United States Government Accountability Office

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Report to the Subcommittee on Emerging Threats and Capabilities, Committee on Armed Services, U.S. Senate

October 2012

DEFENSE ACQUISITIONS

Future Aerostat and Airship Investment Decisions Drive Oversight and Coordination Needs

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Highlights

Highlights of GAO-13-81, a report to the Subcommittee on Emerging Threats and Capabilities, Committee on Armed Services, U.S. Senate

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Why GAO Did This Study

Use of lighter-than-air platforms, such as aerostats, which are tethered to the ground, and airships, which are free-flying, could significantly improve U.S. ISR and communications capabilities, and move cargo more cheaply over long distances and to austere locations. DOD is spending about $1.3 billion in fiscal year 2012 to develop and acquire numerous aerostats and airships.

GAO was asked to determine (1) what key systems governmentwide are being developed and acquired, including funding, purpose, and status; (2) any technical challenges these key efforts may be facing; and (3) how effectively these key efforts are being overseen to ensure coordination, and identify any potential for duplication. To address these questions, GAO reviewed and analyzed documentation and interviewed a wide variety of DOD and civil agency officials.

What GAO Recommends

GAO recommends that DOD take actions based on the extent of its future investments in this area: (1) if investments are curtailed, ensure it has insight into all current and planned efforts in the short term; (2) if investments increase significantly, include the efforts in strategic frameworks to ensure visibility and coordination, guide innovation, and prioritize investments; and (3) ensure the roles and responsibilities of the senior official responsible for the oversight and coordination of airship-related programs are defined. DOD concurred with the recommendations.

View GAO-13-81. For more information, contact Cristina Chaplain at (202) 512-4841 or chaplainc@gao.gov.

What GAO Found

GAO identified 15 key aerostat and airship efforts that were underway or had been initiated since 2007, and the Department of Defense (DOD) had or has primary responsibility for all of these efforts. None of the civil agency efforts met GAO's criteria for a key effort. Most of the aerostat and airship efforts have been fielded or completed, and are intended to provide intelligence, surveillance, and reconnaissance (ISR) support. The estimated total funding of these efforts was almost $7 billion from fiscal years 2007 through 2012. However, funding estimates beyond fiscal year 2012 decline precipitously for aerostat and airship efforts under development, although there is an expectation that investment in the area will continue.

Aerostat (left) and Airship (right)

Sources (left to right): U.S. Army and U.S. Navy.

Three of the four aerostat and airship efforts under development, plus another airship development effort that was terminated in June 2012, have suffered from high acquisition risks because of significant technical challenges, such as overweight components, and difficulties with integration and software development, which, in turn, have driven up costs and delayed schedules.

DOD has provided limited oversight to ensure coordination of its aerostat and airship development and acquisition efforts. Consequently, these efforts have not been effectively integrated into strategic frameworks, such as investment plans and roadmaps. At the time of GAO's review, DOD did not have comprehensive information on all its efforts nor its entire investment in aerostats and airships. Additionally, DOD's coordination efforts have been limited to specific technical activities, as opposed to having a higher level authority to ensure coordination is effective. DOD has recently taken steps to bolster oversight, including the appointment of a senior official responsible for the oversight and coordination of airship-related programs. However, as of August 2012, DOD has not defined the details relating to the authority, scope, and responsibilities of this new position. Whether these steps are sufficient largely depends on the direction DOD intends to take with aerostat and airship programs. If it decides to continue investing in efforts, more steps may be needed to shape these investments.

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Abbreviations

AAFL	Advanced Airship Flying Laboratory
DARPA	Defense Advanced Research Projects Agency
DHS	Department of Homeland Security
DOC	Department of Commerce
DOD	Department of Defense
DOE	Department of Energy
EPA	Environmental Protection Agency
FPDS-NG	Federal Procurement Data System—Next Generation
FY	fiscal year
GARP	Geospatial Airship Research Platform
HALE-D	High Altitude Endurance-Demonstrator
ISIS	Integrated Sensor is Structure
ISR	intelligence, surveillance, and reconnaissance
JLENS	Joint Land Attack Cruise Missile Defense Elevated Netted Sensor
LEMV	Long Endurance Multi-Intelligence Vehicle
LTA	lighter-than-air
NASA	National Aeronautics and Space Administration
NOAA	National Oceanic and Atmospheric Administration
OASDR&E	Office of the Assistant Secretary of Defense for Research and Engineering
O&M	operations and maintenance
PGSS	Persistent Ground Surveillance System
PSST	Persistent Surveillance System-Tethered
PTDS	Persistent Threat Detection System
RAID	Rapid Aerostat Initial Deployment
RDT&E	research, development, test, and evaluation
REAP	Rapidly Elevated Aerostat Platform
TARS	Tethered Aerostat Radar System
TRL	technology readiness level

