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Testimony

Before the House Armed Services
Committee, Defense Acquisition Reform
Panel

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DEFENSE ACQUISITIONS

**Rapid Acquisition of MRAP
Vehicles**

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Highlights of [GAO-10-155T](#), a testimony before the House Armed Services Committee, Defense Acquisition Reform Panel

Why GAO Did This Study

As of July 2008, about 75 percent of casualties in combat operations in Iraq and Afghanistan were attributed to improvised explosive devices. To mitigate the threat from these weapons, the Department of Defense (DOD) initiated the Mine Resistant Ambush Protected (MRAP) program in February 2007, which used a tailored acquisition approach to rapidly acquire and field the vehicles. In May 2007, the Secretary of Defense affirmed MRAP as DOD's most important acquisition program. To date, about \$22.7 billion has been appropriated for the procurement of more than 16,000 MRAP vehicles.

My testimony today describes the MRAP acquisition process, the results to date, lessons learned from that acquisition, and potential implications for improving the standard acquisition process. It is mostly based on the work we have conducted over the past few years on the MRAP program. Most prominently, in 2008, we reported on the processes followed by DOD for the acquisition of MRAP vehicles and identified challenges remaining in the program. To describe DOD's approach for and progress in implementing its strategy for rapidly acquiring and fielding MRAP vehicles, we reviewed DOD's plans to buy, test, and field the vehicles and discussed the plans with cognizant department and contractor officials. To identify the remaining challenges for the program, we reviewed the results of testing and DOD's plans to upgrade and sustain the vehicles.

[View GAO-10-155T or key components.](#)
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DEFENSE ACQUISITIONS

Rapid Acquisition of MRAP Vehicles

What GAO Found

DOD use of a tailored acquisition approach to rapidly acquire and field MRAP vehicles was successful. The program relied only on proven technologies and commercially available products; established minimal operational requirements; and undertook a concurrent approach to producing, testing, and fielding the vehicles. To expand limited production capacity, indefinite delivery, indefinite quantity contracts were awarded to nine commercial sources, with DOD agreeing to buy at least 4 vehicles from each. Subsequent orders were based on a concurrent testing approach with progressively more advanced vehicle test results and other assessments. To expedite fielding of the vehicles, the government retained the responsibility for final integration in them of mission equipment packages including radios and other equipment. DOD also made MRAP its highest priority acquisition, which helped contractors and others more rapidly respond to the need and meet production requirements, in part by early investing of their own capital to purchase steel and other critical components in advance of orders.

Schedule and performance results for MRAP were very good overall. In July 2008, nearly all testing was completed; the Marine Corps had placed orders for 14,173 MRAPs; and, as of May 2008, 9,121 vehicles had been delivered. As of July 2009, 16,204 vehicles have been produced and 13,848 vehicles fielded in two theaters of operation. Total MRAP production funding was about \$22.7 billion, mostly through supplemental appropriations.

In terms of lessons learned, MRAP's success was driven by several factors, including quick action to declare its acquisition DOD's highest priority and giving it a DX rating, which allowed access to more critical materials than was otherwise available. The availability of supplemental appropriations was also essential. However, while neither of these factors are practically transferable to other programs, decisions to 1) use only proven technologies, 2) keep requirements to a minimum, 3) infuse significant competition into contracting, and 4) keep final integration responsibility with the government all led to positive outcomes and may be transferable. Challenges to MRAP remain in its reliability, mobility, and safety, which required some modifying of designs and postproduction fixes, and adapting how vehicles were used. Also, long term sustainment costs are not understood and the services are only now deciding how MRAP fits them in the longer term.

GAO's multiple best practices reports have underscored the need for the use of mature technologies, well understood requirements, systems engineering knowledge, and incremental delivery of capabilities to enable quicker deliveries. Finally, a broader lesson learned is that it is time to invest the time, money, and management skills in the science and technology community to enable the effectiveness we expect from the acquisition community.

Mr. Chairman and Members of the Panel:

I am pleased to be here today to discuss rapid acquisition programs within the Department of Defense (DOD), with a focus on our work on the Mine Resistant Ambush Protected (MRAP) vehicles as a case study example. As of July 2008, about 75 percent of casualties in combat operations in Iraq and Afghanistan were attributed to improvised explosive devices. To mitigate the threat from these weapons, the DOD initiated the MRAP program in February 2007, which used a tailored acquisition approach to rapidly acquire and field the vehicles. In May 2007, the Secretary of Defense affirmed MRAP as DOD's single most important acquisition program. To date, about \$22.7 billion has been appropriated for the procurement of more than 16,000 MRAP vehicles.

