GAO

Testimony

Before the Subcommittee on National Security and Foreign Affairs, Committee on Oversight and Government Reform, House of Representatives

DEFENSE ACQUISITIONS

DOD Could Achieve Greater Commonality and Efficiencies among Its Unmanned Aircraft Systems

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GAO

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Why GAO Did This Study

For the last several years, the Department of Defense (DOD) has planned to invest billions of dollars in development and procurement of unmanned aircraft systems. In its fiscal year 2011 budget request the department indicated a significant increase in these investments, expecting to need more than $24 billion from 2010 through 2015. DOD recognizes that to leverage its resources more effectively, it must achieve greater commonality among the military services' unmanned aircraft system acquisition programs.

This testimony is based primarily on GAO's July 2009 report (GAO-09-520) which examined 10 unmanned aircraft acquisition programs: eight unmanned aircraft systems—Global Hawk, Reaper, Shadow, Predator, Sky Warrior, Fire Scout, Broad Area Maritime Surveillance, and Unmanned Combat Aircraft System-Demonstration; and two payload development programs—Multi-Platform Radar Technology Insertion Program, and Airborne Signals Intelligence Payload. The testimony focuses on: 1) the cost, schedule, and performance progress of the 10 programs as of July 2009; 2) the extent to which the military services collaborated and identified commonality among the programs; 3) factors influencing the effectiveness of the collaboration; and, 4) recent DOD investment decisions related to these acquisitions.

What GAO Found

Most of the 10 programs reviewed had experienced cost increases, schedule delays, performance shortfalls, or some combination of these problems. The programs' development cost estimates increased by more than $3 billion collectively, or 37 percent, from initial estimates. Procurement funding requirements for most programs also increased, primarily because of increases in numbers of aircraft being procured, changes in system requirements, and upgrades and retrofits to fielded systems. Procurement unit costs increased by an average of 12 percent, with three aircraft programs experiencing unit cost increases of 25 percent or more. Four programs reported delays of 1 year or more in delivering capability to the warfighter. Global Hawk, Predator, Reaper, and Shadow had been used in combat operations with success and lessons learned, but had been rushed into service in some cases, leading to performance issues and delays in development and operational testing and verification.

Programs collaborated and identified areas of commonality to varying degrees. The Marine Corps was able to avoid the cost of initial system development and quickly deliver useful capability to the warfighter by choosing to procure existing Army Shadow systems. The Navy expected to save time and money on Broad Area Maritime Surveillance (BAMS) by using Air Force's Global Hawk airframe, and payloads and subsystems from other programs. However, Army and Air Force had not collaborated on their Sky Warrior and Predator programs, and might have achieved greater savings if they had, given that Sky Warrior is a variant of Predator and being developed by the same contractor. DOD encouraged more commonality between these programs.

Although several programs achieved airframe commonality, service-driven acquisition processes and ineffective collaboration were key factors that inhibited commonality among subsystems, payloads, and ground control stations, raising concerns about potential inefficiencies and duplication. Despite DOD's efforts to emphasize a joint approach to identifying needs and commonality among systems, most of the programs assessed continued to pursue service-unique requirements. The services also made independent resource allocation decisions to support their unique requirements. DOD had not quantified the costs and benefits associated with pursuing commonality among these programs, and efforts to collaborate had produced mixed results. However, in order to maximize acquisition resources and meet increased demand, Congress and DOD have continued to push for more commonality.

Since July 2009, DOD has made several investment decisions regarding unmanned aircraft systems, which in general, reflect increased emphasis on developing advanced capabilities and acquiring larger numbers of specific systems. However, the decisions do not appear to focus on increasing collaboration or commonality among the programs.

Mr. Chairman and Members of the Subcommittee:

Thank you for this opportunity to discuss GAO's recently issued report on the Department of Defense's (DOD) unmanned aircraft systems (UAS) acquisition efforts.[1] From 2002 through 2008, the number of unmanned aircraft in the DOD's inventory increased from 167 to more than 6,000 as a result of the department's efforts to meet the growing demand from the warfighters for these capabilities. DOD has noted that meeting this demand has been difficult because of the dynamic nature of supporting ongoing combat operations in Iraq and Afghanistan, while at the same time developing new and emerging capabilities. At the time of our report in July 2009, the department was planning to invest more than $16 billion from 2008 through 2013 to develop and procure additional unmanned aircraft systems. More recently, the fiscal year 2011 defense budget request indicates a significant increase in DOD's unmanned aircraft investment plans. However, the growing number of national priorities competing for federal dollars will continue to challenge DOD's efforts to meet escalating demands for unmanned systems.