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United States Government Accountability Office
Washington, DC 20548

October 23, 2012

The Honorable Kay R. Hagan
Chairman
The Honorable Rob Portman
Ranking Member
Subcommittee on Emerging Threats and Capabilities
Committee on Armed Services
United States Senate

Platforms that utilize lighter-than-air (LTA) technologies—such as aerostats (buoyant craft tethered to the ground), and airships (buoyant craft that are free-flying)—may hold the potential for significantly increasing capabilities in the areas of persistent intelligence, surveillance, and reconnaissance (ISR) and communications, as well as lowering the costs of transporting cargo over long distances and to austere locations, such as those without aircraft runways.[1] The Department of Defense (DOD) has embarked on a variety of efforts to develop and acquire LTA platforms for these purposes. DOD's investments in these platforms totaled about $1.3 billion in fiscal year 2012. Additionally, other federal agencies, such as the Department of Homeland Security (DHS), are using or are considering using these platforms in conducting their missions. However, the visibility into and progress of these efforts, as well as how much they are being coordinated, has been unclear.

Because of the variety and number of aerostat and airship programs and interest in the extent of coordination across programs and potential for unnecessary duplication, you asked us to determine (1) what key aerostat and airship systems across the government are being developed and acquired, including funding, purpose, and status; (2) any technical challenges these key efforts may be facing; and (3) how effectively these key efforts are being overseen to ensure coordination, and identify any potential for duplication.

To determine what key aerostat and airship systems across the federal government are being developed and acquired, including funding, purpose,

[1]Persistence is the length of time a sensor can provide continuous coverage of a location, target, or activity of interest.

and status of those systems, we reviewed documentation and interviewed officials on the status and progress of aerostat and airship development efforts in areas such as requirements, budgets, funding, costs, schedule, contracting, technology maturation, and actual or planned operational characteristics. In doing so, we developed an inventory of key airship and aerostat development and acquisition efforts which enabled a comparison of platform types, performance attributes, and costs. Based on funding data we collected, we determined that our definition of “key aerostat and airship systems being planned, developed, and acquired” includes two key criteria (1) total funding of $1 million or more for fiscal years 2007 to 2012, and (2) efforts to plan, develop, or acquire systems that include both a platform and payload (such as sensors or cargo) capability. We analyzed documentation and interviewed officials from various offices of the Secretary of Defense, Joint Chiefs of Staff, Army, Navy, and Air Force; U.S. Central Command; Defense Advanced Research Projects Agency; and Defense Logistics Agency. We also analyzed documentation and interviewed officials from civil agencies, including the Department of Homeland Security, Department of Energy, Environmental Protection Agency, National Oceanic and Atmospheric Administration, National Aeronautics and Space Administration, and Office of the Director of National Intelligence. We did not examine the development and utilization of LTA technologies outside of the federal government.

To identify any technical challenges these key aerostat and airship efforts may be facing, we analyzed documentation and interviewed officials from the organizations mentioned above. We used the collected information to assess any identified technical problems impacting the funding, cost, schedule, and performance of airships and aerostats.

To determine how the various key aerostat and airship efforts are being overseen to ensure coordination, and identify any potential for duplication, we assessed aerostat and airship investments, acquisitions, capabilities, and operations by analyzing documents and interviewing officials from the organizations listed above, analyzing the inventory of key efforts developed under our first objective, and reviewing prior GAO work for relevant criteria. Specifically, we assessed oversight at the programmatic and enterprise levels by reviewing organizational roles, responsibilities, and authorities as they relate to aerostat and airship development, acquisition, and operations efforts. We also determined the extent to which plans and planning activities integrated aerostat and airship development and acquisition efforts and capabilities within DOD. Reviewed plans and planning activities included architectures, roadmaps, investment plans, and requirements development. We also used the information relating to various aspects of the development and acquisition efforts, such as requirements, and actual or planned performance attributes, to assess whether any of the efforts are potentially duplicative.