My statement today describes the MRAP acquisition process, the results to date, lessons learned from that acquisition, and potential implications for improving the standard acquisition process. It is mostly based on the work we have conducted over the past few years on the MRAP program. Most prominently, in 2008, we reviewed and reported on the processes followed by DOD for the acquisition of MRAP vehicles and identified challenges remaining in the program.¹ In that report, to describe DOD's approach for and progress in implementing its strategy for rapidly acquiring and fielding MRAP vehicles, we reviewed DOD's plans to buy, test, and field the vehicles and discussed the plans with cognizant department and contractor officials. To identify the remaining challenges for the program, we reviewed the results of testing and DOD's plans to upgrade and sustain the vehicles. We conducted that performance audit from June 2007 to July 2008 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

In February 2005, Marine Corps combatant commanders identified an urgent operational need for armored tactical vehicles to increase crew protection and mobility of Marines operating in hazardous fire areas

¹ Rapid Acquisition of Mine Resistant Ambush Protected Vehicles. ([GAO-08-884R](#); July 15, 2008).

against improvised explosive devices, rocket-propelled grenades, and small arms fire. In response, the Marine Corps identified the solution as the up-armored high-mobility multi-purpose wheeled vehicle. Over the next 18 months, however, combatant commanders continued to identify a requirement for more robust mine-protected vehicles. According to the acquisition plan, in November 2006, the Marine Corps awarded a sole source indefinite delivery, indefinite quantity (IDIQ) contract² and subsequently placed orders for the first 144 vehicles to respond to the urgent requirement while it conducted a competitive acquisition for the balance of the vehicles. In February 2007, the Assistant Secretary of the Navy for Research, Development, and Acquisition approved MRAPs entry into production as a rapid acquisition capability. In September of 2007, the Undersecretary of Defense for Acquisition, Technology, and Logistics designated MRAP as a major defense acquisition program³ with the Marine Corps Systems Command as the Joint Program Executive Officer. Quantities to be fielded quickly grew from the initial 1,169 vehicles for the Marine Corps identified in the 2005 urgent need statement to the current approved requirement of over 16,000 vehicles split among the Army, Marine Corps, Navy, Air Force, and Special Operations Command, plus others for ballistic testing.

Three versions of the MRAP vehicle were acquired for different missions:

- Category I, the smallest version of MRAP, is primarily intended for operations in the urban combat environment, and can carry up to 7 personnel.
- Category II is a multi-mission platform capable of supporting security, convoy escort, troop or cargo transport, medical, explosive ordnance disposal, or combat engineer operations, and carries up to 11 personnel.

² An IDIQ contract is a type of indefinite delivery contract that provides for an indefinite quantity of supplies or services within stated limits, during a fixed period. The government places orders for individual requirements. Federal Acquisition Regulation (FAR) 16.504.

³ Major defense acquisition programs are those estimated to require eventual total research, development, test and evaluation expenditures of more than \$365 million or procurement expenditures of more than \$2.19 billion in fiscal year 2000 constant dollars.

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- Category III, the largest of the MRAP family, is primarily intended for the role of mine and IED clearance operations, and carries up to 13 personnel.⁴

MRAP vehicles were purchased without mission equipment—such as communications and situational awareness subsystems—that must be added before the vehicles can be fielded to the user. The military services buy the subsystems for their vehicles and provide them as government furnished equipment to be installed at a government integration facility located at the Space and Naval Warfare Systems Command in Charleston, South Carolina.

Acquisition Strategy Was Tailored and Had Special Priority

DOD used a tailored acquisition approach to rapidly acquire and field MRAP vehicles. The program established minimal operational requirements, decided to rely on only proven technologies, and relied heavily on commercially available products. The program also undertook a concurrent approach to producing, testing, and fielding the most survivable vehicles as quickly as possible. To expand limited existing production capacity, the department expanded competition by awarding IDIQ contracts to nine commercial sources. To evaluate design, performance, producibility, and sustainability, DOD committed to buy at least 4 vehicles from each vendor. According to program officials, subsequent delivery orders were based on a phased testing approach with progressively more advanced vehicle test results and other assessments. To expedite the fielding of the vehicles, the government retained the responsibility for final integration of mission equipment packages including radios and other equipment into the vehicles after they were purchased. DOD also designated the MRAP program as DOD's highest priority acquisition, which helped contractors and other industry partners to more rapidly respond to the urgent need and meet production requirements. Finally, some of the contractors involved in the acquisition responded to the urgency communicated by the department by investing their own capital early to purchase needed steel and other critical components in advance of orders. The decision on the part of the contractors to purchase components in advance of orders was not required under their contracts and was done at their own risk.

