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UNMANNED AERIAL VEHICLES

Improved Strategic and Acquisition Planning Can Help Address Emerging Challenges

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Highlights

Highlights of GAO-05-395T, a testimony before the Subcommittee on Tactical Air and Land Forces, Committee on Armed Services, House of Representatives

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Improved Strategic and Acquisition Planning Can Help Address Emerging Challenges

Why GAO Did This Study

The current generation of unmanned aerial vehicles (UAV) has been under development for defense applications since the 1980s, and as the Department of Defense (DOD) transforms its military operations, UAVs are becoming increasingly vital. Today's testimony identifies (1) GAO's preliminary observations on operational successes and emerging challenges from ongoing GAO work reviewing UAV current operations, (2) the extent to which DOD has developed a strategic plan and oversight body to manage its investment in UAVs, and (3) lessons from GAO's prior work that can be used to promote the efficient development, fielding, and operational use of UAVs.

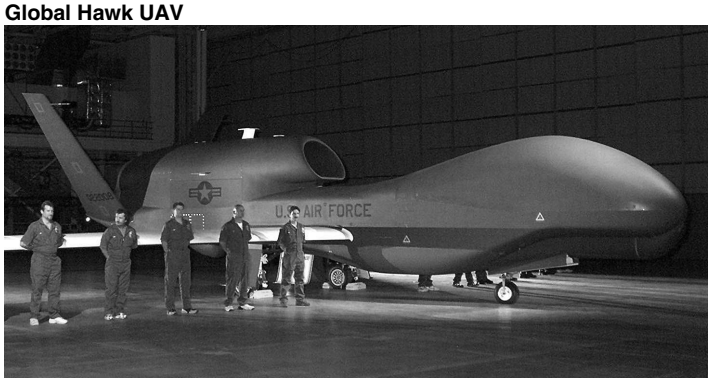
What GAO Found

Current UAV operations have achieved mission successes, but some challenges are emerging. Among the successes, the Predator UAV has performed traditional intelligence, surveillance, and reconnaissance missions and less traditional close air support and armed strike missions. In addition, certain small UAVs have enabled troops to accomplish their missions at greater distances from enemy positions. Nonetheless, UAV operations have been hampered by certain emerging challenges. For example, some UAVs are not fully interoperable with others, with manned aircraft systems, or even with conventional forces. Certain UAVs are unable to operate in sandstorms or other poor weather conditions, thus forfeiting some of the advantages otherwise available from the sensor payloads. And UAVs increasingly compete for limited bandwidth.

DOD still lacks a viable strategic plan and oversight body to guide UAV development efforts and related investment decisions. DOD has set up a Joint UAV Planning Task Force to guide UAV development and fielding, but the task force has only limited authority and cannot enforce program direction. DOD's UAV *Roadmap* contains some elements of a strategic plan, but it does not describe the interrelationship of service roadmaps to the DOD *Roadmap* or clearly identify funding priorities. Thus, DOD may not be well positioned to make sound program decisions or establish funding priorities, nor will Congress have all the information it needs to evaluate funding requests. Such a plan would also help DOD minimize the types of challenges that are emerging.

DOD has not consistently implemented best practices in developing and fielding UAVs. GAO has found that programs have succeeded when DOD has used innovative development processes, relied on evolutionary technology development, ensured high-level management attention, and constrained resources and relied on achievable technologies. Development has been hampered when DOD has insisted on requirements that outstripped technology, rushed into production before completing testing, used overly ambitious schedules, or engaged in concurrent testing and production.

Global Hawk UAV



Source: U.S. Air Force.

www.gao.gov/cgi-bin/getrpt?GAO-05-395T.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Sharon Pickup at (202) 512-9619 or pickups@gao.gov, or Michael J. Sullivan at (937) 258-7915 or sullivanm@gao.gov.

