

**ACQUISITION OF MINE-RESISTANT, AMBUSH-  
PROTECTED (MRAP) VEHICLES: A CASE STUDY**

**BY**

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# **ACQUISITION OF MINE-RESISTANT, AMBUSH-PROTECTED (MRAP) VEHICLES: A CASE STUDY**

by

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## **Executive Summary**

As the largest and fastest industrial mobilization since World War II, the Mine-Resistant Ambush-Protected (MRAP) vehicle program is a testament to the scale and efficiency possible when government and industry collaborate with a sense of urgency, patriotism, and pragmatism. Public pressure over rising casualty numbers, intense political scrutiny, and support from the highest levels of government all combined into a set of unique circumstances. Given great uncertainty in the nature of future security issues, however, urgent and unforeseen needs will frequently press the procurement system. The MRAP program, precisely because of its size and scope, brings into sharp relief the merits and deficiencies of the current system for rapid acquisitions.

Improvised explosive devices (IEDs) were the number one killer of troops in Iraq and Afghanistan. In response to increasing IED attacks, the Defense Department began adding armor kits to High Mobility Multipurpose Wheeled Vehicles (HMMWVs) and procuring up-armored HMMWVs. Even with added armor, the HMMWV's flat bottom made it vulnerable to buried IEDs. Beginning in early 2005, field commanders made formal requests for mine-resistant ambush-protected (MRAP) vehicles. These vehicles—essentially armored trucks—have V-shaped hulls and high ground clearance to deflect and diffuse bomb blasts. A small number of MRAPs were in theater as part of explosive ordnance disposal teams. They had a reputation for survivability—about 400% safer than a HMMWV. Despite earlier requests for MRAPs to be procured for use in combat

missions, it would take until November 2006—almost two years later—for MRAP requirements to be validated and a request for proposals to be released.

The MRAP program had one primary objective—to field the maximum number of survivable vehicles in the shortest period of time. Cost and all other concerns were explicitly secondary. Using funds from supplemental war requests outside the normal budget process, Congress flooded the program with money, often providing amounts in excess of initial requests. Secretary Gates declared MRAPs the military’s highest priority acquisition and put them at the head of the queue for scarce steel armor and tires.

The MRAP program sought commercial off-the-shelf technology with minimal requirements. It provided production contracts to all manufacturers that could meet minimum automotive and survivability standards. In fact, production orders were signed even before initial testing was completed in order to prime industry. This was risk acceptance by the Department of Defense (DoD) on two fronts: it was agreeing to buy vehicles it might not ever field, and it was committing to flood the theater with several different MRAP variants (each with its own parts, support, and logistics needs). The DoD provided incentives to vendors and subsidized capacity expansion. As testing progressed, designs were modified for subsequent models. Manufacturers’ representatives were embedded at the Aberdeen testing site to speed communication back to the production line. User feedback from the field was also fed into ongoing production modifications. The entire acquisition process was compressed for MRAPs. Testing, production, fielding, and feedback were all done concurrently and continuously.

The MRAP program’s successes highlight the limitations of both the traditional acquisition system and the ad hoc organizations that cater to rapid acquisitions. The traditional acquisition system is ill-suited to rapid acquisitions, and its bureaucratic processes can at times resemble the convoluted means used in a “Rube Goldberg” machine. It is linear, stove-piped, and risk-averse. Because of extraordinary levels of support at the highest levels, the MRAP program was able to extend deadlines, or bypass a number of bureaucratic processes. The program office is still in the process of completing some of the preproduction paperwork processes, even though production has

finished. This suggests that perhaps some of the bureaucratic requirements are not particularly relevant to rapid acquisitions. The experience of MRAP procurement demonstrates that there is ample room to streamline the process without sacrificing results and accountability.

Only because of media scrutiny, congressional pressure, and the personal involvement of Secretary Gates could the MRAP program proceed so quickly once it received approval from the requirements process. A high-level MRAP Task Force convened regularly to get all decision makers into the same room to solve problems. The nature of future combat is likely to require more, not less, fielding of urgent and unanticipated equipment for the troops. Congressional pressure and the involvement of the Secretary of Defense cannot be expected to quickly materialize to push through urgent requests, so the current system is unlikely to ever reproduce the impressive results of the MRAP program without serious reform.

Rapid acquisitions will always be in a disadvantaged position if they are forced to work within the same system (and compete for the same funds) as traditional, deliberate acquisitions. We recommend a stand-alone rapid acquisition organization within the DoD, with requirements different from the existing deliberate acquisition process. It should have its own bankable funding stream.

Absent the creation of a separate organization, it is clear that rapid acquisition projects would benefit from a senior-level champion to shepherd them through the acquisition system, ensuring that they do not get sidelined in one of the myriad stovepipes. Better still would be a task force, periodically assembled with relevant stakeholders, that is empowered with decision authority to solve problems and clear delays in real time.

## I. Introduction

Improvised explosive devices caused over two thirds of U.S. casualties in Iraq and Afghanistan. Escalating numbers of attacks and the failure of other countermeasures to stem the rising tide of injuries led to the mass procurement of over 16,000 vehicles that better protected troops from these devices. The Mine-resistant, Ambush-protected (MRAP) vehicle acquisition program had one paramount goal: field as many survivable vehicles as possible as quickly as possible. This program resulted in the largest rapid military industrial mobilization since World War II and probably in the best example to date of private industry and government working together efficiently and urgently on a massive scale. Despite its role in saving lives, the MRAP program was only reluctantly embraced by the military and endured a protracted delay in the requirements process. As such, the MRAP program offers valuable lessons not just for manufacturing, but for the entire acquisition process.

This case study examines the politics and processes that propelled the MRAP program through an acquisition system generally ill-suited for rapid procurements (especially ones of such magnitude). It also explains how a vehicle program, reluctantly embraced by military acquisition planners, ultimately became the flagship procurement program for the wars in Iraq and Afghanistan. Its “special case” status notwithstanding, the MRAP program offers a wide spectrum of valuable insights, which are applicable to all manner of rapid acquisitions. Furthermore, many of the program’s duly celebrated successes and innovations serve to highlight the failings of existing rapid acquisition systems.

The end of the Cold War ended a period of military planning focused almost exclusively on major land combat between major military powers. As a result, steps were taken toward creating a more mobile, expeditionary force. In the wake of the 9/11 attacks in 2001, military planning documents (the National Military Strategy and the Quadrennial Defense Review) again renewed emphasis on expeditionary forces. The enduring wars in Iraq and Afghanistan steadily elevated the status of irregular warfare in military planning; this called for increasingly mobile forces. Yet, as casualty numbers rose and insurgents



quickly shifted tactics, the solutions that better shielded soldiers—such as upgrading armor and, ultimately, procuring MRAPs—steadily reduced that sought mobility.

## **Countering Improvised Explosive Devices**

Improvised Explosive Devices (IEDs) emerged early during Operation Iraqi Freedom as the insurgents' weapon of choice. They posed the single greatest risk to soldiers in Iraq and Afghanistan and were part of an insurgent strategy to bleed the will out of the Allied war effort. As the MRAP acquisition program began, IEDs caused about 70% of U.S. combat casualties. These weapons were a persistent threat. According to a National Defense University paper, “from the summer of 2005 until the spring of 2008, [IEDs were] responsible for 50 to 80 percent of U.S. fatalities” (Lamb, Schmidt, & Fitzsimmons, 2009).

Insurgents rapidly modified IED tactics to defeat U.S. countermeasures. Buried IEDs wrecked havoc on the wide, flat underbellies of High Mobility Multipurpose Wheeled Vehicles (HMMWVs). Particularly lethal variants of IEDs—called explosively formed penetrators (EFPs)—used directed charges capable of punching through the armor of any of the main military vehicles then in service, including Abrams tanks. While only constituting 5% to 10% of attacks, they caused 40% of casualties (Lamb et al., 2009).

In addition to changing tactics, insurgents greatly increased the number of attacks:

Beginning in June 2003, IED incidents targeting coalition forces began to escalate from 22 per month to over 600 per month in June 2004. In June 2006, these incidents reached more than 2,000 per month. At one point in 2006, coalition forces in Iraq were experiencing almost 100 IEDs per day. (Government Accountability Office [GAO], 2009b)

The DoD pursued a two-pronged approach to countering IEDs—defeating IEDs before detonation and hardening vehicles:

- Beginning in October 2003, a small Army unit dedicated itself to studying IED avoidance tactics and defeating insurgents' ability to make and detonate IEDs.

The DoD broadened and elevated the unit to a joint task force in 2004. In February 2006, the task force became a permanent entity—the Joint IED Defeat Organization (JIEDDO). Until JIEDDO’s creation, no single entity had been responsible for coordinating all of the DoD’s counter-IED efforts (GAO, 2009b). In FY2007, JIEDDO employed hundreds of people and commanded a budget of over \$4 billion (DoD, 2009).

- In the summer of 2003, the DoD began procuring additional up-armored HMMWVs (identified as the M1114)<sup>1</sup>, and began adding armor kits to existing vehicles. Significant congressional pressure and media exposure spurred a significant ramp-up in production (Lamb et al., 2009). Between August 2003 and September 2004, there were 5,330 up-armored HMMWVs (out of a requirement for 8,105) produced. During that time, production increased from 51 vehicles per month to 400. Out of a requirement for 13,872 add-on armor kits, only 8,771 were produced by September 2004. Production increased from 35 kits per month in December 2003, to 600 kits per month in July 2004. Despite this ramp-up, the Government Accountability Office (GAO) and others criticized the DoD for not utilizing full industrial capacity in the face of quickly escalating requirements (GAO, 2005). These criticisms were a significant part of the political landscape when the MRAP program began.

These and other efforts appeared to reduce coalition casualties per attack. IED effectiveness decreased from over 50% early in the war, to less than 10% in late 2007 (Lamb et al., 2009). Nevertheless, the escalating number of IED attacks and rapidly adapting tactics (such as buried IEDs and EFPs) made it clear that these efforts alone would not reduce aggregate fatalities.

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<sup>1</sup> In contrast to standard HMMWVs that received post-production armor upgrades, up-armored HMMWVs have integrated armor installed during manufacture. These vehicles are designed to handle the additional weight and armoring during manufacture, and they allow for a sleeker profile than is possible with post-production upgrades.

## **MRAP History and Early Use of MRAP-Type Vehicles in Iraq and Afghanistan**

As the vulnerability of up-armored HMMWVs was becoming more apparent, a small number of MRAP-type vehicles operating in-theater gained a reputation for survivability.

MRAPs are a family of vehicles that incorporate a V-shaped, armored hull and high ground clearance. The design deflects the energy of explosive blasts outward and away from the crew compartment. Used primarily to mitigate mine and IED threats, MRAPs have proven effective against a variety of fragmentary and direct fire weapons including rocket propelled grenades and small arms fire. South Africa deployed the first major contingent of MRAPs in the 1970s. The United Nations relied on MRAP-type vehicles in operations in southern Africa and eastern Europe (Blakeman, Gibbs, & Jeyasingam, 2008).

