troops, placing more at risk of IED attacks in lightly armored supply vehicles.

- The armor/anti-armor competition appears to be running in favor of the insurgents. They have demonstrated the ability to disable even heavily armored vehicles like the Abrams main battle tank. They seem capable of making their IEDs more powerful, and are employing EFPs in growing numbers. Moreover, they have not yet employed ATGMs. Yet, it cannot be ruled out that Iran might provide these weapons to Iraqi insurgents, as they have in the case of Hezbollah. If this occurs, how will the substantial investment in MRAPs be viewed?
- There is a temporal factor at work here as well. Following General Petraeus' recent remarks to Congress,⁹⁵ it appears there is general agreement that the United States will begin to draw down its forces in Iraq before long. If that proves to be the case, then by the time the industrial base can produce MRAPs in large numbers, US forces may be much reduced in number, and their mission in Iraq may have changed such that the MRAP is less relevant. The phased approach being taken by the Defense Department to procure MRAPs appears likely to mitigate this potential problem.
- MRAPs cost much more than Humvees, or even the JLTV. There may be significant opportunity costs at work here. What priorities are not going to be met as a consequence of the MRAP program?
- The MRAP seems likely to have a life span that could run a decade and likely much longer. If so, its general use in the irregular conflicts and distant theaters we envision seems not only at odds with COIN doctrine, but also with the US ground forces' increasingly expeditionary mind-set, which has seen the force structure becoming significantly lighter, not heavier. Yet the MRAP is substantially heavier than systems like the Humvee and JTLV. A more important issue concerns the MRAP's value across a range of contingencies that the US military must be prepared to address, some of which are very different from the conflict environments of Iraq and Afghanistan.

⁹⁵ General David H. Petraeus, US Army, Commander MNFI, "Report to Congress on the Situation in Iraq," September 10-11, 2007. Accessed at <http://armed-services.senate.gov/statemnt/2007/September/Petraeus%2009-11-07.pdf> on September 15, 2007.

Consequently, US defense policymakers and military force planners may want to consider the following thoughts regarding MRAP procurement, employment, and future use:

Balance MRAP procurement and employment with actual operational needs in Iraq. In spite of early comments that all Humvees in Iraq should be replaced with MRAPs, the Services seem to be taking a judicious, phased approach to procuring these new vehicles. In fact, the Defense Department “procurement plan [for MRAPs] includes appropriate “off-ramps” for 2008 and beyond, so the MRAP buy can proceed in a flexible manner, which can be reevaluated as threats change.”⁹⁶ The threat is not homogenous across the theater, nor is it static. As new vehicle systems are deployed, the enemy will devise new technical means of attacking and defeating them. Given that the contest seems to be favoring the physics of explosives over the strength of steel, and that encasing a force in boxes may inhibit mission accomplishment, the other paths being pursued by the Armed Services and Joint community—defeating the IED supply chain and better educating the force—have great potential for disproportionately mitigating the IED advantage. Not all areas in Iraq present the same level of threat from IEDs. The procurement and fielding of MRAPs should take this into consideration.

Continue to pursue alternative approaches to countering the IED threat. This paper has already commented on the value to be gained from taking alternative approaches to meeting the IED challenge; simply introducing larger, heavier armored vehicles has a greater potential for thwarting ground operations success than defeating the threat. Service efforts to better educate and train deploying personnel on the nature of the IED threat and the continual refinement of the tactics used when on patrol are critical to operational success, and should continue to be pursued with vigor. So, too, should the efforts of the Joint IED Defeat Organization (JIEDDO) continue to be supported, because its work provides materiel solutions that can be quickly employed to improve entire capability sets across the force. To quote the former commander of Regimental Combat Team-2, “The best counter-IED tool is

⁹⁶ John Young Jr., Statement before the House Armed Services Subcommittee of Seapower and Expeditionary Force and Air and Land Forces, on July 19, 2007, p. 5. Accessed on August 8, 2007 at http://armedservices.house.gov/pdfs/JointALSPEF071907/Young_Testimony071907.pdf

an aware Marine; the human eye and sound TTPs are the best protection against IEDs.”⁹⁷

Consider MRAPs as an additive capability with post-Iraq uses.