Mr. Chairman and Members of the Subcommittee:

Thank you for this opportunity to discuss our work on the Department of Defense's (DOD) unmanned aerial vehicles (UAV). As you know, we appeared before you last year to discuss management issues that we identified in our work on research, development, and fielding of the latest generation of UAVs. At that time, we emphasized the need for DOD to develop a strategic plan to guide UAV development and fielding and an oversight body to implement such a plan. We also pointed out some of the factors that led to success in UAV acquisition programs and those that hampered acquisition efforts, emphasizing that strong leadership is needed to ensure that the most cost-effective solutions are adopted.

As you know, the current generation of UAVs has been under development for defense applications since the 1980s, and as DOD transforms the way in which it conducts military operations, UAVs are becoming increasingly vital. Since we appeared before you last year, we have seen continued growth in the funding for UAVs and an acceleration of the trend of employing UAVs in military operations in Iraq and Afghanistan. Furthermore, the types and quantities of UAV systems currently in operation, under development, or planned for future development are steadily growing.

Today, you asked us to discuss our preliminary observations on the work we are currently conducting for this Subcommittee on the performance of UAVs in current operations, and DOD's progress in improving strategic and acquisition planning. Specifically, we will highlight (1) operational successes and emerging challenges that U.S. forces are experiencing with UAVs in the field, (2) lack of progress in establishing a viable strategic plan and oversight body to guide joint and service-specific UAV development efforts and related investment decisions, and (3) lessons learned from our prior reviews that can be instructive for the efficient development and fielding of UAVs.

The information we will discuss on emerging challenges is based on our preliminary work for the Subcommittee. We will be continuing our work after this hearing, including meeting with officials from U.S. Central Command and previously deployed units to discuss their actual operational experiences with UAVs and lessons learned. We plan to issue a report based on this work to you later this year.

To address our objectives, we conducted preliminary interviews with or reviewed documents from the Joint UAV Planning Task Force, Joint Forces Command, the U.S. Air Force, U.S. Navy, and U.S. Marine Corps, and other organizations; updated our previously issued report on UAV force structure planning, development, and fielding; and updated our prior body of work on UAV development and acquisition.

We conducted our work from July 2004 to February 2005 in accordance with generally accepted government auditing standards.

Summary

Current UAV operations have achieved certain mission successes but challenges are emerging. UAVs have been used to support tactical, intelligence, surveillance, and reconnaissance missions, as well as strike missions, in Iraq and Afghanistan. For example, Global Hawk was used to identify 55 percent of the time-sensitive targets[1] to defeat enemy air defenses in the Iraqi theater in March and April 2003. In addition, the Predator UAV has been used in Iraq and Afghanistan to conduct intelligence, surveillance, and reconnaissance, as well as highly successful lethal strike missions using Hellfire missiles. According to the Commander of U.S. Central Command, demand for UAVs is insatiable.[2] Nonetheless, based on our preliminary discussions with DOD and the services, it is becoming apparent that DOD faces some emerging challenges affecting its ability to maximize the use of UAVs to enhance operations and effectively promote force transformation. Specifically, interoperability remains a challenge. For example, some UAVs are not fully interoperable with one another and, in some instances, ground forces have not been linked to or able to use data generated by other services' UAVs. Also, the ability of UAVs to operate in poor weather conditions is limited and the availability of bandwidth[3] needed to support UAV operations is constrained.

While DOD continues to request funds for UAVs and the services continue to plan, develop, and field UAV systems, it still has not developed a

[1] Time-sensitive targets are targets that are expected to be vulnerable to attack for only a short time.

[2] Testimony of General John P. Abizaid, Commander, United States Central Command, before the Senate Committee on Armed Services, March 1, 2005.