This case study focuses on a major MRAP procurement effort that began in November 2006 and yielded over 20,000 vehicles for use in combat operations. Beginning in 2003, a small number of MRAPs (less than two dozen) were used in Iraq (Eisler, Morrison, & Vanden Brook, 2007). Less than 100 additional MRAPs were procured in subsequent years. Army and Marine units employed Cat II (Cougar) and Cat III (Buffalo) MRAPs for route clearance and explosive ordnance disposal (EOD) operations (Department of Defense Office of Inspector General [DoD OIG], 2008; Feickert, 2008; Eisler et al., 2007). These vehicles gained a reputation for survivability and likely inspired field commanders' specific requests for MRAPs.



**Figure 1. FPI Cougar Category I MRAP compared to an HMMWV**  
(courtesy Force Protection Industries)

MRAPs already had passionate advocates within the U.S. military since at least 1996, and experiences in the Balkans and Somalia demonstrated the dangers mines and IEDs posed. The DoD first began testing MRAPs in FY2000, so it was well before the invasion of Iraq that MRAPs established themselves as effective and survivable vehicles that could be employed against IEDs and other threats (Blakeman et al., 2008; DoD OIG, 2008; Gayl, 2008). The military was focused on developing vehicle combat systems that were light and expeditionary, and this focus is likely why the military saw bulky MRAPs as a niche capability for EOD teams rather than a mobile combat vehicle replacement for the HMMWV. At any rate, the military was aware of both the IED threat and the MRAP's capabilities, yet it initially chose to field them in the tens of vehicles rather than in the tens of thousands. For a further discussion on why the military may have avoided procuring MRAPs sooner, see the Strategic Concerns: Addressing the "Delay" in the Requirements Process section later in this report.

### **MRAPs for Iraqi Forces**

U.S. appreciation for MRAP effectiveness stemmed to their purchases for the Iraqi army. According to press reporting, a U.S. Army General directed a search for better armored vehicles for the Iraqi forces beginning in December 2004 (Eisler et al., 2007). By May 2006, a contract was awarded for the BAE Systems' MRAP-type vehicle, named the Badger. Known as the Iraqi Light Armored Vehicle (ILAV), and similar to MRAPs procured for U.S. forces, Badgers were manufactured in the U.S. in partnership with Force Protection Industries (FPI). ILAVs began arriving in Iraq 90 days after the contract was signed, despite manufacturing work being split between Alabama and South Carolina plants ("BAE Delivering," 2009). By the spring of 2007, about two thirds of an estimated 600 ordered vehicles had been delivered (Eisler et al., 2007). ILAVs are used for EOD missions, patrols in urban areas, and route clearance operations ("BAE Delivering," 2009). The Badgers cost approximately \$390,000 each, including operation and maintenance training and two years of comprehensive maintenance support (Diaz, 2007).

The U.S. military handled the procurement of ILAVs for the Iraqis both sooner and more quickly than the procurement of MRAPs for U.S. forces. The month that a contract was signed for ILAVs was the same month that the first successful MRAP request was submitted by U.S. forces (the first MRAP production contracts were not signed until six months later, in November 2006). While we know of no official statement addressing this difference, there are a number of possible explanations. Both the U.S. and Iraq faced similar threats and were both using up-armored HMMWVs, but the U.S. was planning to draw down its forces and devolve responsibility to the Iraqis. In addition, the U.S. was focused on its next generation of light, deployable vehicles. This expeditionary model would be strained if bulky MRAPs were added to the mix. According to the MRAP program office, ILAVs and MRAPs had different requirements and performance standards (D. K. Hansen, personal communication, March 29, 2010). The ILAVs used an existing platform (FPI's Cougar) and active production lines. Coupled with a relatively small order size, this may explain why ILAVs arrived in theater faster than MRAPs. For other possible explanations for the military's reluctance to field MRAPs for U.S. troops, please see the Strategic Concerns: Addressing the "Delay" in the Requirements Process section later in this report.

## **II. MRAP Demand, Political Pressure, and the Requirements Process**

### **Demand from the Front Lines and Urgent Needs Requests**

Field demand for better armored vehicles began shortly after the conclusion of the “shock and awe” drive into Baghdad, Iraq in 2003, as IEDs emerged as a major threat. For instance, a Military Police Commander issued an urgent request for armored security vehicles in June 2003, to better protect U.S. convoys in Iraq (Lamb et al., 2009). Also that summer, the 101<sup>st</sup> Army Airborne Division issued a report citing IED injuries and seeking more vehicle armor and training in IED avoidance techniques (Moss, 2005).

### **Formal Field Requests**

Despite early field demand, the first formal field request for MRAPs did not come until 2005 from Marines in-theater. An Urgent Universal Need Statement (UUNS)<sup>2</sup> came February 17, 2005, from Deputy Commanding General, I Marine Expeditionary Force. The request for 1,169 MRAPs was routed directly to the Marine Corps’ in-house rapid acquisition process. For reasons discussed in detail in the requirements section later in this case study, the Marines stopped processing this request in August 2005. While the request was never formally answered or denied, the Marines apparently considered up-armored HMMWVs—already in active production—the most expedient solution to the IED threat identified in the request (DoD OIG, 2008). Ultimately, up-armored HMMWVs failed to provide satisfactory levels of protection, but they were nonetheless an improvement over existing HMMWV models. The Marines’ requirement system apparently believed that the marginal improvement in troop survival afforded by increasing HMMWV armor was a sufficient response to the field demand for better armored vehicles.

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<sup>2</sup> The Marine Corps’ Urgent Universal Needs Process allows deployed commanders to request mission critical equipment based on experience in combat. This web-based system allows users to track requests from submission through resolution and relies on reprogrammed or supplemental funding. Generally this approach is faster than going through the standard defense acquisition process (DoD OIG, 2008).

This first MRAP request did not seek to replace all HMMWVs, but rather to integrate them into the combined-arms force for riskier missions. The number of MRAP vehicles requested amounted to roughly 30% of the 4,000 HMMWVs then in-theater (Gayl, 2008).

<b>Demand Timeline</b>	
<b>Key events—MRAP Demand</b>	
<b><u>Demand for better armored vehicles prior to the MRAP program:</u></b>	
June 2003:	Military Police Commander issued an urgent request for armored security vehicles (better armor than existing vehicles)
December 2003:	I Marine Expeditionary Force issues Marine UUNS for Hardened Engineer Vehicles (HEVs) - medium-sized, MRAP-type, multi-function vehicles
April 2004:	MCCDC issued statement of need for 27 HEVs based on the December 2, 2003, request. This procurement was not part of the MRAP program.
April 2005:	Joint IED Task Force funds the procurement of 122 HEVs known as JERRVs. This procurement was not part of the MRAP program.
<b><u>Unsuccessful Initial UUNS:</u></b>	
November 2004:	Draft copy of a Marine UUNS for MRAPs sent to Marine Corps Systems Command
December 2004:	Request for information on commercially available vehicles providing superior protection
February 2005:	Marine UUNS formally submitted for 1,169
August 2005:	Marine Corps Combat Development Command stopped processing February MRAP UUNS, apparently because up-armored HMMWVs were the chosen solution
<b><u>Successful JUONS:</u></b>	
May 2006:	Commanding General, Multi-National Force–West (MNF–W) submits a Joint Staff Rapid Validation and Resourcing Request for 185 MRAPs to the Joint Requirements Oversight Council (JROC). This formally starts the final process leading to the MRAP program.
July 2006:	The Commanding General MNF–W requests 1,000 additional MRAP-type vehicles to the JROC
November 2006:	First contract awarded for significant MRAP procurement
May 2007:	Secretary of Defense declares MRAP the number one acquisition priority
Nov 2009:	Total approved requirements stand at: 13,065 Cat I; 3,094 Cat II; 79 Cat III; 6,644 M-ATVs

**Figure 2. MRAP Demand Timeline**

Field demands for better protected vehicles persisted; it was clear that even up-armored HMMWVs were not providing sufficient IED protection. Eighteen months after the first UUNS was sent through Marine channels, the first Joint Universal Operational Needs

Statement (JUONS)<sup>3</sup> made its way into joint-service channels. The Commander, Multi-National Forces–West (MNF–W), submitted this first request for 185 MRAPs in May 2006. A second JUONS for 1,000 more MRAPs was made in July. U.S. Central Command approved both requests in October 2006. Within the next two years, aggregate MRAP orders rocketed to over 20,000 (DoD OIG, 2009; GAO, 2009a).

### **Political Pressure, Political Will, and Leadership**

It would be difficult to overemphasize the role that public and political pressure played in procuring MRAPs. A number of elements combined to drive the MRAP program forward: perceived delays in procuring body and HMMWV armor, media coverage of mounting IED-related casualties, public criticism of previous force protection efforts, relentless congressional scrutiny, and high-profile support from Secretary Gates. Once the requirements for MRAP vehicles were finally approved, the procurement program received truly extraordinary levels of support from Congress, top military leadership, and MRAP manufacturers. There was unity of message at the top and across the board—get as many survivable vehicles into the field as quickly as possible. This buy-in provided the political cover subordinates needed to speed the MRAP through a complex, linear, and stove-piped acquisition system.

### **Congressional Pressure and Prior Force Protection Efforts**

The MRAP program cannot be viewed in isolation from force protection efforts that came before it. Long before MRAPs were on their radar, members of Congress lost confidence in the DoD’s ability to rapidly acquire, and field, protective equipment. Congress increasingly drove procurement decisions.

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<sup>3</sup> Joint Universal Operations Needs (JUONS) are rapid acquisition requests relevant to multiple services and routed through the Joint Staff process. Established in 2005 by Chairman of the Joint Chiefs of Staff Instruction 3470.01, this system “establishes policy and procedures to facilitate assessment, validation, sourcing, resourcing, and fielding of operationally driven urgent, execution-year combatant commander needs. Generally, these needs can be considered as life- or combat-mission-threatening needs, based on unforeseen military requirements that must be resolved in days, weeks or months” (Chairman of the Joint Chiefs of Staff [CJCS], 2005). The process does not replace the traditional Joint Capabilities Integration and Development System (JCIDS) process but rather accelerates the process.



During the first months of Operation Iraqi Freedom, it became clear to military leadership (and the public, and Congress) that all soldiers in combat zones needed body armor. Over five-and-a-half months passed between the time the DoD placed the order for body armor and when it started arriving in the field. For some soldiers it took months more to receive armor, and media reports carried stories of soldiers' families privately buying armor and shipping it to Iraq. In contrast, U.S. Allies bypassed the Pentagon and began receiving vests directly from a Michigan manufacturer in 12 days (Moss, 2005).

Anger over body armor fed into media reports of soldiers using makeshift "hillbilly armor" on their HMMWVs—essentially they bolted or welded scrap metal on to the vehicles to provide additional protection for their poorly armored vehicles. Media scrutiny of perceived delays in getting add-on armor kits into the field prompted intensified congressional demands to better protect soldiers sooner. Not content with the DoD's seemingly glacial pace, Congress intervened even at the production level; Representative Duncan Hunter (then Chairman of the House Armed Services Committee) sent a staffer to negotiate with steelmakers and their unions to speed production of steel armor for HMMWVs. As a result, the armor was delivered seven months ahead of the Army's schedule (Morrison, Vanden Brook, & Eisler, 2007).