DOD recognizes that to more effectively leverage its acquisition resources, it must achieve greater commonality and efficiency among the military services' various unmanned system acquisition programs. In fact, DOD states in its Unmanned Systems Roadmap, that there is the potential for an unprecedented level of collaboration to meet capability needs and reduce acquisition costs by requiring greater commonality among the military services' unmanned systems. Although achieving commonality can be difficult, we have reported in the past that taking an open systems[2] approach and designing systems with common subsystems and components can reduce both production and life cycle costs as well as improve interoperability among systems. For maximum benefit, commonality should be incorporated into the design of a system when requirements are being established. Unmanned aircraft systems can potentially achieve commonality in design and development, ranging from a complete system, including the ground control segment, to a subsystem

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[1]GAO, *Defense Acquisitions: Opportunities Exist to Achieve Greater Commonality and Efficiencies among Unmanned Aircraft Systems*, GAO-09-520 (Washington, D.C.: July 30, 2009).

[2]Open systems allow the use of commercially available and widely accepted standard products from multiple vendors, rather than developing unique components.

or component, as well as commonality in production facilities, tooling, and personnel.

My statement today focuses on (1) the cost, schedule, and performance progress of selected unmanned aircraft acquisition programs as of July 2009; (2) the extent to which the military services had collaborated and identified commonality among those programs; (3) the key factors influencing the effectiveness of their collaboration; and (4) recent DOD investment decisions related to unmanned aircraft acquisitions. It is primarily drawn from our July 2009 report that examined 10 acquisition programs: eight unmanned aircraft programs and two payload programs. We conducted this performance audit from August 2008 to July 2009 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.

Summary

Once fielded, unmanned aircraft have proven quite valuable to the warfighter. On the other hand, most of the unmanned aircraft programs we reviewed had experienced cost increases, schedule delays, performance shortfalls, or some combination of these problems. Development cost estimates for the 10 programs we assessed had collectively increased more than $3 billion (37 percent in 2009 dollars) from initial estimates. Procurement funding requirements had also increased for most programs, primarily because of increases in the number of aircraft being procured, changes in system requirements, and upgrades and retrofits to equip fielded systems with capabilities that had been deferred. Overall, procurement unit costs increased by 12 percent, with three aircraft programs experiencing unit cost increases of 25 percent or more. Four programs had reported delays of 1 year or more in delivering capability to the warfighter. While the Global Hawk, Predator, Reaper, and Shadow systems had been used in combat operations with notable success and key lessons learned, they had been rushed into service in some cases, leading to performance issues and delays in development and operational testing and verification.

We found varying degrees of collaboration and commonality among DOD's unmanned aircraft acquisition programs. The Marine Corps was able to avoid the cost of initial system development and quickly deliver useful capability to the warfighter by choosing to procure existing Army Shadow

systems. The Army and Navy had settled on many common requirements between their Fire Scout systems, which had the potential to gain them efficiencies. However, in January 2010 the Army notified the Congress that it had terminated its Fire Scout program because the aircraft was no longer required. In another case, the Navy expected to save time and money on its Broad Area Maritime Surveillance (BAMS) system by using the existing Air Force Global Hawk airframe, with payloads and subsystems from various other programs. In contrast, the Army and Air Force had not effectively collaborated on their Sky Warrior and Predator programs, and greater commonality could have been achieved given that the Sky Warrior is a variant of the Predator and is being developed by the same contractor. At the time of our review, DOD officials continued to press for more commonality between these two programs.

Service-centric requirements and funding, and ineffective collaboration were key factors that resulted in the limited achievement of commonality. While several unmanned aircraft programs had achieved airframe commonality, most were pursuing service unique subsystems, payloads, and ground control stations. Despite DOD's efforts to emphasize a joint approach to identifying and prioritizing warfighting needs and to encourage commonality among programs, the services continued to establish service-unique requirements—some of which have raised concerns about possible inefficiencies caused by unnecessary duplication. Likewise, DOD's funding process gives the individual services the responsibility and authority to independently make resource allocation decisions to support their respective requirements. At the time of our review, DOD officials had not quantified the associated costs or benefits of pursuing increased commonality among unmanned aircraft programs, and service efforts to collaborate had produced mixed results. However, Congress and DOD continued to push for more commonality, which could maximize acquisition resources and help meet increased demand.