We conducted this performance audit from June 2011 to October 2012 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 reasonable basis for 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. Additional details on our scope and methodology are provided in appendix I.

Background

This report examines two types of LTA platforms: aerostats and airships. Both use a lifting gas—most commonly helium—but an aerostat is tethered to the ground while an airship is free moving. Aerostats lack a propulsion mechanism and are connected to a mooring station on the ground by a long cable called a tether. The tether, in addition to securing the aerostat to one general area above the ground, usually provides power to the payload, such as ISR sensors and communications equipment, and carries data between the payload and ground control station. Airships, on the other hand, are manned or unmanned, self-propelled vehicles that have directional control. See figure 1 for an example of an aerostat system.

Figure 1: Aerostat System (U.S. Army's Persistent Threat Detection System)

Source: U.S. Army.

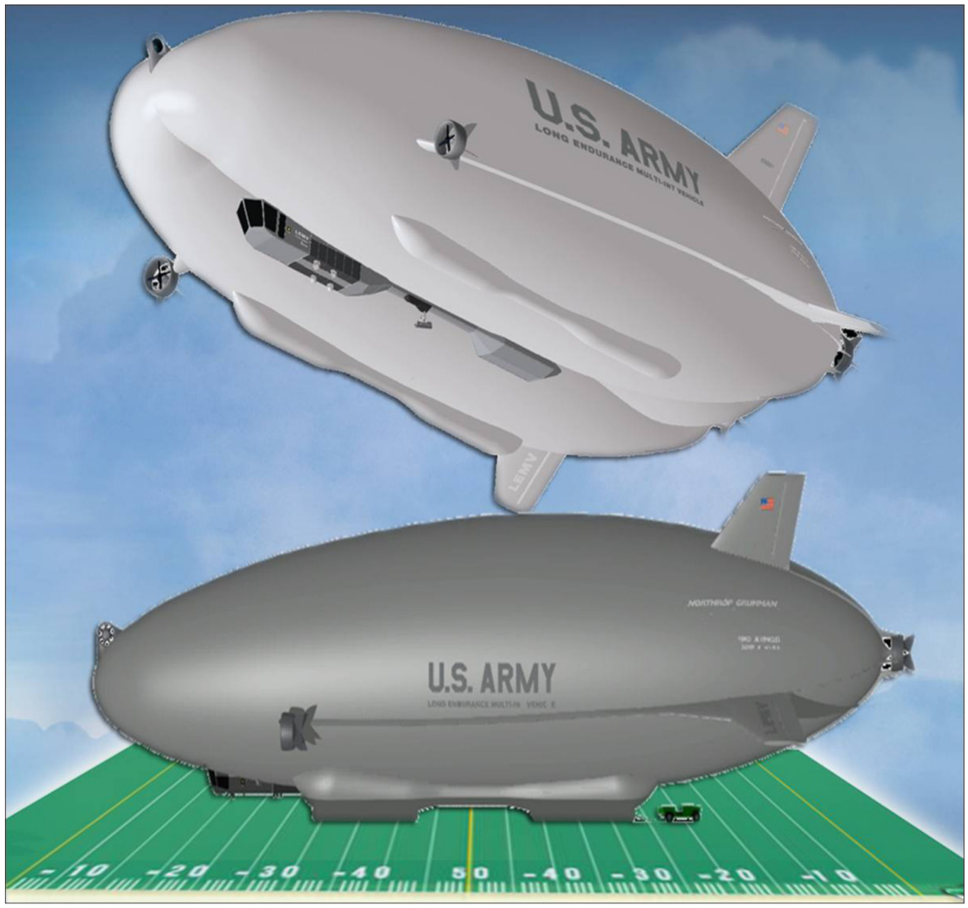
There are three basic types of airships: (1) non-rigid—which has no frame and maintains its envelope (external structure) shape through the slightly pressurized gas it contains; (2) semi-rigid—which also maintains its shape through the slightly pressurized gas it contains, but also has a structural keel along the bottom of the envelope to help distribute loads; and (3) rigid—which has an internal rigid frame to maintain its shape and to distribute lift and load weight. Blimps flying above sporting events are commonly non-rigid airships, whereas the Hindenburg airship of the 1930s is an example of a rigid airship.