Throughout the wars in Iraq and Afghanistan, members of Congress have consistently held the DoD's feet to the fire with public admonishments that delays in life-saving equipment were in fact costing lives. For example, in the summer of 2007, Senators Biden and Bond sent a letter to Secretary Gates asserting that delays in fielding MRAPs from February 2005 onward cost the lives of "621 to 742" soldiers (Eisler et al., 2007).

Beginning in 2003, Congress directed the DoD to purchase body armor, counter-IED signal jammers, vehicle armor, and MRAP-type vehicles in greater quantities, and at a faster pace, than the military sought. They provided funding in excess of requests. They even forced the Army to buy vehicles that it did not request. The Army planned to stop buying Armored Security Vehicles (ASVs, or hardened, non-MRAP-type vehicles) a few months into the Iraq War. Senator Mary Landrieu (LA), whose state manufactures the ASV, added an earmark that restored the ASV funding that the Army cut. Such was the

climate surrounding force protection that this suspicious earmark—in contradiction to the Army’s stated intentions—attracted little resistance or scrutiny (Eisler et al., 2007).

### **Executive Branch Pressure, Leadership**

Events leading up to the MRAP program created tremendous pressure on and within the executive branch to stem casualties. The early hope—expressed at the highest levels—that Iraq would be a short war likely influenced the military’s reluctance to embrace MRAPs quickly during the requirements process (see the requirements section of this report). A major vehicle procurement initiative did not seem to square with the plan to increasingly devolve security responsibility to Iraqis. This belief in a short war gradually gave way to longer term planning, setting the cooperative atmosphere for the MRAP program. Remarks from the President on down laid a foundation for MRAP procurement. In March 2006, President Bush declared IEDs “the principal threat to our troops and to the future of a free Iraq” (Associated Press [AP], 2006). In March 2007, USMC Commandant Conway declared MRAPs “a moral imperative.”

Secretary Gates galvanized support for the MRAP program and became its most important champion. General Petraeus, Commander of U.S. Central Command, put it in these words: “frankly, we could have had [MRAPs] sooner, in my view ... but Secretary Gates’ direction was a key catalyst and a pretty key factor in production of the MRAPs” (Petraeus, 2010). In May 2007—his fifth month in office—Secretary of Defense Gates declared the MRAP the DoD’s top acquisition priority, and called for “any and all options to accelerate the production and fielding of this capability” (Osborn, 2007). Later that month, Secretary Gates approved the formation of the MRAP Task Force to integrate planning, analysis, and actions to accelerate MRAP acquisition. The Under Secretary of Defense for Acquisition, Technology, and Logistics chaired the task force. It assembled all relevant decision makers responsible for producing and fielding the MRAP so that decisions could be made immediately or shortly thereafter (DoD OIG, 2009; *Statement Before the Subcommittees*, 2007; GAO, 2008).

# The Rapid Acquisition & Requirements Processes and the Procurement Decision

## Overview of the Rapid Acquisition and Requirements Processes

*The Department of Defense's conventional modernization programs seek a 99 percent solution over a period of years. Stability and counterinsurgency operations require 75 percent solutions over a period of months. The challenge is whether these two different paradigms can be made to coexist in the U.S. military's mindset and bureaucracy.*

*- Secretary of Defense Gates (Gates, 2009)*

A complex system of laws, regulations, and business practices—developed over decades—drives defense acquisitions. Linear, stove-piped, and process-driven, the acquisition system leans heavily toward minimizing risk, detailing costs, and ferreting out fraud and corruption. Risk aversion is a hallmark of the system. Designed to manage major, marquee development programs involving vehicles or advanced weapons, the system is best suited to developing and testing highly technical solutions over years.

Rapid acquisitions, by contrast, are rarely developmental in nature; they usually call for an existing technology to be deployed immediately and often imperfectly, with only minor modification. Despite the differing character of rapid versus deliberate acquisitions, both must go through the same processes. The only significant difference is that rapid acquisitions are pushed through with a sense of urgency (read: task compression), aided by a number of ad hoc organizations facilitating the process by working within and around the system.

The normal acquisition system is divided into three, interdependent parts:

1. The Requirements Process: Joint Capabilities Integration and Development System (JCIDS). Owned by the Joint Staff, this process identifies warfighting needs, prioritizes them, and proposes requirements to meet those needs.
2. Funding: Planning, Program, Budgeting and Execution (PPBE). Owned by two entities within the Office of the Secretary of Defense (the Office of Program Analysis and

Evaluation and the Comptroller), this process allocates resources. The PPBE process is calendar driven, so rapid acquisitions often need to circumvent this potential time lag by using reprogrammed funds or supplemental appropriations (Blakeman et al., 2008). The MRAP program was funded exclusively with supplemental and reprogrammed funds.

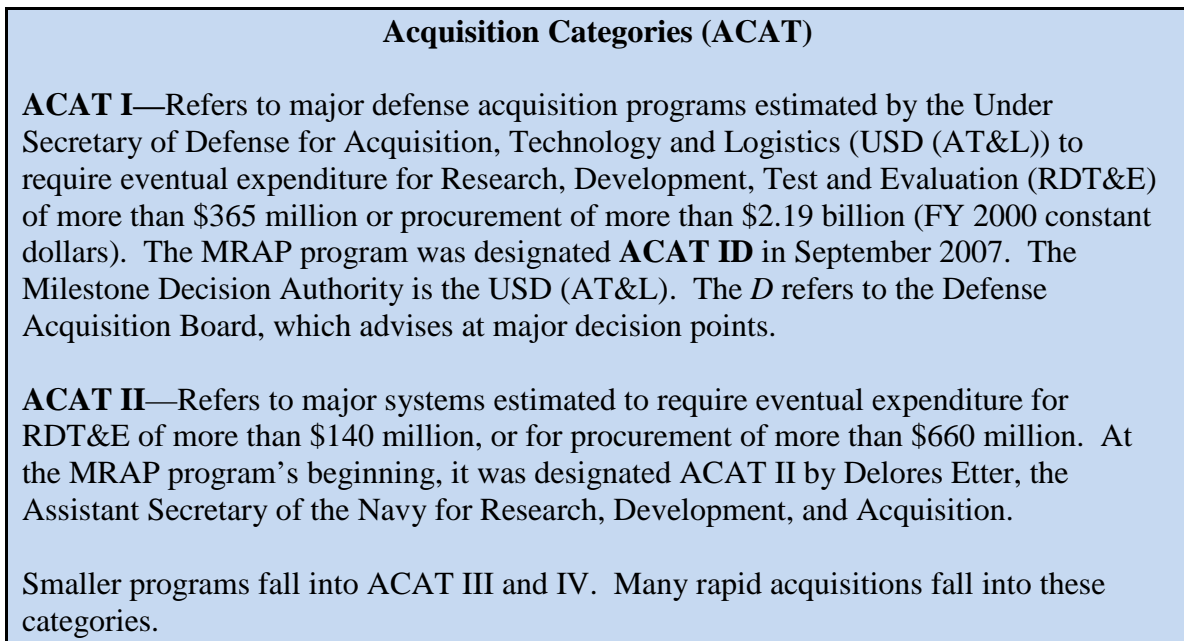
3. Acquisition: The Defense Acquisition System (DAS). Owned by the Under Secretary of Defense for Acquisition, Technology, and Logistics, this system manages the development, procurement, and support of weapons and equipment. It is generally a linear process with mandatory milestones and reviews.

Urgent operational needs are identified by the combatant commands. If a need is sufficiently simple, local field commanders can often fulfill it using operations and maintenance funds. More complex and costly needs flow into either Service-specific or Joint Staff requirements processes. Regardless, the urgent need is reviewed, and a requirement established and validated for a solution. For acquisition to begin, a validated requirement must be received. Each Service has its own, unique urgent need, requirements generation, and rapid acquisition processes. To better meet needs that stretch across Services, the Joint Urgent Operational Needs Statement (JUONS) process was created in November 2004.<sup>4</sup> JUONS go to the Joint Forces Command's Capability Development Directorate (Joint Staff J8) for validation and then on to the Joint Requirements Oversight Council (JROC). The validated requirement then goes to the Joint Rapid Acquisition Cell (JRAC). The JRAC does not directly handle the acquisition, but rather finds a resource and acquisition home within a Service or agency. Currently, over 20 different ad hoc organizations within the DoD and the Services have urgent need processes (Office of the Under Secretary of Defense, 2009). While these processes have improved efficiency over the last several years, they are not fully institutionalized or

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<sup>4</sup> Joint Universal Operations Needs (JUONS) are rapid acquisition requests relevant to multiple services and routed through the Joint Staff process. Established in 2005 by Chairman of the Joint Chiefs of Staff Instruction 3470.01, this system "establishes policy and procedures to facilitate assessment, validation, sourcing, resourcing, and fielding of operationally driven urgent, execution-year combatant commander needs. Generally, these needs can be considered as life- or combat-mission-threatening needs, based on unforeseen military requirements that must be resolved in days, weeks or months" (CJCS, 2005). The process does not replace the traditional Joint Capabilities Integration and Development System (JCIDS) process but rather accelerates the process.

incorporated into “normal” budget and acquisition planning processes. Furthermore, many of these rapid acquisition structures are available only for ACAT II programs or smaller, so once requirements grew to the ACAT ID level (see Figure 3), the MRAP program was forced to proceed according to the standard acquisition management and JCIDS framework (Blakeman et al., 2008).



**Figure 3. Acquisition Categories**  
(Defense Acquisition University, 2010)

### **Urgent Need Requests and MRAP Requirements**

As discussed earlier, the first formal field request began with the Marines. An Urgent Universal Need Statement (UUNS)<sup>5</sup> was submitted on February 17, 2005, by the Deputy Commanding General, I Marine Expeditionary Force. The request was for 1,169 MRAPs, and it was routed directly to the Marine Corps’ in-house rapid acquisition process (DoD OIG, 2008). While the formal request was received in February, the preprocess began months earlier. According to an Inspector General’s report critical of

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<sup>5</sup> The Marine Corps’ Urgent Universal Needs Process allows deployed commanders to request mission critical equipment based on experience in combat. This web-based system allows users to track requests from submission through resolution and relies on reprogrammed or supplemental funding. Generally this approach is faster than going through the standard Defense acquisition process (DoD OIG, 2008).

the Marine Corps' handling of the UUNS, the Marine Corps Combat Development Command (MCCDC) received a draft copy of the UUNS in November 2004. As a result, Marine Corps Systems Command released a request for information (RFI) in December on commercially available vehicles that provided superior ballistic and mine protection. Nine potential vendors were identified (DoD OIG, 2008).