Since July 2009, when our report was issued, DOD has made several key investment decisions regarding unmanned aircraft systems that are contained in the 2010 Quadrennial Defense Review, DOD's fiscal year 2011 budget request, and DOD's Aircraft Investment Plan (2011-2040). In general, these decisions reflect increased emphasis on developing more advanced unmanned aircraft capabilities and acquiring larger numbers of specific systems. However, they do not appear to focus on increasing collaboration or commonality among unmanned aircraft programs.

Background

Unmanned aircraft systems generally consist of (1) multiple aircraft, which can be expendable or recoverable and can carry lethal or non-lethal payloads; (2) a flight control station; (3) information and retrieval or processing stations; and (4) in some cases, wheeled land vehicles that carry launch and recovery platforms. DOD categorizes these systems based on key characteristics including weight and operating altitude. While there were many small, less expensive unmanned aircraft in DOD's portfolio, our review focused on the larger, more costly programs. At that time, these programs accounted for more than 80 percent of DOD's total investment in unmanned aircraft from fiscal year 2008 through fiscal year 2013.[3] DOD's 2011 budget request indicates that the department plans to invest nearly $25 billion from 2010 through 2015 in development and procurement of the unmanned aircraft systems we reviewed. Table 1 details many of the key characteristics and funding requirements of those systems. See appendix I for additional program data.

Table 1: Characteristics and Funding Requirements of Selected Unmanned Aircraft Systems

(Then year dollars in millions)

Aircraft	Gross Weight (pounds)	Maximum Altitude (feet)	Imagery Intelligence	Signals Intelligence	Weapons	Total Investment Funding (FY10-FY15)
Reaper	10,500	50,000	X	X	X	$8,354.7
Global Hawk[a]	32,250	60,000	X	X		5,130.1
BAMS	32,250	60,000	X			3,783.9
Sky Warrior	3,200	25,000	X		X	3,306.1
Shadow	375	15,000	X			1,781.4
UCAS-D	46,000	40,000	n/a	n/a	n/a	1,056.4
Predator	2,250	25,000	X	X	X	829.5
Fire Scout[b]	3,150	20,000	X	X		472.4

Sources: DOD, *Unmanned Systems Roadmap 2007 – 2032* and BAMS Program Office

[a]Global Hawk characteristics presented in this table refer to the RQ-4B.

[b]Fire Scout data presented here are for the Navy program only.

Note: While we also assessed the Navy's Unmanned Combat Aircraft System Demonstration (UCAS-D) as part of our review, UCAS-D is a demonstration effort and will not be equipped with any mission payloads.

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[3]The programs we focused on are often referred to as tactical-level and theater-level systems.

Unmanned Aircraft Acquisitions Have Experienced Cost Growth, Schedule Delays, and Performance Problems

Despite the proven success of unmanned aircraft on the battlefield and the growing demand for the aircraft, these acquisitions continued to incur cost and schedule growth. The cumulative development cost for the 10 programs we reviewed increased by over $3 billion, or 37 percent, from initial estimates. While 3 of the 10 programs had little or no development cost growth and one had a cost reduction, six experienced substantial growth ranging from 60 to 264 percent. This cost growth was in large part the result of changes in program requirements and system designs after initiating development. Many of the programs began system development with unclear or poorly defined requirements, immature technologies, and unstable designs—problems we have frequently found in other major acquisition programs.[4] For example, in 2001, the Air Force began the Global Hawk program based on knowledge gained from a demonstration program, and planned to incrementally integrate more advanced technologies over time. Within a year, however, the Air Force fundamentally restructured and accelerated the program to pursue a larger, unproven airframe with a multimission capability that relied on immature technologies. The final design of the new airframe required more substantial changes than expected. These changes ultimately drove development costs up nearly threefold.

Procurement costs also increased for 6 of the 7 systems that reported procurement cost data. Although in large part the cost increases were due to the planned procurement of additional aircraft, many programs had also experienced unit cost increases independent of quantity. As detailed in table 2, overall procurement unit costs increased by 12 percent on average, with three programs experiencing unit cost growth of 25 percent of more. The Reaper and Shadow had unit cost growth despite increased quantities. Reaper's unit costs increased in part because requirements for missiles and a digital electronic engine control were added—resulting in design changes and increased production costs. Unit cost increases in the Shadow program were largely the result of upgrades to the airframe that were needed to accommodate the size, weight, and power requirements for integrating a congressionally mandated data link onto the aircraft.[5] Furthermore, the Army is retrofitting fielded systems with capabilities that it had initially deferred, such as a heavy fuel engine.