Airships can be further categorized by their shape—conventional or hybrid. A conventional airship has an ellipsoidal shape reminiscent of those that fly over sporting events. A hybrid airship combines the buoyant lift of a lighter-than-air gas with the aerodynamic lift created by the shape of the airship as it flies through the air. Shaped roughly like the cross-section of an aircraft wing, a hybrid airship can generate up to 30 percent of its lift as it flies. Additional lift can be generated by directing the thrust of on-board propulsion systems (called vectored thrust) downward. Because of the additional sources of lift, hybrid airships theoretically can take off in a heavier-than-air configuration. See figures 2 and 3 for respective depictions of conventional and hybrid airships.

Figure 2: Conventional Airship (U.S. Navy's Advanced Airship Flying Laboratory)

Source: U.S. Navy.

Figure 3: Hybrid Airship (U.S. Army's Long-Endurance Multi-Intelligence Vehicle)



Source: Northrop Grumman

In the early to mid 1900s, and especially during World War II, the U.S. Navy operated a variety of airships for maritime patrol and fleet reconnaissance, including assistance in antisubmarine warfare. Additionally, in the early 1930s, airships were used for commercial transportation across the Atlantic Ocean. However, advances in fixed-wing aircraft design, capabilities, and availability, as well as in enemy antiaircraft weaponry, led to a marked decline in the military and commercial use of airships. For instance, the Navy disbanded its last airship unit in 1962, and since then, the military use of airships for other than research and development purposes essentially discontinued.

Since 1978, DOD has operated aerostats along the southern U.S. border for counterdrug detection and monitoring. Additionally, civil government agencies have used aerostats for a variety of purposes, such as monitoring of environmental pollution, and atmospheric and climate research. For example, since 2009, the Environmental Protection Agency has used aerostats for the purpose of sampling air emissions from open sources, such as prescribed forest burns. Additionally, the Department of Commerce's National Oceanic and Atmospheric Administration has used small aerostats to collect wind data. Furthermore, the Department of Homeland Security's U.S. Customs and Border Protection is considering using aerostats for its border security mission. The overall investment of civil government agencies in LTA activities is small compared to that of DOD. See appendix II for examples of civil agency aerostat activities. While commercial use of airships has primarily been limited to sightseeing and advertising, there has been interest in using airships for cargo transportation to logistically austere locations, such as remote areas in Alaska and Canada.

Several factors have increased DOD's attention toward LTA platforms. The lack of enemy air defense capabilities in recent military operations has made threats to LTA platforms appear to be low, and the military's demand for persistent ISR has grown significantly. For example, DOD plans to almost double the number of aerostats—from 66 to 125—in Afghanistan for ISR in fiscal years 2011 and 2012. Also, growing budget pressures have encouraged the study of potential solutions to military problems, such as persistent ISR and heavy-lift cargo transportation, which may reduce procurement and operations and maintenance costs. For example, a 2008 Army Science Board study that compared fixed-wing unmanned aircraft, space satellites, and LTA platforms for providing persistent communications, surveillance, and reconnaissance missions, concluded that airships offered great promise at being effective in supporting these missions because of factors including ease of reconfigurability, extended time on station, large payload capacity, and lower cost.[2]

LTA platforms face several significant operational hazards. For example, weather phenomena such as high winds and lightning have posed the

[2]Department of the Army, *Army Science Board FY2008 Summer Study Final Report: Platforms for Persistent Communications, Surveillance, and Reconnaissance*, (Washington, D.C.: Sept. 2008).

highest threats to aerostats deployed by the military in Afghanistan. Before the arrival of hazardous weather conditions, aerostat operations must cease and the platform must be lowered and secured to the mooring station to help prevent platform or payload damage. Additionally, high winds can make airships hard to control and increase fuel consumption, reducing on-station endurance. Furthermore, combat operations can result in punctures in the fabric caused by bullets and other projectiles. However, low helium pressure in the envelope (which is only slightly higher than the surrounding atmospheric pressure) means small helium leaks from bullet holes are typically slow and repairs can usually wait until a normally scheduled maintenance period.

Most Key Aerostat and Airship Efforts Underway or Initiated Since 2007 Have Been Fielded or Completed

We identified 15 key aerostat and airship efforts that were underway or had been initiated since 2007, and DOD had or has primary responsibility for all of these efforts.[3] Most of these efforts have been fielded, completed, or terminated. Over the past 6 years, DOD's overall investment has increased, and the estimated total funding of these efforts was almost $7 billion from fiscal years 2007 through 2012. However, funding estimates for aerostat and airship efforts under development beyond fiscal year 2012 decline significantly, although there is an expectation that investment in the area will continue.