The MCCCCD stopped processing the UUNS in August 2005, apparently in light of a decision two months earlier by the Marine Corps Commandant to procure up-armored HMMWVs to replace existing HMMWVs. With HMMWV production lines already active, up-armored HMMWV procurement was considered by the MCCDC to be the most expedient solution. Up-armored HMMWVs were, of course, more survivable than predecessor models of the HMMWV. But the flat-bottomed design of HMMWVs meant that adding additional armor could yield only marginal improvements in survivability. The military must have knowingly chosen to incrementally improve an existing vehicle rather than procure an entirely new vehicle platform (such as the MRAP). While the up-armored HMMWV was apparently the answer to the MRAP request, the UUNS was never formally resolved and the Commandant stated afterward that he did not intend for his decision on HMMWVs to sideline the MRAP UUNS (DoD OIG, 2008).

Despite the fact that MRAPs provided a capability that was useful across several Services, the February UUNS was never forwarded into the Joint rapid acquisition process (JUONS). However, commanders in the field continued to specifically demand MRAPs, and subsequently submitted requests through the JUONS process. Multi-National Force–West issued two JUONS on May 21, 2006, and on July 10, 2006, documenting the need for 185 Medium Mine Protected Vehicles and 1,000 MRAP vehicles, respectively. U.S. Central Command validated the requirement for all of the 1,185 requested vehicles on October 26, 2006. The Joint Requirements Oversight Council subsequently approved the requirement. The initial request for proposals (RFP) was released on November 9, effectively starting the MRAP program (DoD OIG, 2009).

The unrelenting IED threat continued to drive demand. The requirements for MRAPs rapidly increased over the following months, with the eventual goal that MRAPs would

replace up-armored HMMWVs on missions where increased levels of protection were needed. After the initial 1,185 MRAPs, the requirement for a total of 6,738 vehicles was approved in February 2007. It was subsequently increased again to 7,774 in May, and then to 15,374 by September (Brogan, 2007). There was also an interim JROC decision on July 11, 2007, to produce as many MRAPs as the industry could provide by the end of the calendar year (*Statement Before the Subcommittees*, 2007). The Services adjusted their demand for MRAP vehicles upwards and downwards in response to changing field conditions. By October 2009, requirements stood at 22,882.

**Table 1. MRAP Requirements as of October 7, 2009**  
(MRAP Program Office, 2009)

	<b><u>Category I</u></b>	<b><u>Category II</u></b>	<b><u>Category III</u></b>	<b><u>M-ATV</u></b>	<b>Total</b>
Marine Corps	1,840	610	77	1,588	<b>4,115</b>
Army	9,820	2,190		3,931	<b>15,941</b>
Navy	397	147		117	<b>661</b>
Air Force	472	66		272	<b>810</b>
SOCOM	451	35		643	<b>1,129</b>
Ballistic Testing	85	46	2	93	<b>226</b>
<b>Total</b>	<b>13,065</b>	<b>3,094</b>	<b>79</b>	<b>6,644</b>	<b>22,882</b>

*Note.* For a description of the different categories of MRAP, please see the section titled MRAP Descriptions and Limitations in this report.

### **Strategic Concerns: Addressing the “Delay” in the Requirements Process**

Nearly two years (20 months) passed from the time of the first formal field request for MRAPs until validated requirements were obtained. If only the formal requests that reached the Joint (JUONS) process were considered, then five months passed.

Preliminary appraisals of industrial capacity and limited preparations can occur while a proposed solution is in the requirements process. However, most of the acquisition and budgeting processes are not initiated until requirements are formally validated. Many

critics of the procurement effort point to this long lag in the requirements process as a major failure, which in the end, many believe cost hundreds of lives. As discussed in the previous section on political pressure and leadership, criticisms of the delay in fielding MRAPs came from Senators and military leaders alike. By most accounts, however, the procurement of MRAPs post-requirements process proceeded expeditiously.

Given that MRAPs were ultimately procured in large numbers and had been proven to save lives, it is difficult to find anyone on record rationalizing why it took so long to validate a requirement for MRAPs. Congress has not refrained from equating delays and body counts, so reticence by those in the requirements process seems understandable. Yet, it is apparent that there was some hesitation on the part of military requirements planners. Below are several areas of strategic concern that may have influenced the reluctance of some in the military to embrace a robust MRAP procurement program.

**MRAP funding threatened other programs of record.** Former Marine Science and Technology Advisor Franz Gayl, who gained notoriety as a whistleblower on MRAP requirement delays, insisted that the 2005 Marine Urgent Universal Need request was intentionally ignored because MRAPs would divert funding away from existing development programs such as the Joint Light Tactical Vehicle (JLTV) program (Gayl, 2008). Others have made similar claims. While MRAPs were procured mostly with supplemental funding, some funds were in fact drawn from other accounts. Furthermore, if MRAPs are to be kept as part of future forces, their sustainment costs will certainly compete with other items in the regular DoD budget. If acquisition history is any guide, sustainment costs for the MRAP fleet could, over time, amount to more than double the original cost of producing them. MRAPs procured for a very specific set of circumstances will likely threaten flexible, expeditionary platforms (e.g., JLTV) deliberately designed to meet a wide variety of future combat situations (Scales, 2010; Gayl, 2008).

Military planners may have been correct to fear the MRAPs' future budget impact, but that should not really be an excuse for failing to address the urgent needs of the warfighters. In so far as the MRAP program was driven by congressional pressure, the military planners failed to provide an acceptable alternative solution to minimize



casualties. It was clear that Congress was willing to pay significant sums to stem casualties. The military planning process did not suggest an alternative more compelling than the MRAP.

**Escalating threat/up-armored HMMWVs as the immediate solution.** Under this explanation, the military was slow to realize the impact IEDs and changing insurgent tactics would have on the battlefield. They may have thought up-armored HMMWVs were sufficient protection, and they were already in production (this was, in fact, the claim of the MCCDC). However, the danger of IEDs and mines were well known even before the Iraq invasion, and military planners should have been quick to realize that flat-bottomed HMMWVs were vulnerable regardless of armor. A DoD Inspector General's report echoed this conclusion, citing the data in Table 2, which show that the majority of combat-vehicle losses were due to mines and IEDs.

**Table 2. U.S. Vehicular Loss Rates Due to Mines (as a percentage of total combat losses)**  
(DoD OIG, 2008)

Conflict	Loss rate (%)
World War II	23
Korea	56
Vietnam	70
Operation Desert Storm	59
Operation Restore Hope (Somalia)	60

The report also highlighted the fact that the military did indeed anticipate the IED threat:

The Army, before the 2003 Iraq invasion, warned both commanders and soldiers that the Iraqi military had extensive knowledge and 22 years of experience in the use of mines, booby traps, and IEDs. Ground commanders were told to expect U.S. forces to encounter significant, sophisticated, and improvised devices,

including remote-controlled roadside bombs and car bombs during the war and occupation of Iraq. (DoD OIG, 2008)

**Wrong solution/incongruent with force strategy.** Many in the military are quite clear that the MRAPs solve a particular, theater-specific threat and are not a substitute for the HMMWV or JLTV. The Army Deputy Chief of Staff for Programs G8 has stated that “MRAPs will not be a dominant part of our tactical wheeled vehicle strategy” (Osborn, 2008). The Services are already planning to put the vast majority of MRAPs into prepositioned storage and to keep only a fraction of the vehicles on active duty (Feickert, 2009; see the Disposition section of this paper for details on MRAP disposition).

Yet, perhaps validating the fears of military planners, Secretary Gates has been pushing the Services to incorporate MRAPs more prominently into their future vehicle strategy. The Services did not just wrestle with how to treat MRAPs in the future—they even struggled with deciding how to incorporate MRAPs into their current operations (Osborn, 2007).

Because of their size and weight, MRAPs are an awkward addition to a military increasingly focused on becoming a more mobile, expeditionary fighting force. Over 70% of the world’s bridges cannot hold the MRAP, and its transport is possible only with the largest cargo planes and ships (Erwin & Jean, 2008). The former Military Deputy to the Assistant Secretary of the Army for Acquisition, Logistics, and Technology stated in an interview that “no consensus existed within the user community, and particularly the Army, on how to best address the IED threat” (Blakeman et al., 2008).

There is certainly substantial evidence to suggest that MRAPs are not the ideal solution. The argument that the military cannot produce a new, theater-specific solution for every military operation is also compelling. However, the requirements process failed to put forward a credible alternative. Lack of consensus does not justify a lack of action. Since MRAPs were ultimately fielded in large numbers, there was obviously a demand—by both Congress and field commanders—that needed to be met. Aside from the up-armored HMMWV, the only other vehicular option identified in the public literature was the JLTV, a platform that would not be ready until 2012 at the earliest (Eisler et al., 2007).

**Continued belief in a short war.** General George Casey, the top commander in Iraq from June 2004 until February 2007, repeatedly insisted that troop levels would be cut as soon as Iraqi troops took more responsibility for security, and he predicted “very substantial reductions in troops by early 2006” (Eisler et al., 2007). This prediction echoed comments by Vice President Cheney and even by President Bush himself that combat operations would wind down in the near term.

**Undermines counterinsurgency strategy.** The U.S. Army’s revised counterinsurgency strategy involves interfacing with local populations and taking a less threatening posture. Some suggest that MRAPs—enormous, imposing, menacing—send precisely the wrong message to the host nation’s population.

**Insurgents constantly adapt while technical protection undermines the overarching mission.** Analysts argue that insurgents will constantly adapt and change tactics faster than technical countermeasures can be developed (e.g., using Explosively Formed Penetrators [EFPs]). In response, MRAPs, which were initially large, have grown larger as more advanced armor is added to defeat EFPs and modified IEDs. By prioritizing protection over mobility and mission accomplishment, MRAPs may abet the insurgency and allow militants the time and space to develop ever more lethal tactics (Moss, 2005; Krepinevich & Wood, 2007).

**Too late.** Some analysts put aside the question of whether the MRAP was the right solution, and instead suggest that it arrived too late to really make a difference. IED casualties trended downward as MRAPs were fielded. This was not due solely to MRAPs. Changes in insurgency tactics, the new U.S. counterinsurgency strategy, strategic successes in the ground campaign, and improved IED defeat efforts all contributed to an improved security climate.

**Casualty rates were not historically high.** At the time the MRAP program was initiated, casualty rates were significantly below other historical military engagements. It is unlikely that any military officials will ever go on record to say that MRAPs were not worth the money because the U.S. was experiencing acceptable levels of casualties by historical standards. However, it stands to reason that they may have had this

information in mind. As a percentage of deployed forces, combat deaths were 16.4% in the civil war, 2.5% in World War I, 2.5% in World War II, 0.67% in Vietnam, and 0.25% for U.S. operations in Iraq and Afghanistan. Casualty ratios were roughly a third of those in Vietnam (Krepinevich & Wood, 2007).

On a statistical basis, casualty numbers may not have compelled military planners to embrace MRAPs. But this line of argument ignores the fact that Congress—especially in light of failures and delays in body armor and up-armored HMMWVs—was demanding a solution to casualty rates. Furthermore, the U.S. public is more sensitive to casualties in an open-ended war not seen as an imperative for survival of the U.S. way of life (Krepinevich & Wood, 2007; Lamb et al., 2009). Public sensitivity to casualties, in this respect, represents a major obstacle to mission accomplishment.