[3] Bandwith refers to the available frequencies to support the flight of UAVs, to transmit the output of on-board sensors, and to interface with air traffic control centers.

strategic plan to guide investment decisions or established an office with sufficient authority to implement such a plan. Last year, we reported that DOD had established a Joint UAV Planning Task Force (Task Force) within the Office of the Undersecretary of Defense (Acquisition, Technology, and Logistics), and that the Task Force had issued the *UAV Roadmap 2002–2027* in December 2002 covering UAV development from 2002 through 2027.[4] However, we noted that DOD did not have a viable strategic plan to guide the development and fielding of UAVs. Although the *Roadmap* included some elements of a strategic plan, including long-term goals, approaches to attaining long-term goals, performance goals, and some performance indicators, it omitted some critical elements. For example, the *Roadmap* did not include a mission statement, description of how program evaluations were used to establish or revise goals, discussion of the interrelationship between service plans and programs to develop and field UAVs, or provide adequate information on current and projected funding needs. Moreover, even if a strategic plan existed, we reported that neither the Task Force nor any other office has sufficient authority to implement such a plan. We recommended that DOD establish a strategic plan and designate the Task Force or another body to oversee implementation of the plan. Since that time, we understand that the Task Force is updating the *UAV Roadmap* and continues to act as the focal point to coordinate with the services on UAV development. We are hopeful that the new *Roadmap* will include all of the elements of a strategic plan. Without a strategic plan to guide investment decisions, we continue to believe that DOD will not be in the best position to validate requirements, make sound programmatic decisions, or establish funding priorities. We also believe that the Congress will not have all the information it needs to evaluate DOD's funding requests. Furthermore, such a plan could help DOD anticipate and take steps to minimize the types of challenges that are occurring today.

Our past work in UAV development and acquisition has identified important lessons that can be applied to the development and fielding of UAV systems to overcome some of the emerging challenges that we have identified. Our reviews have found that success was achieved when DOD has used innovative development processes, relied on evolutionary approaches to technology development, ensured high-level management attention, and constrained resources and relied on achievable technologies.

[4] GAO, *Force Structure: Improved Strategic Planning Can Enhance DOD's Unmanned Aerial Vehicles Efforts*, GAO-04-342 (Washington, D.C.: Mar. 17, 2004).

On the other hand, development was hampered when DOD insisted on requirements that outstripped technological capability, rushed into production before testing was completed, implemented overly ambitious schedules, or engaged in concurrent testing and production.

Background

DOD defines a UAV as a powered aerial vehicle that does not carry a human operator; can be land-, air-, or ship-launched; uses aerodynamic forces to provide lift; can be autonomously or remotely piloted;[5] can be expendable or recoverable; and can carry a lethal or nonlethal payload. Generally, UAVs consist of the aerial vehicle; a flight control station; information and retrieval or processing stations; and, sometimes, wheeled land vehicles that carry launch and recovery platforms. In addition, UAV systems require adequate intra- or inter-theater communications capabilities to permit operators to maintain control of some vehicles, and to permit the UAVs' communications equipment to transmit the information obtained by the onboard sensors to ground commanders or other users.

UAVs provide battlefield commanders with real-time intelligence through their intelligence, surveillance, and reconnaissance mission. The United States is also considering using UAVs to assist with border security for homeland security or homeland defense. Important advantages of UAVs include their ability to operate for a far longer period than a pilot could safely operate an aircraft, and the fact that DOD avoids putting servicemembers' lives at risk during operations.

Initially, UAVs were seen as complementary systems that augmented the capabilities the warfighter already had. However, UAVs are evolving into more significant roles, for which they can provide primary capability. For example, the Global Hawk UAV may eventually replace the U-2 reconnaissance aircraft, and the Unmanned Combat Aerial System may eventually perform electronic warfare missions performed by the EA-6 Prowler aircraft today. Moreover, UAVs are figuring prominently in plans to transform the military into a more strategically responsive force. UAVs are expected to be an integral part of this information-based force. For example, they may serve as relay nodes in the Army's Future Combat System's command and control network.

[5] An autonomously piloted UAV is one that is pre-programmed for its mission before it takes off. It then flies its mission without a ground-based pilot. A remotely piloted UAV is controlled by a pilot in a control station on the ground during the flight.

Since we testified before the Subcommittee last year, DOD has increased its planned expenditure for UAVs and associated systems, and the systems have continued to be heavily used in Afghanistan and Iraq. In fact, about 12 different types of UAV systems have been used in Iraq and Afghanistan. In addition, the budget request for UAVs grew significantly between fiscal year 2001 and fiscal year 2005, from about $363 million to about $2.3 billion, respectively. DOD projects that funding needs will grow to about $2.9 billion in fiscal year 2009. These figures do not include supplemental appropriations. DOD has requested about another $234 million for UAVs in the fiscal year 2005 supplemental request.