⁴Only the Marine Corps acquired these vehicles. The Army is pursuing a separate acquisition program to replace its current fleet of vehicles that perform this mission.

DOD leadership took several steps to communicate the importance of producing survivable vehicles as quickly as possible, for example

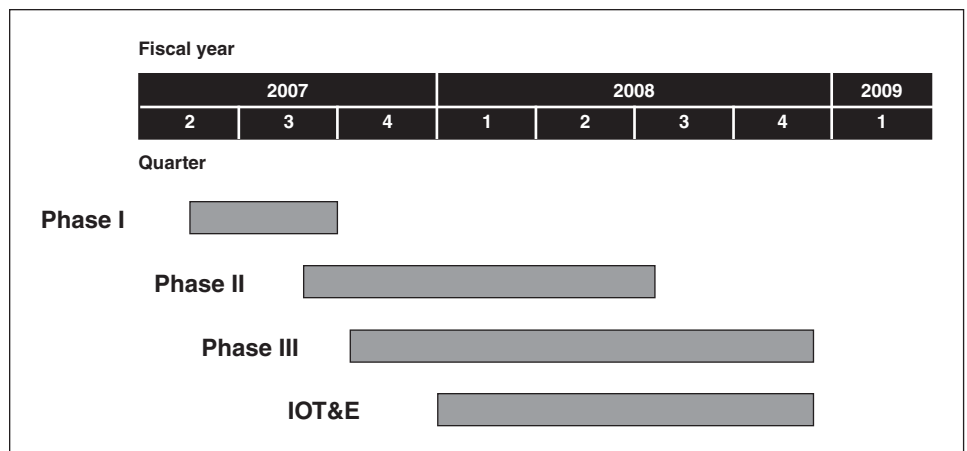
- In May 2007, the Secretary of Defense designated MRAP as DOD's single most important acquisition program and established the MRAP Task Force to integrate planning, analysis, and actions to accelerate MRAP acquisition.
- The Secretary also approved a special designation for MRAP—a DX rating—that requires related contracts to be accepted and performed on a priority basis over other contracts without this rating.
- The Secretary of the Army waived a restriction on armor plate steel, which expanded the countries from which DOD could procure steel.
- DOD allocated funds to increase steel and tire production capacity for MRAP vehicles as these materials were identified as potential limiting factors for the MRAP industrial base.

DOD recognized that no single vendor could provide all of the vehicles needed to meet requirements quickly enough and invited vendors to offer their non-developmental⁵ solutions. The request for proposal made clear that the government planned to award one or more IDIQ contracts to those vendors that were determined to be the best value to the government. The Marine Corps awarded IDIQ contracts to nine vendors and issued the first delivery orders in early 2007 for 4 vehicles from each vendor for initial limited ballistic and automotive testing. One vendor could not deliver test articles in the time required and the Marine Corps terminated that contract at no cost to the government. According to program officials, vehicles from another vendor did not meet minimum requirements and the Marine Corps terminated the contract for convenience.

⁵ A non-developmental item means any previously developed item of supply used exclusively for government purposes by a federal agency, a state or local government, or a foreign government with which the United States has a mutual defense cooperation agreement; any item described above that requires only minor modifications or modifications of a type customarily available in the commercial marketplace in order to meet the requirements of the procuring department or agency, or any item of supply being produced that does not meet the requirements described above solely because the item is not yet in use. FAR 2.101.

Conventional DOD acquisition policy dictates that weapons be fully tested before they are fielded to the user. However, the need to begin fielding survivable vehicles as quickly as possible resulted in a phased approach designed to quickly identify vehicles that met the requirement for crew protection so they could be rapidly fielded. This approach resulted in a high degree of overlap between testing and fielding of the MRAP vehicles; orders for thousands of vehicles were placed before operational testing began and orders for thousands more were placed before it was completed. Figure 1 shows the concurrent nature of the overall test plan.

Figure 1: MRAP Developmental and Operational Test Plan



Source: GAO based on DOD information.