### III. MRAP Descriptions and Limitations

The previous section charted the requirements process for the MRAP program. Part of this process entailed deciding the types and specifications of MRAPs to be procured. This section describes those MRAPs and discusses some of their limitations.

Rather than setting detailed design requirements, the MRAP program gave significant flexibility to manufacturers. The program set basic survivability and automotive criteria. Avoiding prescriptive designs and using commercial off-the-shelf (COTS) technology allowed manufacturers to turnaround testing prototypes in a matter of weeks rather than months and/or years. Additionally, it led to designs and innovations that greatly supported and accelerated the production rate.

The MRAP program initially called for three categories of MRAPs to meet specific operational needs. A smaller, lighter version (M-ATV) was ultimately designed and produced for use in Afghanistan. All told, the U.S. military ordered over 20,000 MRAPs. Depending on the variant, armor level, and upgrades, MRAPs can cost anywhere from \$400,000 to \$1.2 million, averaging around \$1 million (Vanden Brook, 2008). As a point of reference, foreign-made commercial MRAPs could be purchased for as little as \$200,000 in 2004 (Eisler et al., 2007).

The three main categories of MRAPs initially procured for use in Afghanistan were:

#### Category I

- Intended for urban combat environments and patrols;
- Transports up to 6 personnel;
- Curb weight 7–15 tons; and
- Estimated per unit cost range of \$300,000–\$550,000 (see Figure 4).



**Figure 4. Navistar Category I MaxxPro MRAP**  
(courtesy U.S. Army)

### **Category II**

- Intended for convoy escort, troop/cargo transport, explosive ordnance disposal, and ambulance missions;
- Transports up to 10 personnel;
- 15–25 tons; and
- Estimated per unit cost range of \$540,000–\$644,000 (see Figure 5).



**Figure 5. FPI Category II Cougar MRAP**  
(courtesy U.S. Navy)

### **Category III**

- Used primarily for route clearance and explosive ordnance disposal;
- Transports up to 13 personnel;
- 25 tons;
- Estimated unit cost of \$856,000; and
- Only FPI's 6x6 Buffalo was awarded production in this category, and only the USMC acquired Category III MRAPs through the MRAP program (see Figure 6).



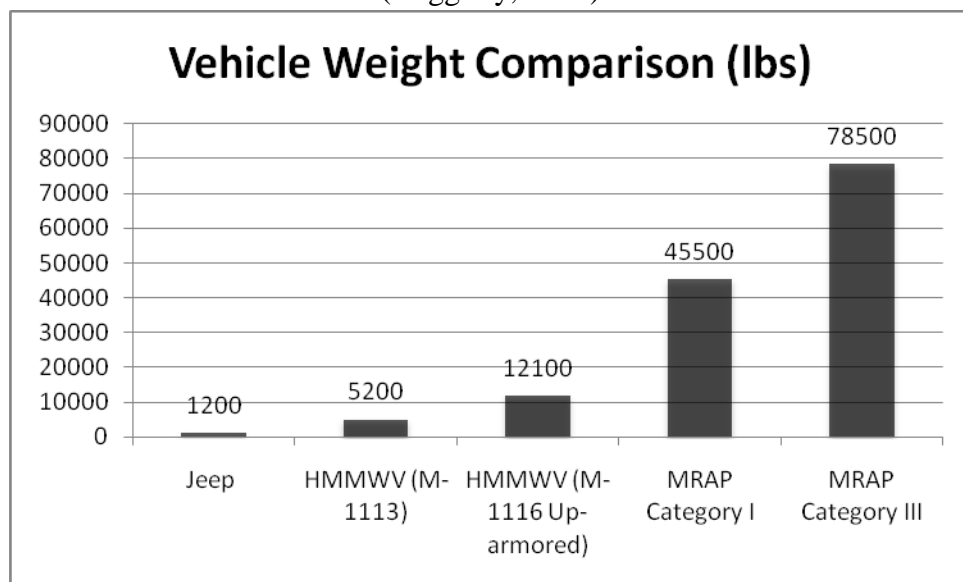
**Figure 6. Buffalo Category III MRAP**  
(courtesy U.S. Army)

The cost ranges for each MRAP category are third-party estimates from Defense Technology International and do not include the cost of government-furnished equipment and upgrades. The weights listed for each category are curb weights and do not include additional armor and government equipment (Axe, 2007; Feickert, 2007; DoD OIG, 2009).

MRAPs are heavy, bulky vehicles whose maneuverability and off-road capabilities are limited. Weighing 12–25 tons depending on the specific variant and armor configuration, the typical MRAP dwarfs the three-ton HMMWV; even a fully burdened, up-armored HMMWV maxes out at 6–7 tons (see Table 3). At the other end of the spectrum, the M-1 Abrams tank weighs in at 71 tons (Feickert, 2007).

As of July 2009, total MRAP production funding amounted to \$22.7 billion for the procurement of 16,204 vehicles, only 13,848 of which arrived in-theater (GAO, 2009a).

**Table 3. Comparison of Vehicle Weights**  
(Haggerty, 2008)



### Upgrading Existing MRAPs and the MRAP All Terrain Vehicle (M-ATV)

The MRAPs' poor performance in off-road conditions is especially problematic in Afghanistan, where roads are generally poor or non-existent. To counter the continuing IED threat and to increase mobility, the military is producing a new type of MRAP and is upgrading the suspension systems of existing MRAPs.

With a curb weight of 25,000 pounds, the lighter MRAP version—dubbed the M-ATV—is currently under sole-source production by Oshkosh Corporation. Oshkosh notably failed to provide an acceptable vehicle for the original MRAP program—a surprise to the

program office and other observers given Oshkosh's extensive military production experience and reputation as a low-risk manufacturer. Nonetheless, Oshkosh beat out MRAP production veterans BAE, Navistar, and Force Protection Industries (FPI) for the initial M-ATV contract awarded June 30, 2009. As of January 2010, M-ATV contracts totaled \$3.9 billion for 6,619 M-ATVs, spare parts kits, and in-theater support. Deliveries began in October and production reached its target rate of 1,000 vehicles per month in December (Oshkosh, 2010).

While waiting for new vehicles the Marine Corps has been retrofitting FPI's Cougar 4x4 MRAPs with Oshkosh's TAK4 suspension systems—the same systems used in the M-ATV. The Marines seem to have found the retrofitted vehicle's performance satisfactory, and may ultimately cut the number of M-ATVs they procure. The retrofits are said to cost around \$160,000 per vehicle. As of July 2009, the goal was to have 1,400 retrofitted Cougars in Afghanistan by February 2010 (Feickert, 2009; Calvert, 2009).

## Survivability and Effectiveness

*MRAPs have proven time and time again to save the lives and limbs of soldiers and Marines ... and I think they're worth every dime the taxpayers are spending on them.*

*- Secretary of Defense Gates (Scully, 2009)*

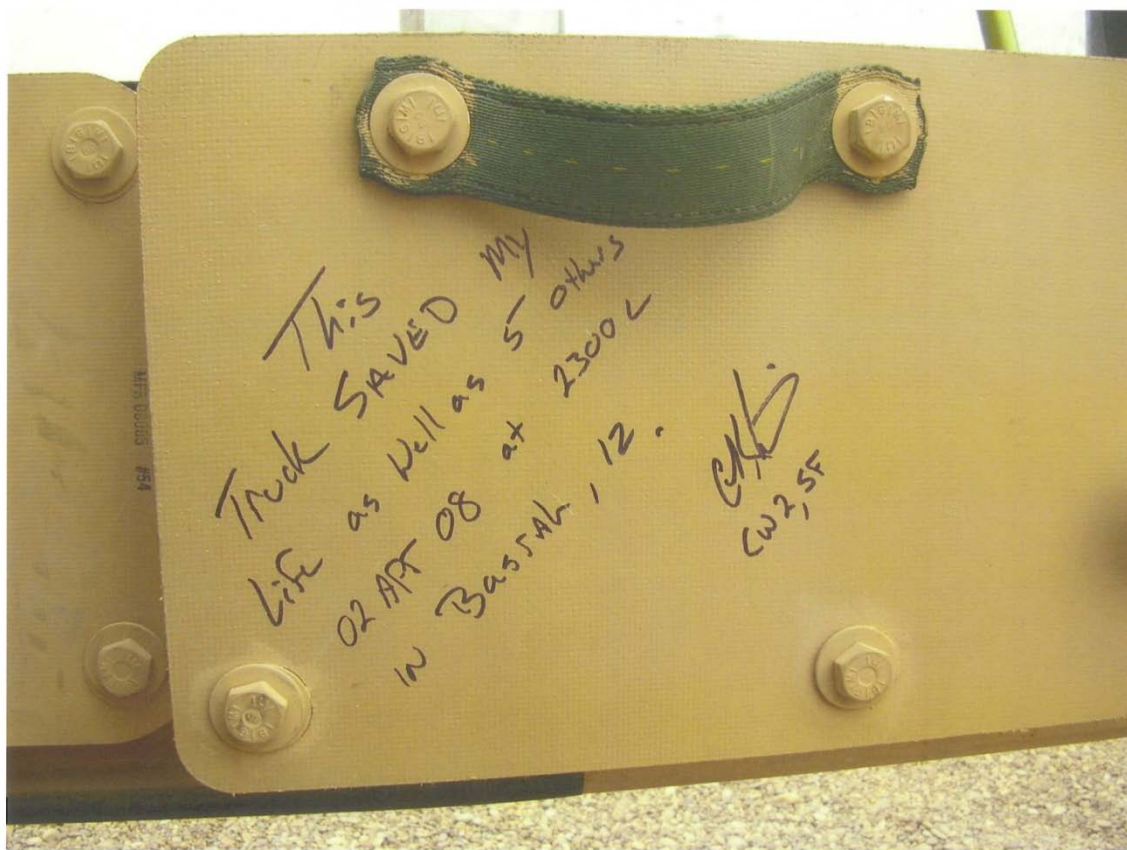
Questions will likely persist about whether the MRAP was the right vehicular solution to the IED threat and whether it fit into tactical military strategy. However, there can be little doubt that MRAPs are the most survivable vehicle for troops in Iraq and Afghanistan.

In planning for MRAP procurement, the Commandant of the Marine Corps cited an estimate that MRAPs could reduce casualties in vehicles due to IEDs by 80% (DoD OIG, 2009). In congressional testimony in March 2007, the Assistant Commandant of the Marine Corps stated that field experience has shown MRAPs to be “4 to 5 times safer ... than an up-armored HMMWV” (*Statement of General Robert Magnus, 2007; DoD OIG,*



2008). His comments likely referred to the handful of MRAPs that were operating in-theater for route clearance and explosive ordinance disposal. These gained a reputation for survivability and likely inspired MRAP requests from combat units.

These predictions proved accurate as MRAPs flowed into theater. The DoD stated flatly that MRAPs are the most survivable vehicle in theater with a 6% casualty rate. By comparison, the M1 Abrams main battle tank has a 15% casualty rate and the up-armored HMMWV has a 22% casualty rate (Feickert, 2009).