DOD Has Achieved Certain Operational Successes, but Some Challenges Are Emerging

As we have seen in recent operations, UAVs are being used in greater numbers and on increasingly challenging missions, and they are likely to be called on to operate more extensively with other UAVs, manned systems, and conventional ground and air forces. As our preliminary discussions with DOD officials and our review of various documents suggests, DOD has performed successful missions using a variety of UAVs, including the Predator, Global Hawk, Pointer, and Raven. However, some challenges are emerging, such as issues concerning interoperability, the ability to operate in poor weather conditions, and communications and bandwidth limitations.

Recent UAV Successes in Combat Operations

The Air Force has used Predator in a variety of intelligence, surveillance, and reconnaissance roles in Iraq and Afghanistan. The Predator is also being used for other missions, including close air support and armed strike. For example, a Predator UAV armed with Hellfire missiles was used to attack a target carrying suspected terrorists in Yemen in 2002. The Air Force believes that using Predator has enabled it to achieve time-critical targeting that might otherwise have been impossible.

In addition, Global Hawk has also significantly improved DOD's ability to gather intelligence, surveillance, and reconnaissance in Iraq and Afghanistan. Global Hawk captures detailed images of targets and wide swaths of terrain and then transmits those images on a nearly real-time basis to battlefield commanders and intelligence centers. In fact, while flying just 3 percent of the intelligence, surveillance, and reconnaissance missions in Operation Iraqi Freedom, Global Hawk generated 55 percent of the time-critical targets against enemy air defenses.

Lastly, small UAVs such as the Pointer and Raven have been instrumental in enabling troops to find, locate, and destroy numerous targets. For example, during a single mission, a team used a small UAV system to locate a target, cover the team's movements, target the adversary, and then conduct a bomb damage assessment to determine whether additional strike missions were needed. Moreover, the use of small UAVs has enabled ground forces to accomplish their missions at greater distances from enemy positions, in effect expanding the standoff distance and thereby reducing the risk to U.S. servicemembers on the ground.

Certain Challenges Are Emerging

Notwithstanding these operational successes, it is becoming apparent from our preliminary discussions with DOD officials and our review of various documents that DOD faces some emerging challenges affecting its ability to maximize the use of UAVs to enhance operations and effectively promote force transformation. Such challenges relate to interoperability, the ability of UAVs to operate in poor weather, and the availability of communications and bandwidth.

First, while numerous UAVs have been used to conduct various missions in recent operations, interoperability is a challenge. The services have generally been reluctant to adopt common mission management systems or other interoperability approaches within similar types or classes of UAVs. As a result, it appears that some UAVs may not be fully interoperable with other UAVs, with manned aircraft systems, or even with conventional forces. For example, in certain instances ground forces have not been linked to or able to utilize data generated by other services' UAVs. Each service has tended to initiate its own separate development program, specifically tailored to its own requirements, rather than adopting an existing capability from another service. DOD is aware of this problem and has taken some steps to address it. For example, DOD is evaluating several areas, including vehicle development, training, and data sharing, to determine if improvements in these areas will increase UAV interoperability. However, we have not evaluated the effectiveness of DOD's efforts at this time.

Second, weather and environmental constraints are a key limiting factor for UAV operations. UAVs are generally not able to operate in certain inclement weather conditions, including sandstorms and icing conditions. For example, dust storms have kept Marine Corps UAVs from performing some of their missions. At the same time, certain UAV sensors are capable of "seeing" through clouds, sandstorms, and other inclement weather

conditions by day or night. Nonetheless, this capability may not be available because the vehicles themselves are not always able to carry the onboard sensors during these poor weather conditions, consequently undermining the capability made available by UAV operations.