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[4]GAO, *Defense Acquisitions: Assessments of Selected Weapon Programs*, GAO-09-326SP (Washington, D.C.: Mar. 30, 2009).

[5]National Defense Authorization Act for Fiscal Year 2006, Pub. L. No. 109-163, § 141.

Table 2: Cost and Quantity for Selected Unmanned Aircraft Systems (as of July 2009)

2009 dollars in millions

Aircraft	Estimated development cost	Initial procurement cost estimate	Initial quantity	Current procurement cost estimate	Current quantity	Percent procurement unit cost change
Global Hawk	$3,657.5	$4,171.4	63	$5,929.7	54	66
Reaper[a]	385.5	508.7	33	2,405.7	118	32
Shadow	356.6	447.0	160	1,640.7	460	28
Fire Scout[b]	605.0	1,625.1	168	1,743.0	168	7
BAMS	3,049.1	9,048.6	65	9,048.6	65	0
Sky Warrior	568.5	647.5	48	1,614.2	132	-9
Predator	428.2	642.8	48	2,546.4	320	-41
UCAS-D[c]	1,474.9	n/a	n/a	n/a	n/a	n/a
Total	**$10,525.3**	**$17,091.1**	**585**	**$24,928.3**	**1,317**	**12 (average)**

Sources: DOD (data); GAO (analysis and presentation)

[a]Initial procurement cost estimate provided for Reaper was based on 33 aircraft. However, the Air Force initially planned for 63 aircraft.

[b]Fire Scout data presented here are for the Navy program only.

[c]UCAS-D is a demonstration effort only, so the Navy was not projecting procurement funding or quantities.

A number of programs had experienced problems in both testing and performance, requiring additional development that contributed to the cost growth noted above. Four programs had experienced delays of 1 to nearly 4 years in achieving initial operational capability. Some of these delays resulted from expediting limited capability to the warfighter, while others were the result of system development and testing problems. For example, early demonstration and production Global Hawks were rushed into operational service. Program officials noted that as a result, the availability of test resources and time for testing were limited, which delayed the operational assessment of the original aircraft model by 3 years. Similarly, in February 2009, the Air Force reported that initial operational testing for the larger, more capable Global Hawk aircraft and the program's production readiness review had schedule breaches. Air Force officials cite the high level of concurrency between development, production, and testing; poor contractor performance; developmental and technical problems; system failures; and bad weather as key reasons for the most recent schedule breach.

Efforts to Collaborate and Identify Commonality Were Successful in Some Cases, While Not in Others

Consistent with DOD's framework for acquiring unmanned systems, some of the tactical and theater-level unmanned aircraft acquisition programs we reviewed had identified areas of commonality to leverage resources and gain efficiencies. For example, the Army and Marine Corps achieved full commonality in the Shadow program. In assessing options for replacing an aging tactical unmanned aircraft system,[6] the Marine Corps determined that the Army's Shadow system could meet its requirements for reconnaissance, surveillance, and target acquisition capabilities without any service-unique modifications. An official from DOD's Office of Unmanned Warfare emphasized that the Marine Corps believed that Shadow represented a "100 percent" solution. The Marine Corps also found that it could use the Army's ground control station to pilot the Shadow aircraft as well as other Marine Corps unmanned aircraft. A memorandum of agreement was established in July 2007 to articulate how the Marine Corps and the Army would coordinate to acquire Shadow systems.

By forgoing any service-unique modifications in order to achieve a high level of commonality, the Marine Corps avoided the costs of developing the Shadow. Additionally, the Marine Corps and Army are likely to realize some benefits in supporting and maintaining the systems because the components are interchangeable. The Army's Shadow program office agreed that commonality has allowed the two services to realize economies of scale while meeting each service's needs. According to an official at the Navy, the Marine Corps has been able to realize savings or cost avoidance in other areas such as administration, contracting, and testing, although quantitative data on these savings were not available.