Status of 15 Efforts

Highlights on the 15 aerostat and airships efforts that were underway or initiated since 2007 by DOD are presented in the table below—details of each are provided in appendix III. Most of the aerostat and airship efforts have been fielded or completed, and are intended to provide ISR support or persistent surveillance, with on-station duration time typically greater than fixed-wing unmanned aircraft.

[3] None of the civil agency efforts we identified (see appendix II) met our criteria for "key" systems being planned, developed, and acquired (details on our scope and methodology are provided in appendix I).

Table 1: Inventory of Aerostat and Airship Efforts as of June 2012

Name	Purpose	Number of units	Total funding Fiscal years 2007-2012 (Millions of dollars)	Status
Fielded, completed, or terminated				
Aerostats				
Geospatial Airship Research Platform (GARP)	Test ISR and communication payloads	2	$9.4	Fielded
Persistent Ground Surveillance System (PGSS)	Provide ISR support	59	$1,508.0	Fielded
Persistent Threat Detection System (PTDS)	Provide ISR support	66	$1,717.1	Fielded
Rapid Aerostat Initial Deployment (RAID)	Provide persistent surveillance for force protection	21	$127.1	Fielded
Rapidly Elevated Aerostat Platform (REAP)-XL B	Army: provide persistent surveillance/Navy: extended communications relay system	3	$5.3	Fielded
Tethered Aerostat Radar System (TARS)	Support DOD's counterdrug detection and monitoring mission along the southern U.S. border	8	$213.5	Fielded
Airships				
Advanced Airship Flying Laboratory (AAFL, also known as MZ-3A)	Test ISR and communication payloads	1	$14.1	Fielded
Blue Devil Block 2	Demonstrate persistent multi-intelligence ISR capabilities	1	$243.6	Terminated
High Altitude Endurance-Demonstrator (HALE-D)	Demonstrate ISR capabilities at high altitudes	1	$36.3	Completed
HiSentinel	Demonstrate ISR capabilities at high altitudes	2	$11.2	Completed
Star Light	Develop and demonstrate a high altitude and long endurance airship	1	$2.1	Terminated
Under development				
Aerostat				
Joint Land Attack Cruise Missile Defense Elevated Netted Sensor (JLENS)	Provide detection and tracking of land-attack cruise missiles and other targets	2	$2,222.3	Under development
Airships				
Integrated Sensor is Structure (ISIS)	Develop and demonstrate radar sensor fully integrated into a stratospheric airship	1	$471.4	Under development
Long Endurance Multi-Intelligence Vehicle (LEMV)	Develop and demonstrate a hybrid prototype airship for long-endurance ISR support	1	$275.9	Under development
Project Pelican	Develop and demonstrate a hybrid airship with a rigid internal structure and test airship buoyancy control technologies	1	$42.4	Under development

Source: GAO analysis of DOD data.

DOD's pursuit of aerostats and airships is mostly due to the ability of these platforms to loiter for a longer period of time than fixed-wing unmanned aircraft, which makes them very suitable for supporting the ISR mission. The various ISR sensors used or planned for the aerostats and airships in our review include:

- electro-optical cameras to conduct optical monitoring of the electromagnetic spectrum from ultraviolet through far infrared;
- ground moving target indicator radars to detect, locate, and track vehicles throughout a large area when they are moving slowly on or just above the surface of land or water;
- unattended transient acoustic measurement and signature intelligence systems that use sets of microphones to capture sounds that are processed and analyzed to determine the direction of the points of origin and impact of mortar launch; and
- signals intelligence sensors to collect transmissions deriving from communications, electronic, and foreign instrumentation systems.