The Director, Operational Test & Evaluation approved the MRAP Test and Evaluation Master Plan in 2007. Candidate vehicles underwent ballistic and automotive testing beginning in March 2007. The test plan included three phases of developmental tests (DT) of increasing scope as well as initial operational test and evaluation (IOT&E). Phase I included a limited evaluation by users. Phase II further evaluated vehicles at the desired level of performance against the ballistic threat, added more endurance miles to the automotive portion of the test, and included mission equipment such as radios and other electronic systems. Phase III raised the bar for ballistic performance to the emerging threat and assessed non-ballistic protection to include near-lightning strikes, high-altitude electromagnetic pulse, and nuclear, biological, and chemical decontamination tests. The automotive portion of the test increased endurance to 12,000 miles per vehicle.

Developmental and operational tests were conducted from March 2007 through June 2008. Each of the six MRAP variants have also undergone

IOT&E. All vehicles were rated operationally survivable and operationally effective with limitations by the Army Evaluation Center. These limitations were comprised of vehicle size, weight, mobility, and weapon dead space. All vehicles were also rated operationally suitable with limitations. These limitations were due to logistic shortfalls, payload restrictions, and restricted fields of view.

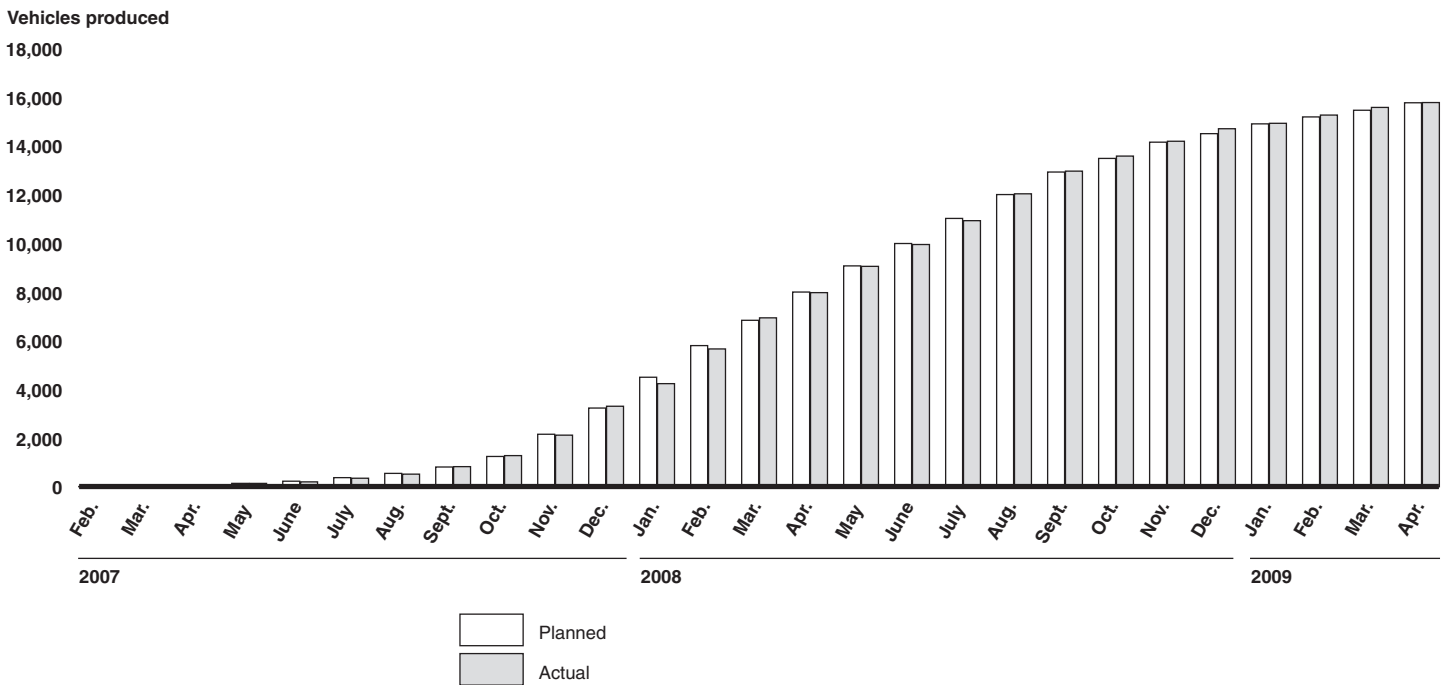
MRAP Schedule and Performance Results Have Been Very Good