In some cases, the services had collaborated to identify common configuration, performance, and support requirements, but ultimately were not maximizing efficiencies. For example, the Army and Navy had different data link requirements for their respective variants of Fire Scout, primarily because of the Army's requirement for its variant to operate within the Future Combat Systems network. According to the Fire Scout contractor, the Army's system could have been equipped with the same data link as the Navy Fire Scout, as well as the Army's Shadow and Sky Warrior systems, and placed into service sooner. Though the services had

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[6]Shadow was identified as a replacement system for the Marine Corps Pioneer unmanned aircraft. Specifically, the cost for maintaining the Pioneer fleet was cited as a reason for selecting the Shadow system. The Marine Corps is considering a future replacement to the Shadow, which is not expected before 2015.

not agreed on a common data link, the Army and Navy had settled on common Fire Scout requirements for the air vehicle, engine, radar, navigation, and some core avionics subsystems requirements. The services had also agreed to use one contract to procure the airframe. However, in an information letter sent to members of Congress on January 11, 2010, the Army noted that it had terminated the Fire Scout portion of its FCS contract—following a decision by the Office of the Secretary of Defense (OSD) to cancel the FCS program—because analysis indicated that an improved Shadow system could meet future Army requirements, and the Fire Scout was no longer needed. Cancellation of the Army Fire Scout could lead to increased unit cost for the Navy variant.

Although the Navy BAMS and Air Force Global Hawk programs had identified commonalities between their airframes, the two programs had established different payload, subsystem, and ground station requirements. The Navy anticipated spending more than $3 billion to modify the Global Hawk airframe and ground stations, and to integrate Navy-specific payloads, including the radar. In addition, we found that the Navy had an opportunity to achieve greater efficiency in BAMS production. While production of the first two BAMS aircraft was planned to occur at the same California facility that produces Global Hawk, the remaining aircraft were expected to be produced at a facility in Florida. We pointed out that this approach might create duplication in production by staffing and equipping two facilities to conduct essentially the same work. At the time of our review the Navy had not assessed the costs or benefits of establishing a second production facility, and according to contractor officials, the official business case analysis would not be conducted for several years. Therefore, it was unclear whether any benefits of a second production facility would outweigh costs, such as additional tooling and personnel.

In contrast to the examples of the Shadow, Fire Scout, and BAMS / Global Hawk programs above, the Army and Air Force missed opportunities to achieve commonality and efficiencies between their Sky Warrior and Predator programs. In 2001, the Army began defining requirements for a replacement to the aging Hunter unmanned aircraft system, and decided to pursue the development of Sky Warrior. Both the Air Force and the Joint Staff responsible for reviewing Sky Warrior's requirements and acquisition documentation raised concerns about duplicating existing capability—specifically, capability provided by Predator. Nevertheless, the Army program received approval to forgo an analysis of alternatives that could have determined whether or not existing capabilities met its requirements. The Army noted that such an analysis was not needed and not worth the

cost and effort. Instead, it conducted a source selection competition and began the Sky Warrior development program in 2005, citing battlefield commanders' urgent need for the capability. The development contract was awarded to the same contractor working with the Air Force to develop and produce Predators and Reapers. Since the Sky Warrior is a variant of the Predator, the two aircraft are assembled in the same production facility. Despite the establishment of a memorandum of understanding in 2006, direction from the Deputy Secretary of Defense in 2007 to combine their programs, and a subsequent memorandum of agreement, the Army and Air Force maintained separate programs and at the time of our review, had achieved little commonality.

Service-Centric Acquisition Processes and Ineffective Collaboration Have Reduced Opportunities for Commonality

While several of the unmanned aircraft programs we examined had achieved commonality at the airframe level, service-centric acquisition processes and ineffective collaboration resulted in service-unique subsystems, payloads, and ground control stations. Despite DOD's efforts to encourage a joint approach to identifying and prioritizing warfighting needs and to emphasize the need for commonality among the programs, we noted that the individual services continued to drive requirements and make independent resource allocation decisions. In many cases, the services had established requirements so specific that they demanded service-unique solutions, thereby precluding opportunities for commonality. Within DOD's funding system, each service has the responsibility and authority to prioritize its own budget, allowing it to make independent funding decisions to support unique requirements. Therefore, once a service concludes that a unique solution is warranted, the service has the authority to budget for that unique solution, to the exclusion of other solutions that might achieve greater commonality and efficiencies. While we recognized that service-unique requirements appeared to be necessary in some cases, one OSD official we spoke with emphasized concerns that some of the services' distinctions in requirements could lead to duplication and inefficiencies. However, OSD had not quantified the potential costs or benefits of pursuing various alternatives, including commonality.