The aerostat and airship efforts we identified vary in terms of the time they can operate on station in any single session. Their on-station endurance time is typically greater than that of fixed-wing unmanned aircraft. For example, the TARS aerostat is expected to stay on station for 6 days, whereas the LEMV airship is expected to stay on station for at least 16 days. In contrast, tactical and theater-level fixed-wing unmanned aircraft can stay on station from 6 hours for a Shadow aircraft, to 40 hours for a Sky Warrior.[4] The amount of time on station is greatly dependent on how often the aerostats and airships need to be topped off with additional helium, and in the case of most airships, how often they have to be refueled.[5]

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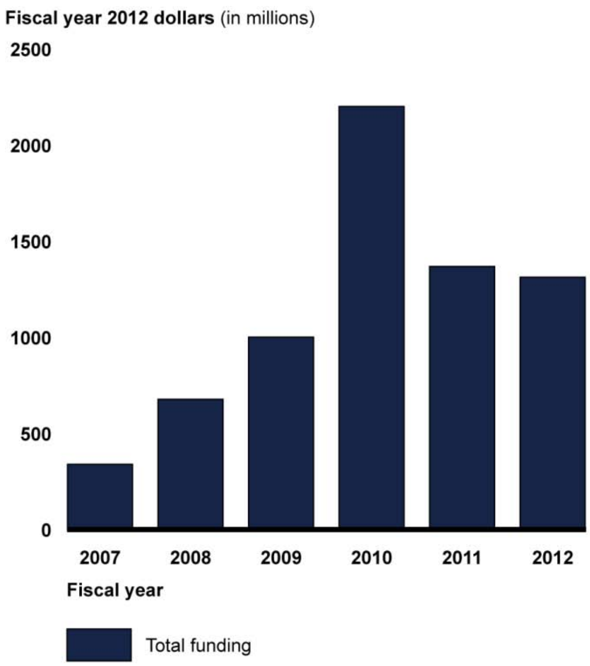
[4]See GAO, *Defense Acquisitions: Opportunities Exist to Achieve Greater Commonality and Efficiencies among Unmanned Aircraft Systems*, GAO-09-520 (Washington, D.C.: July 30, 2009).

[5]The ISIS airship is to be solar-powered; therefore, the airship's on-station endurance time is expected be one year. Also, the TARS aerostats are powered by a generator on board that must be refueled after 6 days of operations.

DOD Has Invested Almost $7 Billion in Aerostats and Airships over the Past 6 Years

Over the past 6 years, overall total DOD investment in aerostat and airship development, acquisition, and operations and maintenance has increased, ranging from about $339 million in fiscal year 2007 to a high of about $2.2 billion in fiscal year 2010, and about $1.3 billion in fiscal year 2012, as illustrated in figure 4. DOD has invested almost $7 billion from fiscal years 2007 through 2012 on key aerostat and airship efforts in our review. Moreover, aerostat-related investment—$5.8 billion—accounted for more than 80 percent of the total. See appendix IV for additional details on the reported funding for these efforts.

Figure 4: Funding for DOD Aerostat and Airship Efforts for Fiscal Years 2007 through 2012



Source: GAO analysis of DOD data.

Note: Includes research, development, test, and evaluation; procurement; military construction; and operations and maintenance funding, as applicable, during fiscal years 2007 through 2012. See appendix IV for specific funding types and amounts.

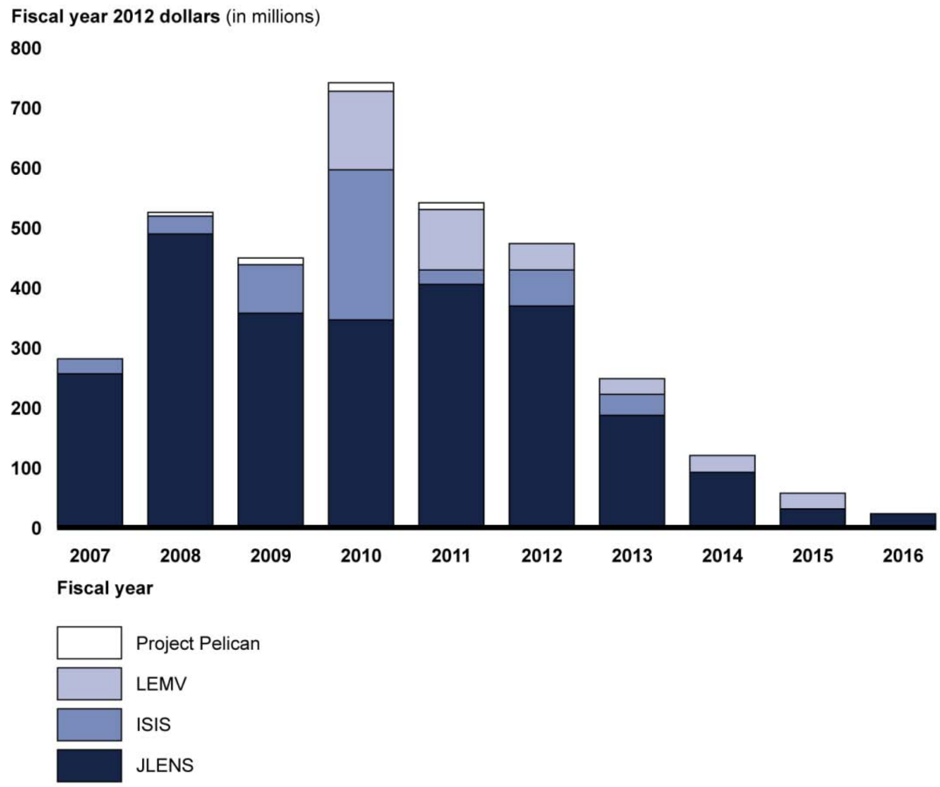
Over 90 percent of all estimated aerostat investment from fiscal years 2007 to 2012—almost $5.4 billion—is attributed to the development and procurement of three aerostat programs—JLENS, PGSS, and PTDS. Aerostat funding increased through fiscal year 2010 primarily because of increased demand for PGSS and PTDS aerostats in Afghanistan and Iraq.