The US Military. The IED problem will not go away following the conclusion of US operations in Iraq. IEDs will be used much more widely, just as mines are in many parts of the world. It is unlikely that IEDs of the size and sophistication of those being used in Iraq will be found in such large numbers elsewhere, because it is relatively improbable that in other conflicts, an insurgent force will have such ready access to hundreds of thousands of tons of military grade munitions. Nevertheless, the type of threat will remain. The US military should retain a significant percentage of MRAPs for use in future contingencies. While it is unlikely that MRAPs will be retained as an active component of unit vehicle inventories for daily use—outside combat engineer and EOD units—they could be placed in storage for use as required by contingency. MRAPs should be considered one component of a balanced armor capability across the force, not simply as a replacement for light vehicles *in toto*.

Iraq. The Iraqi Armed Forces will have a long-term need for MRAPs, too, as they deal with what assuredly will be a protracted security crisis. The same insurgents and sectarian combatants who are using IEDs against US and coalition forces will continue to use them against the Iraqis. The US should consider leaving behind a portion of MRAPs deployed to that country as a component of the security assistance package that is sure to accompany a drawdown of US forces. MRAPs can be used to sustain route clearance operations, serve as an “anchor” at security checkpoints, and as a lead vehicle for forces engaging situations of uncertain status.

The United Nations. The United Nations, through its UN Mine Action Service office, supports demining operations in over 30 countries located primarily in Africa, the Middle East, Asia, and the Balkans.⁹⁸ As part of its continued support to UN efforts globally, the US

⁹⁷ Steve Davis, Colonel USMC. Personal interview. MCB Quantico, VA, June 20, 2007.

⁹⁸ The UN demining issues page can be found at <http://www.un.org/issues/m-demin.html>. A listing of countries is provided at http://www.mineaction.org/section.asp?s=where_it_happens.

could offer MRAPs in service to regional demining operations. Such a proposal would materially contribute to an extremely worthwhile cause, benefiting millions of people, in addition to serving the interests of the US in its strategic communications and influence efforts.

In Conclusion

To borrow from the Defense Science Board once more, “Technology and materiel can contribute to enhanced force protection in SSTR and counterinsurgency operations. . . . However, they will not provide ‘silver bullets.’ The human dimension habitually is the dominant factor in war.”⁹⁹

There are no easy answers to protecting American troops from harm while they go about the tasks demanded of them by their country. The reality is that US forces will, at times, have to put themselves at risk in order to destroy enemy forces, protect noncombatants, or keep warring parties apart long enough for political solutions to be found and implemented. Of course, the enemy will constantly be searching for ways to make such work as difficult and dangerous as possible. It is ultimately the responsibility of military and civilian leaders to equip military forces for the tasks they demand them to perform. And it is the responsibility of military leaders to know how and when to use the tools at their disposal, realizing that, at times, a tool intended to protect actually inhibits achieving operational or strategic objectives.

MRAPs certainly have a place on the modern (and future) battlefield, especially in supporting tasks for which it was optimally designed—e.g., route clearance, mine clearing, convoy lead, and troop transport in hostile environments characterized by mines and large IEDs. In particular, MRAPs appear to have a special attraction in complex environments, such as Iraq, where enemy forces are well-armed irregulars, possessing an ability to strike from within the protective shroud of dense, urban areas. At the same time, light utility vehicles such as the Humvee and its planned replacement, the JLTV, will continue to shoulder the bulk of the support load in general transportation and patrol duties across a wide range of operating environments and scenarios. Transportability, utility on the battlefield (particularly in terms of maneuverability and mission-enabling value in urban environments), cost, and force flexibility will continue to inform decisions on equipping and employing forces for the foreseeable future. While

⁹⁹ DSB, *Force Protection*, p. v.

the MRAP-class of vehicles unquestionably provides increased protection to supported forces, the tactical requirements for success in a host of operating environments and mission profiles—not least of which are counterinsurgency and stability/security operations in complex, irregular warfare environments—indicate that light vehicles will continue to have value for US forces.

The complex conditions of Iraq and like-crises will continue to vex leaders at all levels wrestling with the conflicting requirements to both “use the force” and “protect the force,” but mission success will (or should) exert priority influence in the end. Military leaders will frame their priorities within the context provided them by civilian leaders: whether to achieve military objectives or to protect the deployed force. Since these potentially competing objectives will rise and fall in prominence depending on the circumstances of the moment, it would best serve the force to retain a balanced portfolio of vehicle capabilities.