In 2007, OSD established the Unmanned Aircraft Systems Task Force and the Office of Unmanned Warfare primarily to facilitate collaboration and encourage greater commonality among unmanned aircraft programs. While the two groups act as advisors and have implemented OSD's

recommendations regarding areas where further commonality might be achieved key officials from these groups emphasized to us that they do not have direct decision-making or resource allocation authority.[7] OSD repeatedly directed the Army and Air Force to collaborate on their Sky Warrior and Predator programs, but the services continued to pursue unique systems. In response to OSD direction to merge their unique signals intelligence payload efforts into a single acquisition program, the Army and Air Force concluded that continuing their separate programs was warranted, and recommended that OSD direct an objective, independent organization—such as a federally funded research and development center—to conduct a business case analysis to assess the impact of merging the two programs.[8] Table 3 summarizes OSD's directions and the services' responses over the past few years.

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[7]GAO recently reported (*GAO-09-175*) that the Under Secretary of Defense for Acquisition, Technology, and Logistics created the task force in 2007 to lead a DOD-wide effort to coordinate critical unmanned aircraft systems issues and develop a way ahead to enhance operations and streamline acquisitions.

[8]In a March 2010 meeting with the Air Force Predator and Reaper program office, program officials noted that the Air Force and Army are now pursuing a common sensor payload for their respective aircraft.

Table 3: OSD and Service Efforts to Achieve Predator and Sky Warrior Commonality

	OSD	Services
November 2006	Under Secretary of Defense for Acquisition, Technology and Logistics (AT&L) establishes goal for the programs to have a common aircraft, propulsion system, and avionics configuration	
September 2007	Deputy Secretary of Defense directs the services to combine the programs into a single acquisition program and to migrate to a single contract by October 2008	
February 2008		Army and Air Force program executive officers sign a memorandum of agreement
May 2008	Under Secretary of Defense for AT&L reiterates the Deputy Secretary of Defense's directive to combine the programs into a single acquisition program, states that fiscal year 2009 funds can only be used to purchase a common airframe, and expresses dissatisfaction with the progress made on achieving a common electro-optical and infrared sensor	
October 2008	Undersecretary of Defense for AT&L grants a waiver to the Air Force to buy 20 additional Predators, but also directs the Air Force to buy five common airframes and noted that no additional waivers would be granted	
January 2009	Deputy Under Secretary for Acquisition and Technology and the Deputy Under Secretary of Defense (Intelligence) for Portfolio, Programs, and Resources direct the services to conduct a comprehensive business case analysis to assess the impacts of migrating to a single signals intelligence payload acquisition program	
February 2009		Acting Assistant Secretary of the Army (Acquisition, Logistics, and Technology) and Assistant Secretary of the Air Force (Acquisition) issue a joint memorandum, noting that despite more than 15 months of work and a dozen meetings, neither service supports the assertion that a joint program makes sense, and recommend that an objective, independent agency or organization do the business case analysis

Source: GAO.

Congress and OSD took additional action in 2009 aimed at increasing collaboration and commonality among unmanned aircraft programs. In section 144 of the Duncan Hunter National Defense Authorization Act for Fiscal Year 2009, Congress directed "[t]he Secretary of Defense, in consultation with the Chairman of the Joint Chiefs of Staff, [to] establish a policy and an acquisition strategy for intelligence, surveillance, and reconnaissance payloads and ground stations for manned and unmanned aerial vehicle systems. The policy and acquisition strategy shall be

applicable throughout the Department of Defense and shall achieve integrated research, development, test, and evaluation, and procurement commonality."[9] In an acquisition decision memorandum issued on February 11, 2009, the Under Secretary of Defense for Acquisition, Technology and Logistics identified the opportunity to adopt a common unmanned aircraft ground control station architecture that supports future capability upgrades through an open system and modular design. Similar to OSD's approach to ground control stations, the Air Force Unmanned Aircraft Systems Task Force expected future unmanned aircraft to be developed as open, modular systems to which new capabilities could be added instead of developing entirely new systems each time a new capability is needed.

DOD Continues to Increase Its Emphasis on and Funding For Unmanned Aircraft Systems

Since July 2009 when our report was issued, DOD has made several key investment decisions regarding unmanned aircraft systems that will likely impact those estimates. In general, these decisions reflect increased emphasis on developing more advanced unmanned aircraft capabilities and acquiring larger numbers of specific systems, but they do not appear to focus on increasing collaboration or commonality among systems.