Schedule and performance results for the MRAP have been very good overall. At the time of our review in July 2008, nearly all of the developmental and operational testing had been completed; the Marine Corps, the buying command for the MRAP, had placed orders for 14,173 MRAPs; and, as of May 2008, a little more than a year after the first contracts were awarded, 9,121 vehicles had been delivered. As of July 2009, 16,204 vehicles have been produced and 13,848 vehicles have been fielded in two theaters of operation. Total procurement funding for the MRAP vehicles, mostly through supplemental appropriations, was about \$22.7 billion. According to DOD officials, the MRAP is providing safe, sustainable, and survivable transport for troops in the theater. It recognizes that MRAPs have limitations, particularly in the area of off-road mobility and transportability. Nonetheless, MRAPs are considered outstanding vehicles for specific missions.

Twenty-one months elapsed from the time the need was first identified in February 2005 until the sole source IDIQ contract was awarded and subsequent orders were placed for the first 144 vehicles in November 2006. Three months elapsed between the award of the sole source contract and the delivery of vehicles under the orders placed pursuant to the contract in February 2007—about the same time the IDIQ contracts were awarded to multiple vendors for more vehicles. Testing of vehicles delivered under orders placed pursuant to the newly awarded contracts began one month later in March 2007. Initial operational capability was accomplished in October 2007 or about 33 months after the need was first identified.

Ultimately, MRAP vendors have successfully increased their production rates to meet the delivery requirement (see fig. 2). Production began in February 2007 with one vendor producing 10 vehicles. By March 2008—a little more than a year after the contracts were awarded—6,935 vehicles had been produced.

Figure 2: Actual Versus Planned Production (monthly)



Source: GAO analysis of Joint Program Office data.

According to DOD officials, the MRAP provides survivable, safe, and sustainable vehicles for troops in theater. It is recognized that MRAPs have limitations, particularly in the area of off-road mobility and transportability. Nevertheless, MRAPs met minimum requirements for specific missions. Based on an earlier survey of over 300 soldiers interviewed in the field, warfighters were satisfied with MRAP overall, which offers significant improvement in survivability. MRAP vehicles were seen as well suited for combat logistics patrols, route clearance missions, raids, quick reaction forces, and other missions requiring large, dismounted force. MRAP vehicles were seen as not well suited for mounted patrols in constrained urban areas or extensive operations in off-road operations.

Many Lessons Learned, Many Challenges Remain

As with any acquisition of this nature, there are lessons to be learned. On the positive side, it appears that quick action by the Secretary of Defense to declare the MRAP program DOD's highest priority and give it a DX rating allowed the government and the contractors access to more critical materials than otherwise would have been available. The availability of

funding mostly through supplemental appropriations was essential. In addition, the decisions to 1) use only proven technologies, 2) keep requirements to a minimum, 3) infuse significant competition into the contracting strategy, and 4) keep final integration responsibility with the government are all practices that led to positive outcomes. Challenges remain in the form of reliability, mobility, and safety, which have required some modifying of the designs, postproduction fixes, and adapting how vehicles were to be used. Also, long term sustainment costs for MRAP are not yet well understood and the services are only now deciding how MRAP will fit into their longer term organizations. This combination of actions executed to address the urgent need for accelerating the delivery of MRAP vehicles to theater was innovative and effective.

Major vendors and key subcontractors responded to the urgency communicated by the department. According to vendor officials from four of the companies, they collectively invested a substantial amount of their own capital in anticipation of MRAP work. For example, some vendors purchased steel and other critical components in advance of delivery orders for MRAP vehicles in order to meet projected time lines. In other cases, vendors purchased or developed new facilities for MRAP production. Multiple vendors also formed teaming arrangements to meet the increase in vehicle delivery demands. As stated above, these actions on the part of the contractors were not required under their contracts and were done at their own risk.