Third, communications represent a major challenge for UAVs. There is widespread concern that UAVs are consuming increasingly large amounts of communication bandwidth as DOD fields additional UAVs requiring communications capability. Bandwidth is needed to support systems that control the flight of UAVs, to transmit the data collected by payload sensors, and to interface with air traffic control centers. As UAVs and other weapons systems requiring bandwidth are increasingly employed, limits on bandwidth availability will hamper DOD's ability to obtain the benefits from these new weapons systems if bandwidth availability is not expanded. DOD is aware of this challenge and is exploring possible solutions.

A Strategic Plan and Effective DOD Oversight Can Be Helpful in Addressing the Challenges

DOD has set up a Joint UAV Planning Task Force to guide UAV development and fielding. The Task Force is the primary focal point, but has limited authority to enforce program direction. The Task Force has issued its *UAV Roadmap 2002--2027* to communicate its vision and promote interoperability. Although the *Roadmap* includes some elements of a strategic plan, DOD still lacks a comprehensive plan, as well as an office with sufficient authority to implement it. Without a strategic plan to guide investment decisions, DOD will not be in a position to validate requirements, make sound programmatic decisions, or establish funding priorities nor will the Congress have all the information it needs to evaluate DOD's funding requests. Furthermore, such a plan would help DOD anticipate and potentially minimize the types of challenges that are emerging today.

Joint UAV Planning Task Force Established

In October 2001, the Under Secretary of Defense (Acquisition, Technology, and Logistics) created the Joint UAV Planning Task Force as the joint advocate for developing and fielding UAVs. The Task Force is the focal point to coordinate UAV efforts throughout DOD, helping to create a common vision for future UAV-related activities and establish interoperability standards. However, while the Task Force's authority focuses on program review and advice, it is insufficient to enforce program direction. The Task Force Director testified in March 2003 that the Task Force does not have program directive authority, but instead provides the

Under Secretary of Defense (Acquisition, Technology, and Logistics) with advice and recommendations[6]—that is, the Task Force tries to influence service programs by proposing changes for consideration by the Under Secretary. Last year, the Director of Defense Systems, in the Office of the Undersecretary, testified that the Task Force tries to guide service acquisition, planning, prioritization, and execution of unmanned air systems.[7] Nonetheless, the Task Force cannot compel the services to adopt its suggestions and does not have approval authority. For example, according to DOD officials, additional progress is needed to achieve better interoperability among the services in UAV platform and sensor coordination.

The *Roadmap* Has Some Elements of a Strategic Plan

The *UAV Roadmap* exhibits some elements of a strategic plan, but is not a comprehensive plan to guide the development and fielding of UAVs that complement each other, perform the range of missions needed, and avoid duplication. Key elements of a strategic plan would include:

- a mission statement;
- an explanation of long-term goals and objectives;
- strategies to attain long-term goals;
- an explanation of the relationship between long-term goals and objectives and annual performance goals;
- identification of external factors that could affect accomplishment of the goals;
- a description of how program evaluations were used to establish or revise the goals;
- a description of the relationship between similar programs; and

[6] Statement of the Director, Joint UAV Planning Task Force, before the Subcommittee on Tactical Air and Land Forces, House Committee on Armed Services, March 26, 2003.

[7] Statement of the Director, Defense Systems, Office of the Undersecretary of Defense (Acquisition, Technology, and Logistics), Subcommittee on Tactical Air and Land Forces, House Committee on Armed Services, March 17, 2004.

- information concerning funding needs and expenditures.

The *Roadmap* represents a good start on a strategic plan because it incorporates some of the key elements. For example, the *Roadmap* identifies approaches to attaining long- term goals, and it assesses, in part, annual performance goals and performance indicators that identify progress toward these goals. However, the *Roadmap* only minimally addresses the other key elements. In particular, it does not explain the interrelationship between service-specific efforts, identify opportunities for joint endeavors, or address funding issues.