The 2010 Quadrennial Defense Review (QDR) reported that "U.S. forces would be able to perform their missions more effectively—both in the near-term and against future adversaries—if they had more and better key enabling capabilities at their disposal." The QDR report included unmanned aircraft systems among these key enablers, and emphasized the importance of rapidly increasing the number and quality of unmanned aircraft systems—among other enablers—to prevail in today's wars, and to deter and defeat aggression in anti-access environments. The report also noted that: the Air Force is going to increase the total number of Predator/Reaper aircraft it plans to buy; the Army will accelerate the production of its Predator-class Sky Warrior[10] system; and the Navy will conduct field experiments with prototype versions of its Unmanned Combat Aircraft System, which, the QDR points out, offers the potential to greatly increase the range of strike, and intelligence, surveillance, and reconnaissance (ISR) operations from the Navy's carrier fleet.

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[9]Pub. L. No. 110-417, § 144.

[10]The 2010 QDR specifically refers to the Extended Range Multi-Purpose system, which at the time of our 2009 report was being referred to as Sky Warrior.

As part of DOD's fiscal year 2011 budget development process, OSD made several unmanned aircraft-related adjustments to the services' budget submissions. As part of those adjustments, OSD:

- Directed the Army to stop development and initial fielding of its Fire Scout unmanned aircraft;
- Provided the Air Force an additional $344 million from FY2011 to FY2015 to develop, procure, and integrate counter-communication and counter-improvised explosive device jamming pods onto 33 MQ-9 Reaper aircraft, and directed the Air Force to present its assessment of platforms for this capability by June 1, 2010;
- Provided an additional $1.8 billion from FY2011 through FY2015 to purchase an additional 74 MQ-9 Reaper aircraft;
- Added $2 billion to the Navy budget from FY2013 to FY2015 to define requirements and develop unmanned carrier based capability, and directed the Navy to develop an execution plan by March 30, 2010;
- Added $201.6 million to the Global Hawk procurement budget to procure 19 Block 40 aircraft by 2015, and 22 total;
- Added $270.5 million for development and procurement of Global Hawk satellite communication terminals;
- Added $2.4 billion over the Future Years Defense Program to the Army's Extended Range Multi-Purpose (Sky Warrior) Aircraft budget to procure an additional 12 aircraft and 5 ground stations (one company) per year from 2011 through 2015.

In concert with the QDR and the fiscal year 2011 budget, DOD also published its first submission of a long-range, fixed-wing aviation procurement plan. Among other things, the plan addresses DOD's strategy for meeting the demand for persistent, unmanned, multi-role ISR capabilities by:

- Emphasizing "long-endurance, unmanned ISR assets—many with strike capabilities—to meet warfighter demands;
- Projecting an increase in the number of platforms in this category from approximately 300 in 2011 to more than 800 in 2020, nearly 200 percent increase;
- Noting the "replacement of Air Force Predators with more capable Reapers";
- Establishing a specific category for Unmanned Multi-role Surveillance and Strike systems, that distinguishes those systems from other types of aircraft, such as fighters and bombers;
- Noting that the department will continue to adapt the mix of unmanned and manned systems as security needs evolve; and

- Noting that unmanned systems are being considered as future long-range strike platforms and future fighter / attack aircraft.

Concluding Observations

In closing, recent experience in Iraq and Afghanistan has proven that unmanned aircraft are extremely valuable to the warfighter, and it is clear that more are needed. However, DOD will continue to be challenged to meet this increasing demand within available resources. Many of DOD's larger unmanned aircraft acquisition programs have experienced cost growth, schedule delays, and performance shortfalls, while not enough have achieved the efficiencies one might expect from commonality. DOD recognizes that to more effectively leverage its acquisition resources, it must achieve greater commonality among the military services' various unmanned system programs. However, in many cases the services have preferred to pursue unique solutions. In general, the military services continue to establish unique requirements and prioritize resources while foregoing opportunities to achieve greater efficiencies. As a result, commonality has largely been limited to system airframes, and in most cases, has not been achieved among payloads, subsystems, or ground control stations.