**Figure 7. A Member of the Special Forces Wrote This Note on the Door of an MRAP in Basrah**  
(courtesy U.S. Army)

## MRAP Limitations

MRAPs are clearly a success from a survivability standpoint. However, over the course of their service, a number of problems were identified. These problems are outlined in the following sections.

### **Vehicle Safety**

The high height of an MRAP is critical to its blast deflection, but it makes it prone to rolling. Rolling accounts for the vast majority of MRAP accidents. Rolling also occurs when rural roadsides give out under the heavy weight of MRAPs. The rolling risk was highlighted in 2008 by the deaths of three Special Forces soldiers who drowned when their vehicle rolled into a river in Afghanistan. The military implemented enhanced training on roll-avoidance, but given the design of the vehicles and the environment in which they are operating, this problem will persist. Another hazard linked to height is electric shock from low-hanging power lines (Marine Corps Center for Lessons Learned [MCCLL], 2008; Mitchell & Scutro, 2008).

### **Maneuverability, Utility, and Fuel Consumption**

The MRAPs' weight and bulk make them difficult or impossible to use in urban environments and in rough terrain. They are limited in the kinds of roads they can use and bridges they can cross—72% of the world's bridges cannot hold the MRAP (Erwin & Jean, 2008).

Transporting them to and within theater is also a major challenge. They can only fit in the largest cargo airplanes (U.S. Air Force's C-17 and C-5, and Russia's AN-124). If MRAPs are needed in future conflicts, transporting them will prove especially problematic for Marines. MRAPs will not fit on the amphibious ships that Marines use for prepositioning equipment (Erwin & Jean, 2008).

One of the greatest vulnerabilities in modern warfare is the logistics tail for fuel. In no place is this vulnerability more evident than in Afghanistan, where supply lines have been under tremendous pressure from insurgents. Field fuel consumption is not available

publically, but it is estimated that MRAPs get roughly 3 miles per gallon—less than half that of a normal HMMWV (Warner & Singer, 2009; Tiron, 2007). An up-armored HMMWV gets approximately 4 miles per gallon—roughly 25% better fuel economy than an MRAP under similar conditions (Warner & Singer, 2009). As of November 2009, over 21,000 MRAPs had been ordered and over 14,000 fielded (MRAP Program Office, 2009). These data represent a massive increase in the quantity of fuel required in the field; however, public discussions of the MRAP program generally omit references to the MRAPs’ effect on fuel logistics.

## IV. MRAP Procurement

*The MRAP program was the first major defense procurement program to go from concept to full-scale production in less than a year since World War II.*

*- Secretary of Defense Gates*

### Contracting and Manufacturers

In the realm of public–private cooperation, the MRAP program stands out as a clear success story. The program office, together with the manufacturers, worked relentlessly to increase production, took substantial risks, and cooperated with the wartime sense of urgency.

The dialogue with industry began with an August 2006 Request for Information to gauge industrial capacity for MRAP production. Requirements were validated in October 2006. Marine Corps Systems Command (MCSC) released the first RFP to industry for Category I and II MRAPs in November 2006. While all vendors deemed technically capable were ultimately awarded contracts, the RFP made it clear that the government planned to award one or more indefinite delivery indefinite quantity (IDIQ) contracts<sup>6</sup> to vendors that provided the best value. According to the program office, vendors did not know that all potential vendors would be awarded contracts. The DoD Inspector General (IG) criticized this approach as not insuring that the government was getting the most competitive price. The IG believed that each vendor’s vehicle was unique and hence not directly competing with the other submissions. However, this was a “mission need” requirement, not a “design” requirement, and all of the selected vehicles passed operational and survivability tests. Moreover, the program office believed that since the vendors did not know that all would receive contracts, they had an incentive to provide

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<sup>6</sup> An IDIQ contract allows the government to purchase an indefinite quantity of supplies or services within stated limits, usually within a stated period of time. The government can place orders against this contract.

the government with a competitive bid (Hansen, 2009; DoD OIG, 2009; Blakeman et al., 2008).

Concurrent with the MRAP RFP, a sole-source contract was issued to Force Protection Industries (FPI) for up to 200 Category II and for 91 Category III vehicles. At the time, FPI had a production line that was actively manufacturing MRAPs currently in theater, albeit in small quantities. The goal of the sole-source contract was to start procuring vehicles immediately to meet demands from the field (DoD OIG, 2009).

Ten manufacturers responded to the RFP and nine were awarded firm-fixed-price IDIQ contracts for up to 1,500 Cat I and 2,600 Cat II MRAPs per year for one year and four option years. The proposals were evaluated based on technical approach and proposed delivery schedule. The contracts required the nine vendors to supply 2 vehicles in each category (I and II) for survivability and mobility testing. These 36 test vehicles cost \$88 million (DoD OIG, 2009).

Below are descriptions of the nine vendors, their unique attributes, and the total orders placed with them through November 2009:

1) Navistar Defense, LLC (formerly International Military and Government)—Navistar was initially considered a higher risk manufacturer due to a non-traditional design. Its MRAP did not use a single hull design and bolted the chassis and cab together on the outside. Because of the perceived risk, Navistar was passed over for initial orders until it advanced further into testing. Ultimately, its design passed testing and Navistar was able to ratchet up production far faster than the other manufacturers. It received the most orders: 6,424 Cat I and 16 Cat II (Hansen, 2009; MRAP Program Office, 2009).

2) Force Protection Industries (FPI)—FPI was already producing MRAPs at the start of the program, and so it was awarded a sole-source contract as a bridge while the competitive process was underway. In the sole-source and competitive processes it was awarded production for 1,996 Cat I; 1,058 Cat II; and 79 Cat III MRAPs. FPI was the only manufacturer awarded production of Cat III under the MRAP program (MRAP Program Office, 2009).

3) Armored Holding, Inc. (AHI) (later acquired by BAE)—Like Navistar, AHI was considered higher risk based on a rapid Industrial Capability Assessment performed at its facilities. As a result, it was excluded from the first production orders. It persevered to become the third-largest supplier of MRAPs. It had total orders of 2,848 Cat I and 16 Cat II (MRAP Program Office, 2009; DoD OIG, 2009).

4) BAE Systems Land and Armaments—BAE received awards of 321 Cat I and 1,905 Cat II (MRAP Program Office, 2009).

5) General Dynamics Land Systems—Canada received orders for 1,384 Cat I (MRAP Program Office, 2009).

6) Oshkosh Truck Corporation—Oshkosh was initially considered a low-risk manufacturer given its extensive experience in military mass production. Before testing was complete, 100 vehicles were ordered based on its reputation. Its vehicles failed to meet specifications, and Oshkosh was dropped from the MRAP program. The purchased vehicles were offloaded to the Border Patrol and the FBI. Oshkosh subsequently won the M-ATV competition and received sole-source contracts for 6,619 M-ATVs (Oshkosh, 2010; Hansen, 2009).

7) Protected Vehicles, Inc. (PVI)—An offshoot of FPI, PVI presented a promising technical vehicle that seemed to offer potential armor innovations. The MRAP program ordered an initial 60, but PVI failed to meet its contractual obligations. Only 11 were produced, none fielded. The company subsequently went bankrupt (Hansen, 2009; DoD OIG, 2009).

8) Textron Marine and Land Systems—These vehicles did not pass initial MRAP testing. The vehicles were sold back to Textron at reduced cost, and its contract was terminated for convenience (DoD OIG, 2009).

9) General Purpose Vehicles (GPV)—GPV failed to deliver test vehicles on time (DoD OIG, 2009).

In order to accelerate production, the Assistant Secretary of the Navy for Research, Development, and Logistics (ASN [RD&L]) approved low-rate initial production (LRIP) orders against the IDIQ contracts for 7 of the 9 manufacturers. The LRIP orders allowed manufacturers to develop and sustain a production workforce, but it also represented a deliberate acceptance of risk by the ASN (RD&L). As of November 2009, a total of 15 LRIP orders had been placed (MRAP Program Office, 2009). LRIPs were used because the procedures for a Full-Rate Production Decision (FRPD) would have stalled the process. High-level approval was required to allow such large LRIP orders. When we conducted our interview with the program office, they were still in the process of finalizing the FRPD even though the MRAPs had finished production (DoD OIG, 2009; Hansen, 2009).

Those intimately familiar with the MRAP program have consistently highlighted the importance of contracting personnel willing to look for “ways to say yes, instead of no” (David K. Hansen, personal communication, December 7, 2009). For instance, the program office mentioned how at one point they had over \$3 billion of undefinitized contract actions. The program was moving so quickly that it did not have time to develop a statement of work, circulate proposals, or analyze them. This kind of leeway in contracting is rare within the DoD, but it enabled the MRAP to proceed at a brisk pace (David K. Hansen, personal communication, December 7, 2009). Dr. Delores Etter, the ASN (RD&L), stated in our interview that she had lawyers with her “all the time, giving their advice as to what was legal, what might be on the edge, and what was not legal” (Delores Etter, personal communication, January 28, 2010). The program moved quickly because it had the high-level support necessary for Dr. Etter and others to operate on that edge, while avoiding anything illegal.

It appears as though the MRAP experience is informing wider DoD contracting practices. Secretary Gates noted that lessons learned from the MRAP program have inspired the DoD to emphasize fixed-price contracts and to use “performance awards in the right places in the process” (Scully, 2009).