DOD officials acknowledged that the Office of the Secretary of Defense has not issued any guidance that establishes an overall strategy for UAVs. While several high-level DOD strategic-planning documents—including the National Military Strategy and the Strategic Planning Guidance—provide some general encouragement to pursue transformational technologies, these documents do not provide specific guidance on UAV development or related force structure integration. In 2004, we recommended that DOD develop a strategic plan or set of plans. We understand that DOD plans to issue an updated *Roadmap* later this year. We hope that the new *Roadmap* will include all of the elements of a strategic plan. As we testified last year, it is important that DOD's plan clearly identify goals, requirements, programs, funding needs, performance measures, and the interrelationship of service-specific programs to each other; how service-specific UAV programs promote joint operations; and funding requirements. With such a plan, we continue to believe that DOD will be better positioned to validate requirements, integrate service efforts, and establish program and funding priorities. We also believe that such a plan will assist the Congress in evaluating DOD's funding requests for UAVs.

Our Prior Work Identifies Important Lessons for the Efficient Development, Fielding, and Operational Use of UAVs

Within the past year, we have reviewed four UAV programs and observed factors that lead to successful outcomes and others that tend to increase risk of poor outcomes. The UAV programs included in our reviews were the Global Hawk, Predator, Shadow, and Joint Unmanned Combat Air Systems. Table 1 displays the common factors that we identified that lead to successful acquisition programs and those that increase risk and limit success.

Table 1: Factors That Lead to or Limit Success

Lead to success	Limit success
Innovative process	Requirements that outstrip resources, including technology
Evolutionary approach	Rush to production
Management attention	Ambitious schedules
Simple requirements and fixed resources	Concurrent testing and production

Source: GAO.

Global Hawk

Top management attention set the stage for the early success of Global Hawk. The Under Secretary of Defense (Acquisition, Technology, and Logistics) became personally involved in establishing the original plan for development. Leadership insisted on fielding an initial capability that could be developed within a fixed budget while providing for an evolutionary process to add enhancements to succeeding versions. The result was a successful advanced concept technology demonstration which produced seven demonstrators, logged several thousand-flight hours, passed its military usefulness assessment, and effectively supported combat operations in Afghanistan and Iraq.

In March 2001, the Air Force began a systems acquisition program that continued the evolutionary approach with a plan to first acquire basic systems very similar to the demonstrators (designated the RQ-4A) and then slowly and incrementally develop and acquire systems with more advanced sensor capabilities while using the same air vehicle. However, DOD restructured the program twice in 2002 to more quickly develop and field a larger air vehicle (RQ-4B) with more advanced but immature technologies. The restructurings tripled development costs and compressed the procurement schedule. Program funding, which previously had been stretched relatively evenly across 20 years, was compressed into roughly half the time, tripling Global Hawk's budgetary requirements in some years. The development period was expanded by 5 years and production period compressed by 9 years, creating significant concurrency between fiscal years 2004 to 2010. By adding the new larger air vehicle with its associated new technologies and design elements, while speeding up the acquisition schedule, the Air Force accepted higher risks compared to the original plan which followed a more evolutionary approach.

Because of this concurrency, the Air Force plans to invest in almost half of the total fleet of the new larger Global Hawks before a production model is flight-tested and operational evaluations are completed to show that the air vehicle design works as required. Likewise, full-rate production will begin before the airborne signals intelligence and multiplatform radar (the two required capabilities justifying the new, larger model) complete development and are flight-tested to prove the integrated system will work as intended. The primary reason for building the RQ-4B model was to integrate and carry the advanced sensors to provide added capability to the warfighter. In our November 2004 report, we raised concerns about the substantial concurrency and accelerated pace for acquiring the new system. We recommended rethinking the revised plans and limiting initial procurement of the new model until a new business case is completed that reduces risk and justifies further investments based on a knowledge-based acquisition strategy. The Air Force did not agree with us, but we note that since our report was issued, DOD officials have criticized the Global Hawk program for cost increases and have decreased buys in fiscal years 2006 and 2007.