On the down side, because of unique designs, operating procedures, and maintenance for multiple vehicles from multiple vendors, vehicle maintenance and support has been somewhat complicated. To ease maintenance and support concerns in the near term, the MRAP program office established a centralized training entity where maintainers would be cross-trained on multiple vendors' vehicles. Longer term, a key challenge for DOD will be to effectively manage maintenance personnel and vehicle repair parts without sacrificing vehicle operational availability. Also, long term sustainment costs for MRAP are not yet projected and budgeted. The Services are only now deciding how to fit MRAP vehicles into their organizational structures. Another lesson, based on operational use of the MRAP vehicles, was their lack of maneuverability and off-road capability. As a result, DOD is in the process of acquiring an all terrain version of the MRAP to address the more difficult terrain and road conditions in Afghanistan. While most of the vehicles met ballistic requirements, other issues were identified (reliability, mobility and handling, and safety). These issues required some modifying of the designs, postproduction fixes, or adapting how vehicles were to be used. Testing of proposed

solutions to more advanced threats continues. The program office continues to enhance MRAP vehicle system performance through capability insertion initiatives executed via engineering change proposals. Such changes are verified through testing. This testing will be an ongoing process as additional upgrades are applied.

Broader Lessons and Implications from the MRAP Acquisition

What were the keys in DOD meeting the urgent requirement for fielding MRAP in a timely manner? First, DOD kept the requirements simple, clear, and flexible and did not dictate a single acceptable solution. Second, DOD made sure that only mature technologies and stable designs were used by setting a very short and inflexible schedule. DOD acting as integrator of government furnished equipment after initial delivery eliminated some risk and uncertainty. Third, MRAP was also given the highest possible acquisition priority and the participating contractors responded in positive ways to meet the needs. Fourth, full and timely funding for the acquisition was a definite plus. The question is, can this formula be applied to all of DOD's major acquisitions and the broader acquisition process? The first two keys—simple requirements and mature technologies—certainly can be and, in fact, recent changes to the department's acquisition policies and acquisition reform legislation passed by the Congress should enable these practices to be implemented easier than in the past. However, the MRAP program also owes its success to the third and fourth key practices as well—a DX rating as the highest priority acquisition in the department and nearly unlimited funding to meet the urgent need—that are not scalable to the broader acquisition process. Not every program can be a highest priority and acquisition funds are constrained.

While the MRAP acquisition benefited from all of the practices mentioned above, the biggest differentiator between that rapid acquisition and other more common acquisitions in DOD was that it established requirements that could be achieved with existing technologies. Recent studies by the Defense Science Board⁶, the Defense Acquisition Performance Assessment Panel (DAPA),⁷ and GAO all indicate that the department can and should acquire and deliver weapon systems that fulfill urgent warfighter needs to the field much more quickly. The DSB study recommends a dual

⁶ Report of the Defense Science Board Task Force on the Fulfillment of Urgent Operational Needs, July 2009.

⁷ A Report by the Assessment Panel of the Defense Acquisition Performance Assessment Project "Defense Acquisition Performance Assessment, January 2006.

acquisition path that allows for a “rapid” acquisition process for urgent needs and “deliberate” acquisition processes for others. It recommends a new agency, proposed as the Rapid Acquisition and Fielding Agency, that would be focused on speed, utilizing existing technologies, and acquisition flexibility to achieve the “75 percent solution” quickly. The DAPA Panel report, among other things, recommended that the acquisition process should never exceed 6 years from its beginning to initial operational capability of the acquired weapon system. It stated that mature technologies and achievable requirements are critical to the success of such time certain development efforts.

GAO has issued multiple reports under our “best practices” body of work that underscore the need for faster development cycles and the need for mature technologies, well understood requirements, systems engineering knowledge, and incremental delivery of capabilities to enable quicker deliveries. As early as 1999⁸, we concluded that successful product developments separated technology development from product development, invested time and money in ensuring that their technology base was vibrant and cutting edge, and eliminated technology risk from acquisitions. We noted that the DOD’s science and technology (S&T) organization would need to be organized and structured differently, provided more funding to take new technologies to higher levels of maturity, and would have to coordinate better with the department’s acquisition community to achieve the synergies necessary to reduce cycle times. We made recommendations along those lines. We believe that the “game changer” today in achieving rapid acquisition is the technology base. Finally, a broader lesson learned is that it may be time to invest the time, money, and management skills in the S&T community to enable the effectiveness we expect from the acquisition community.

Mr. Chairman, that concludes my prepared statement. I will be happy to answer any of your questions.

Contacts and Staff Acknowledgements

For future questions about this statement, please contact me on (202) 512-4841 or sullivanm@gao.gov. Individuals making key contributions to this

⁸ Best Practices: Better Management of Technology Development Can Improve Weapon System Outcomes ([GAO/NSIAD-99-162](#), July 30, 1999).

statement include William R. Graveline, Paul Williams, Dayna Foster,
Danny Owens,

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