# MRAP Program Timeline

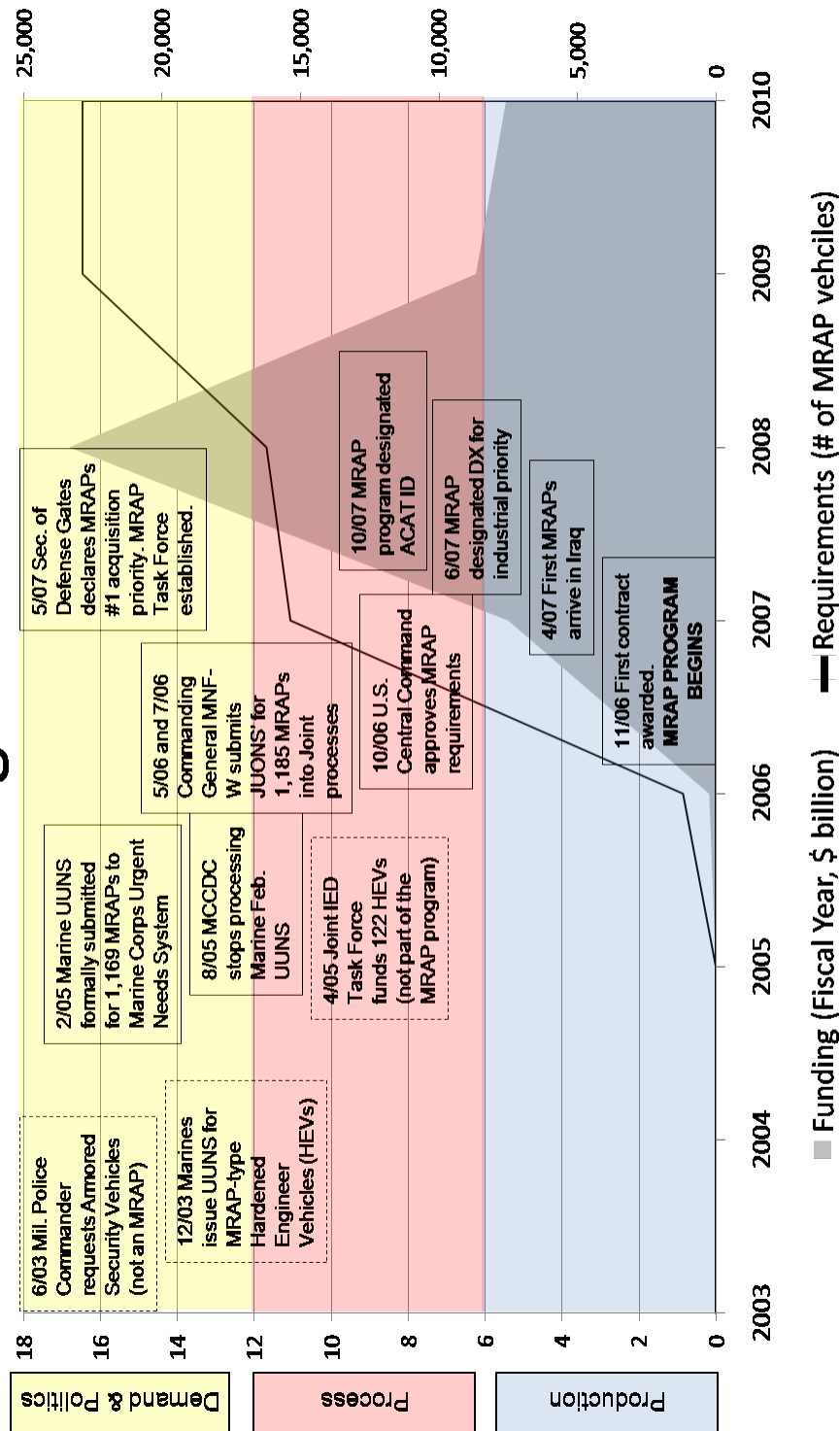


Figure 8. MRAP Program Timeline



## Funding

The envy of many an acquisition program, the MRAP program was never starved for funding. Congress not only gave the program everything it requested, it even appropriated funds in excess of its requests. Even under a Continuing Resolution, Congress made sure that MRAP funding was available (*Statement Before the Subcommittees*, 2007). Through FY2009, \$26.815 billion in wartime supplementals and reprogramming was spent to procure over 16,000 MRAP vehicles (Feickert, 2009).

A component critical to the funding system's success was a transfer fund set up by the Office of the Secretary of Defense (OSD). Supplemental funding from Congress had no "color."<sup>7</sup> This flexibility allowed the Joint Program Office (JPO) to decide how to color money by type and Service. At one point, the DoD even allowed transfer-back authority for overestimated transportation costs (money was transferred back, uncolored, and then it was reused) (Cresswell-Atkinson, 2009; Hansen, 2009). The program office, the OSD, the Services, and Congress all worked together to provide funding when needed and in the form required.

The program office shared an anecdote to highlight how quickly things were made to happen for the MRAP. Late on a Wednesday, the program office was alerted that Secretary Gates wanted to award contracts at the press conference the next day. Usually it takes weeks to get this type of funding over to Congress, back to the program office, to the Services, and then back to the program office again. In this instance, however, the whole process was completed in time for the 5 PM press conference (Hansen, 2009). For all the speed that high-level support provided the MRAP, it did not relieve the typical

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<sup>7</sup> The "color of money" refers to the way Defense funding is appropriated and directed by Congress. Generally funds are earmarked (or "colored") according to what Service will receive the funds and for what purpose the funds can be used (e.g., transportation). The MRAP program office was in practice given colorless money, which allowed the office to directly transfer funds to the Services. At the start of that transfer, the office decided for what purpose the funds would be used. The Services then sent the money (now colored because it reached the Services) back to the program office for use. Transfer-back authority, which was given to the MRAP program in specific incidences, was a program-level mechanism that allowed money to be de-colored and reused for a different category of expense (Cresswell-Atkinson, 2009).

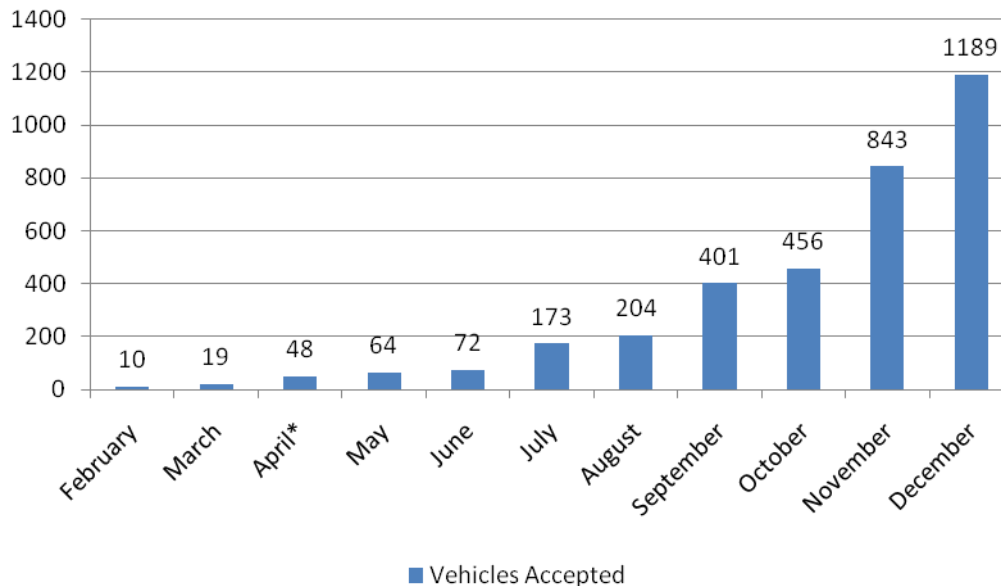
budgeting and reporting requirements. Although some deadlines were made more flexible, generally all procedures still had to be followed (Cresswell-Atkinson, 2009).

## **Production**

While the MRAP program has its critics, few take pronounced issue with the speed at which the MRAPs were physically produced. The primary objective of the program was to “field the maximum number of survivable, safe, sustainable MRAP vehicles in the shortest period of time” (MRAP Program Office, 2009). Importantly, and perhaps atypically, all of the relevant actors—the Office of the Secretary of Defense, the JPO, the Services, and Congress—faithfully shared this common objective. Cost and all other considerations were explicitly secondary.

Efforts to ramp up production resulted in increases of two orders of magnitude in less than a year. However, the MRAP program faced delays early on and failed to meet production targets. An Inspector General report cited overly aggressive schedules, engineering changes to vehicles, and material shortages as being responsible for the delays (DoD OIG, 2009). By the end of 2007, however, production levels met targets (see Figure 9).

## MRAPs Accepted in 2007



**Figure 9. MRAP Vehicles Accepted Monthly During 2007<sup>8</sup>**  
(DoD OIG, 2009)

In addition to using LRIPs to prime industry for production (discussed earlier in the contracting section), the DoD also provided funding for one manufacturer to upgrade its facilities to increase vehicle production. Similarly it incentivized Michelin with \$4 million to purchase additional tire molds and equipment to meet current and projected demands (DoD OIG, 2009; Hansen, 2009).

The greatest bottlenecks in terms of production materials were tires and armor-grade steel. When Michelin could not keep up with demand, the DoD worked with Goodyear to certify their tires as a second source. Steel proved more complicated. The OSD's industrial policy office charted out how much steel would be required to meet MRAP production needs. It was clear that there would not be enough steel available. Secretary Gates approved a DX rating<sup>9</sup> for the MRAP program on June 1, 2007, to assure priority

<sup>8</sup> The first MRAPs were fielded in Iraq in April 2007.

<sup>9</sup> A DX designation gives industrial priority over all regularly-rated (DO) and non-rated acquisitions. DX ratings can only be approved by the Secretary of Defense or the Deputy Secretary of Defense. As of November 2007, only six other programs within the DoD had a DX rating (U.S. Department of Commerce, 2007).

access to available materials. A DX rating indicates the highest level of national defense urgency, giving it priority for procuring equipment and raw materials for production over all production without a DX rating. As a result, non-DX DoD acquisition programs experienced steel and other shortages. The DX priority provides access to scarce production resources, but it does not resolve capacity shortfalls (*Statement Before the Subcommittees*, 2007; Hansen, 2009; DoD OIG, 2009). Even with these efforts, steel was still in short supply. The DoD took a three-pronged approach—it qualified more people to make steel, allowed some manufacturers to get their products and raw materials from other countries (which required congressional approval), and increased the capacity of existing plants. The DoD obligated \$200 million to increase the capacity and availability for specialty steel products (Hansen, 2009; *Statement Before the Subcommittees*, 2007).

### **Government Furnished Equipment and Transport**

The last link in the production chain was the integration of Government Furnished Equipment, at the Space and Naval Warfare Systems Command (SPAWAR) in Charleston, SC. Here, all MRAPs converged and received Service-specific equipment. The SPAWAR created several processing lines and cross-trained technicians to work across multiple platforms. Despite initial concerns that it would be a bottleneck, the SPAWAR dealt successfully with some 11 different Service variants. After the initial months, it was able to keep the fielding pipeline full (Delores Etter, personal communication, January 28, 2010). Throughout the process, the SPAWAR communicated back to manufacturers to have them incorporate design changes (such as installing brackets) into production in order to increase efficiency.

From the SPAWAR, vehicles were shipped to theater. Roughly half were shipped by air (at a cost of approximately \$160,000 per vehicle); this form of transportation was initially the exclusive method of fielding in order to get them into theater as soon as possible. MRAPs can only fit into the largest cargo airplanes (U.S. Air Force's C-17 and C-5, and Russia's AN-124). When the air pipeline was filled to capacity, MRAPs were transported via ship (at a cost of about \$20,000 apiece) (Cresswell-Atkinson, 2009; Blakeman et al., 2008). By May 2008, vehicle flow had saturated the de-processing capability in theater.<sup>10</sup> From that point onward, MRAPs going to Iraq were transported exclusively by ship. MRAPs destined for Afghanistan required either direct airlift or inter-theater airlift due to a lack of reliable land connections to ports (Blakeman et al., 2008).



**Figure 10. Loading an MRAP into a C-5 Galaxy Aircraft at Charleston Air Force Base, SC**  
(courtesy U.S. Army)

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<sup>10</sup> The main de-processing centers for air shipments were Ali Al-Salim Airbase in Kuwait and Balad Airbase located on Camp Anaconda in Iraq. Later in the program, MRAPs were surface shipped to Iraq. MRAPs bound for Afghanistan still required airlift, either directly or from Iraq and Kuwait. Within theater, MRAPs were transported by trailers to their issue points (Blakeman et al., 2008).