Shadow

The Army's Tactical Unmanned Aerial Vehicle program, called Shadow, had unusual interventions by top-level individuals that early on established resource constraints, encouraged evolutionary acquisition strategies, and set an early fielding date. Agreements were reached to ensure that the program followed a "no bells and whistles" approach to development that focused on key achievable technologies and limited the program to "must have" capabilities and restrained costs. Despite cost increases and operational shortfalls caused largely because the program did not allow time to develop and test the system before production began, the Army was still able to quickly deliver a needed capability to the warfighter that has been used during recent combat operations.

Predator

The Air Force's Predator A (MQ-1) also had success by following an innovative advanced concept technology demonstration approach. Development was focused and brisk and within 18-months of start-up prototypes were deployed in Bosnia, demonstrating its worth before completing development and starting production. Predator As are being used with substantial success in Operations Enduring and Iraqi Freedom.

However, the Air Force then started a highly-concurrent development and production program in 2002 to quickly acquire substantial numbers of a

new, larger, and multirole variant, the Predator B (MQ-9). Subsequently, Air Force headquarters revised the strategy to include fielding an interim combat capability by fiscal year 2006 and developing Predator B in three separate increments, thereby extending the completion of development by 4 years. Recognizing increased risks, the program office lowered annual buy quantities and extended production 5 years.

Joint Unmanned Combat Air Systems

This joint effort combined previously separate efforts of the Air Force and Navy to develop advanced unmanned systems that can attack ground targets. The Air Force had plans to abandon its initial low-risk approach to development that increased its requirements and accelerated its program schedule shortly before shifting to product development. Concerned about the accelerated schedule and a lack of synergy in the separate Air Force and Navy efforts, Office of the Secretary of Defense officials intervened to reconcile requirements and funding challenges and to improve oversight. The Defense Advanced Research Projects Agency was designated to lead the joint demonstration program with Air Force and Navy participation. Plans and strategy established a $4 billion demonstration program that would develop larger versions of the Air Force and Navy prototypes, leading to an operational assessment in 2007. A common operating system was to be developed and both versions were expected to also share common subsystems and weapons. The intent was to then offer alternatives to the services leading to possible start-up of systems development in 2010.

Although not clear at this time, program direction and content appears to be again changing. Congress reduced fiscal year 2005 funding, stating that the program had not properly coordinated with the services and that the focus should be on meeting Air Force and Navy requirements. Recently, DOD decided to transfer leadership and funding from the Defense Advanced Research Project Agency to the Air Force as joint office lead with Navy participation. Transitioning will occur this year with Air Force taking over in 2006.

There are trends that run consistently through these four programs. That is, when DOD provides strong leadership at an appropriate organizational level, it enables innovative, evolutionary, and disciplined processes to work. Once leadership is removed or diminished, all these programs have tended to lose control of requirements and add technical and funding risk. We have also found that after successful demonstrations to quickly field systems with existing technologies, problems were encountered after the

programs transitioned into the system development phase of the acquisition process. The services pushed programs into production without maturing processes and also began to add new requirements that stretched beyond technology and design resources. DOD officials tend to agree with the factors that lead to success and those that lead to problems and have made some limited progress in the last year, but we have not yet seen a consistent and across the board application of these successful practices.

Concluding Remarks

We believe that a greater emphasis on strategic planning and application of the lessons learned for development and fielding of UAVs could be helpful in addressing the emerging challenges that we are identifying on our current work for the Subcommittee. We will more fully examine these emerging challenges and monitor DOD's efforts to address the challenges, and we will report to you on this work later this year.

Mr. Chairman, this concludes our prepared statement. We would be happy to answer any questions that you or members of the Subcommittee may have.

Contacts and Staff Acknowledgments

For future questions about this statement, please contact Sharon Pickup at (202) 512-9619, Michael J. Sullivan at (937) 258-7915, or Brian J. Lepore at (202) 512-4523. Other individuals making key contributions to this statement include Harry E. Taylor, Jr., Patricia F. Albritton, Jeanett H. Reid, Elisha T. Matvay, Robert B. Brown, Cheryl A. Weissman, Ron La Due Lake, Kenneth E. Patton, Lily J. Chin, Bruce D. Fairbairn, Steven M. Hunter, Matthew B. Lea, Charlie Shivers, and Adam Vodraska.

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