Opportunities for identifying commonality are greatest when requirements are being established. Therefore, as the department continues to develop and procure unmanned aircraft systems, it must take more care in setting requirements for those systems. Rather than looking for unique solutions to common problems, DOD must increasingly find common solutions to those problems. However, we recognize that commonality is not a panacea, and in some cases, given legitimate differences in operating environments or mission needs, may not make sense. We also recognize that achieving commonality is not always easy, especially given the strong service-driven acquisition processes and culture within the department. Therefore, in our July 2009 report we recommended that DOD (1) direct an objective, independent examination of unmanned aircraft requirements and report a strategy to Congress for achieving greater commonality among systems and subsystems, and (2) require future unmanned aircraft programs to take an open systems approach to product development and to clearly demonstrate that potential areas of commonality have been analyzed and identified. We believe that these steps could help overcome these barriers and could go a long way to ensuring that DOD maximizes efficiency as it continues to greatly increase emphasis on developing and acquiring more capable and larger quantities of unmanned aircraft.

Contacts and Staff Acknowledgments

For further questions about this statement please contact Michael J. Sullivan at (202) 512-4841. Individuals making key contributions to this statement include Bruce Fairbairn, Assistant Director; Travis Masters; Rae Ann Sapp; Leigh Ann Nally; Laura Jezewski; and Susan Neill.

Appendix I: Additional Unmanned Aircraft Program Data and Information

This appendix contains 3 tables that provide additional information about the 8 unmanned aircraft systems assessed in our July 2009 report. Table 4 contains the combined total development and procurement funding DOD has requested in its fiscal year 2011 budget submission for each of the programs. The budget data is presented in then year dollars and may not add precisely due to rounding. Tables 5 and 6 detail many of the key characteristics and compare the capabilities of the systems discussed in this statement.

Table 4: Fiscal Year 2011 Development and Procurement Funding Requested for Selected Unmanned Aircraft Programs

(Then year dollars in millions)

Aircraft	2010	2011	2012	2013	2014	2015	FY10-FY15
Reaper	$689.8	$1,474.3	$1,406.3	$1,600.2	$1,522.9	$1,661.1	$8,354.7
Global Hawk[a]	911.2	961.4	1,021.9	855.1	726.5	653.9	5,130.1
BAMS	439.0	529.3	541.0	744.5	807.2	723.2	3,783.9
Sky Warrior	568.2	644.2	544.2	519.9	532.2	497.4	3,306.1
Shadow	607.9	610.6	88.0	118.4	125.7	171.1	1,781.4
UCAS-D	304.9	266.4	216.0	165.2	51.3	52.7	1,056.4
Predator	188.9	208.2	123.0	99.7	75.1	44.8	829.5
Fire Scout	118.6	61.6	50.9	70.3	90.8	90.8	472.4
Total	**$3,921.1**	**$4,781.4**	**$4,003.2**	**$4,178.1**	**$3,935.6**	**$3,895.1**	**$24,714.5**

Source: DOD (data); GAO (analysis and presentation)

[a]Information on the RQ-4B Global Hawk is presented in this chart.

Table 5: Key Characteristics of Selected Unmanned Aircraft Systems

Aircraft	Length (feet)	Wing Span (feet)	Gross Weight (pounds)	Payload Capacity (pounds)	Endurance (hours)[a]	Maximum Altitude (feet)
Reaper	36	66	10,500	3,750	24	50,000
Global Hawk[b]	48	131	32,250	3,000	28	60,000
BAMS	48	131	32,250	3,200	34+	60,000
Sky Warrior	28	56	3,200	800	40	25,000
Shadow	11	14	375	60	6	15,000
UCAS-D	38	62	46,000	4,500	9	40,000
Predator	27	55	2,250	450	24+	25,000
Fire Scout	23	28	3,150	600	6+	20,000

Sources: DOD, *Unmanned Systems Roadmap 2007 – 2032* and BAMS Program Office

[a]Endurance capacity reported here is the maximum endurance possible, without external payloads. For some aircraft, the addition of external payloads can impact endurance capacity.

[b]Information on the RQ-4B Global Hawk is presented in this chart.

Table 6: Comparison of Key System Capabilities

Aircraft	Imagery Intelligence			Signals Intelligence		Weapons
	Electro-Optical / Infrared	Synthetic Aperture Radar	Full Motion Video	Communications Intelligence	Electronic Intelligence	
Global Hawk	X	X		X	X	
Predator	X	X	X	X		X
Reaper	X	X	X	X		X
Sky Warrior	X	X	X			X
Shadow	X		X			
Fire Scout - Navy	X		X			
Fire Scout - Army	X	X	X	X	X	
BAMS	X	X	X			

Source: DOD (data); GAO (analysis and presentation)

Note: While we also assessed the Navy's Unmanned Combat Aircraft System Demonstration (UCAS-D) as part of our review, UCAS-D is a demonstration effort and will not be equipped with any mission payloads.