## Testing

Typically, most vehicle and weapon designs must be fully tested before being fielded. Because of the compressed timescale for MRAPs, a phased approach was instituted to identify those models that provided acceptable levels of survivability and vehicle performance. Based on these tests, production was awarded. Testing did weed out a number of designs, but once a manufacturer passed a round of testing, the program office generally ordered as many vehicles as they could produce. Later test phases increased the extensiveness of testing. Nearly all testing was complete by June 2008 (Hansen, 2009; GAO, 2009a). One of the key innovations of the MRAP program was that manufacturers' representatives were present at the Aberdeen test center. As test results came in, the representatives were immediately able to communicate with production and design teams to help develop improvements to vehicles on the production line. Similarly, user feedback from the field was incorporated into ongoing design changes (Delores Etter, personal communication, January 28, 2010).

## Field Support

When the requirement was below 1,700 vehicles, the program office originally planned for contractor logistics support in the field. As the requirements dramatically increased, the Army believed that they would need to transition to an organic approach to meet their operational requirements. Currently, they are employing a hybrid strategy, using organic maintenance along with contractor logistics support. The program office also developed a very innovative approach, requiring contractor's field service representatives to be able to maintain the other manufacturers' MRAPs, providing significant flexibility in-theater. As witnessed throughout the production process, the manufacturers' responsiveness to the wartime sense of urgency, allowed them to get past their concern about proprietary data and support this cross training of their competitor's technicians. This facilitated improved vehicle readiness rates, with a reduced number of contractors (Hansen, 2009; Delores Etter, personal communication, January 28, 2010). As of November 2009, fleet readiness was 97% in Iraq and 90% in Afghanistan (MRAP Program Office, 2009).

## Disposition



**Figure 11. An MRAP Undergoes Maintenance at the MRAP Sustainment Facility**  
(courtesy U.S. Army)

As operations wind down in Iraq, the question arises about what will happen to MRAPs. Some are being sent to Afghanistan, notably ones that undergo suspension improvements. Some may go to Iraqi or to other Allied forces. The Army and the Marines plan to put the majority of their MRAPs into prepositioned stocks at various overseas locations, ship some to the U.S. for training, and place a number into logistics and route clearance units (Feickert, 2009).

- The Army owns well over 10,000 MRAPs. According to the Congressional Research Service, the Army plans to keep only 2,675 units operational. Another 702 will be allocated for training (in addition to the 50 already being used for driver training), and an additional 1,400 will be incorporated into

route clearance units. Most of the remaining vehicles (in excess of 7,000) will likely be put in prepositioned stocks.

- As of mid-2009, the Marines planned to keep 800 of 2,225 MRAPs with operating forces, with the remainder sent to prepositioned stocks (Feickert, 2009).



## V. Lessons Learned and Recommendations

The MRAP program offers a number of lessons for rapid acquisitions that fall broadly into three categories: leadership, the requirements and acquisition processes, and production. Success in all three areas is critical. Even though MRAPs are a special case of acquisition, many of its lessons are applicable to rapid acquisitions of lesser magnitude.

### Leadership

**Champions or task forces.** Once the requirement was approved, the MRAP program's speed was possible only because it enjoyed the personal support of the Secretary of Defense and members of Congress. It also benefitted from the MRAP Task Force, which brought together all relevant decision makers to problem-solve in real time on a weekly basis.

**Unity of message/purpose.** Despite any misgivings in choosing the MRAP as a solution, once it was chosen there was clear agreement by all relevant players what the goal was—field as many survivable vehicles as possible as quickly as possible. This clarity of purpose—owed in large part to leadership at the top—precluded much bureaucratic infighting. There was a clear bifurcation in the MRAP process. The reluctant requirements generation process gave way to a procurement phase categorized by a sense of urgency that permeated everywhere from the program office to the testing facilities to the manufacturers.

### Recommendations

- If a rapid acquisition is critically important (e.g., body armor early in the Iraq War), we recommend the appointment of a task force or a senior-level champion to shepherd the program through the system. The goal is not to muscle a program through per se, but rather to ensure that the program keeps progressing through

myriad reviews and bureaucratic procedures (Delores Etter, personal communication, January 28, 2010).

- The champion or task force should consistently reinforce the priorities of the project and the expectations for the involved parties.

## Requirements and Acquisition Processes

**Rapid acquisitions need not be linear.** In order to keep the process moving forward, the MRAP program was able to skip over some bureaucratic chokepoints in the process with the permission of high-level procurement officials, such as the Assistant Secretary of the Navy (RD&A). It was also able to operate multiple processes at different parts of the acquisition cycle (e.g., testing, production, refinement, fielding) simultaneously, which was a tailored flexibility that saved months of acquisition time. The program was rarely allowed to skip steps entirely, especially not in testing. Instead, it was given extra time to complete the required paperwork and it was allowed to continue to the next step in the acquisition process. In regard to testing, a phased approach allowed the fielding of survivable vehicles immediately followed by the constant refinement of production models as more advanced testing was completed (Delores Etter, personal communication, January 28, 2010; Hansen, 2009).

**Inadequacy of the current rapid acquisition system.** Rapid acquisitions take place within a number of ad hoc organizations, but they are nonetheless ultimately shackled to the traditional acquisition system. This system is linear, stove-piped, and designed for risk minimization during extended development of technologically sophisticated equipment. Rapid acquisitions are generally of a completely different character—imperfect solutions required immediately, using currently available technology. One of the proposed explanations for the delay in the requirements process was the prospect of MRAPs usurping funding from programs of record. This tension will always exist between rapid and deliberate acquisitions. The need for rapid acquisitions is unlikely to wane anytime soon.

**Supplemental funding.** The MRAP program was possible because it was funded through supplemental appropriations. There is little reason to suspect that a program of similar magnitude could be accomplished solely by reprogramming existing budgetary funds or by competing directly with programs of record in the budget process.

## **Recommendations**

- Rapid acquisition systems should be modified to allow more flexibility in the timing of paperwork requirements, and possibly modified to include a reduction in the number of signatures required for some steps. The MRAP program was able to do this on a case-by-case basis with senior approval. Acquisitions with less political clout will find it more difficult to do this, even though there may be compelling reasons and minimal risk in allowing such flexibility.
- In light of the linear nature of the acquisition system and the tensions that will always exist between deliberate and rapid acquisitions within the requirements process, we recommend creating a separate agency within the DoD that focuses solely on rapid acquisitions that require minimal technological development. The agency should have its own separate, bankable funding stream. Secretary Gates echoed the spirit of this recommendation while referencing the MRAP program in 2009. He stated that the DoD needs to make distinctions in how it awards contracts for commercial off-the-shelf versus more technical acquisitions (Scully, 2009).

## **Production**

**Priming the industrial base.** Industry leaned forward, buying materials in advance of contract delivery orders and at their own risk (*Statement Before the Subcommittees*, 2007). The wartime atmosphere likely made this possible. The DoD incentivized the process by awarding LRIP contracts to all low-risk manufacturers even before testing was underway, allowing manufacturers to gear up immediately. The DoD provided funding to upgrade facilities and equipment. The escalating requirements for MRAPs were such

that the DoD bought all the MRAPs that could be produced in the first year. In this context, the risk and expense undertaken to prime the industrial base was rewarded.

**Securing scarce resources.** For a procurement program of the scale and scope of the MRAP program, designation as a priority acquisition program and a DX rating were critical to MRAP production. Steel and tires were the main limiting factors, and the DoD showed appropriate resourcefulness by expanding its search for steel-armor materials outside the U.S. Without these exceptions, MRAP production would have slowed.

**Existing technology, continuous refinement, and competition.** The constant cycle of testing, reengineering, and user feedback yielded vehicle designs that were consistently improving. This type of constant improvement was possible because the underlying MRAP design was a proven, existing technology. After each successive round of testing and fielding, additional production contracts were awarded. This process meant that manufacturers had a constant incentive to improve their product to win more follow-on orders. This approach maximized the number of survivable vehicles reaching the field, and accelerated the rate of improvements in production models. The downside was that each iteration meant yet another variant in the field, complicating spare parts, maintenance, and life-cycle cost issues. The program office estimated that there are effectively 35–40 different variants now operating (Hansen, 2009). This type of production is appropriate when lifecycle cost is not a primary concern.

**Manufacturers embedded at the test center.** An innovation worth repeating is that manufacturers' representatives were on the campus of the Aberdeen testing grounds. As test results came in, the manufacturers could immediately begin modifying their production design. This greatly reduced feedback cycle-time (Delores Etter, personal communication, January 28, 2010).

**Open to outside solutions.** Rather than set a rigorous list of requirements for the MRAP, the DoD set minimal performance standards and let manufacturers devise their best solution. In a similar spirit, the DoD opened up its narrow list of countries from which it is allowed to purchase armor-grade steel components. Another important point is that the DoD was open to the gamut of existing, proven technologies, but also willing to diversify

and take calculated risks on new designs. The fastest manufacturer of MRAPs turned out to be one with a new design, which was initially considered one of the riskiest (Hansen, 2009).

**Willingness to take reasonable risk.** The current acquisition system rewards risk-averse behavior. But much of the MRAP program's success is the result of being empowered to take on risk. Signing LRIP orders with manufacturers before initial testing was complete, speeded up the process but exposed the program to the risk of agreeing to buy vehicles it might never field. The program "cash-flowed" MRAPs, meaning that it purchased the vehicles immediately without logistics and other services (Hansen, 2009). It then fielded MRAPs with a minimal, immature support base. There was still greater risk in fielding so many different variants of the MRAP, both in terms of support and spare parts. These and other risks were apparent throughout MRAP procurement, but they were at the heart of the program's speed.

### **Recommendation**

- If appropriate, manufacturers should be allowed to monitor the testing of their prototypes to allow near-instant feedback to their home design and production units. This type of feedback was an innovation during the MRAP program—one that shaved weeks or months off of the total production time (Delores Etter, personal communication, January 28, 2010).

## VI. Conclusion

As the largest rapid military production effort since World War II, the MRAP program is an extremely positive example of the speed with which government and private industry can work together when interests are aligned in an atmosphere of urgency. The level of effort and flexibility of everyone involved—from the program office to the manufacturers to the SPAWAR—made the rapid fielding of MRAPs possible and absolutely saved lives. The program has also shown what is possible in scale and scope when enormous political will and (nearly unlimited) funding are brought to bear on the existing military procurement system.

Part of why the production effort is such a notable success is because it succeeded despite having to work within the existing acquisition system. In this regard, MRAP successes highlight deficiencies in the existing system. Tensions inherent within the system, such as those between funding for rapid acquisitions and (deliberate) programs of record that may have delayed the requirements process, are unlikely to abate. Furthermore, there is cultural resistance to changing the risk-averse, linear nature of the traditional acquisition process, even when it is tasked with responding quickly.

Despite its success and magnitude, the MRAP program is above all a clarion call for the creation of a separate rapid acquisition agency within the Department of Defense. Only within a separate system—with its own funding stream—can there truly be the tailored and risk-accepting approaches necessary for efficient rapid acquisitions. Future urgent needs not enjoying the same high-level political support cannot be assured of success within the current system. While our recommendation for project champions or task forces can mitigate some of these problems, only with a separate agency can the budget, cultural, and time horizon tensions between rapid and deliberate acquisitions be fully addressed.

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