Most of the total estimated airship investment from fiscal years 2007 to 2012—approximately $1.1 billion—consists of research, development, test, and evaluation (RDT&E) costs. Of this amount, over 90 percent of the airship RDT&E investment—approximately $1 billion—is for the Blue Devil Block 2, ISIS and LEMV development efforts. The major increase depicted for fiscal year 2010 reflects an increase in RDT&E investment due to the beginning of funding for the Blue Devil Block 2 and LEMV development efforts, as well as a substantial increase for the ISIS development effort the Air Force began funding.

Estimated Funding for Aerostats and Airships under Development Expected to Decline after Fiscal Year 2012

Estimated funding for JLENS, ISIS, LEMV, and Project Pelican—efforts under development—is expected to decline significantly after fiscal year 2012, as illustrated in figure 5.

Figure 5: Fiscal Years 2007 through 2016 Funding for Aerostats and Airships under Development



Source: GAO analysis of DOD data.

Note: Includes research, development, test, and evaluation; procurement; and military construction funding, as applicable, during fiscal years 2007 through 2016. See appendix IV for specific funding types and amounts.

However, according to DOD officials, investment in this area is expected to continue in the future. The aggregate funding for these four development efforts declines from $473 million in fiscal year 2012, to $23 million in fiscal year 2016. Funding for JLENS, the development effort with the highest estimated cost from fiscal years 2012 to 2016, drops from $369 million in fiscal year 2012 to $187 million in fiscal year 2013, $92 million in fiscal year 2014, $31 million in fiscal year 2015, and $23 million in fiscal year 2016. The original funding profile for JLENS showed substantively higher amounts over this time period, but due to a recent decision to reduce the number of JLENS aerostats that DOD intends to procure from 16 to 2, the current funding profile reflects this significant reduction in procurement. There are also investment uncertainties in the near term for LEMV and ISIS. According to LEMV program officials, if the first LEMV is successfully demonstrated in Afghanistan, then it may transition to an acquisition program which would likely require additional funding. Also, ISIS program officials do not yet know if ISIS will become a program of record.

According to an official in the Office of the Under Secretary of Defense for Intelligence, while DOD expects to continue funding airship and aerostat efforts beyond fiscal year 2016, specific information regarding funding amounts is not available at this time. Furthermore, we did not find any current architectures, investment plans, or roadmaps that incorporated aerostat and airship efforts to indicate DOD's commitment to increase or reduce its investment in this area.

Aerostat and Airship Efforts under Development Are Experiencing Technical Challenges

Three of the four aerostat and airship efforts under development, plus another airship development effort that was terminated in June 2012, have suffered from high acquisition risks because of significant technical challenges, leading to cost overruns and schedule delays. Additionally, DOD used the rapid acquisition process to acquire airships that had high technical risks.

Aerostat and Airship Technical Challenges

JLENS has experienced schedule delays and a Nunn-McCurdy unit cost breach,[6] ISIS will not and LEMV did not meet their originally scheduled launch dates and have experienced cost overruns, and Blue Devil Block 2 was terminated to avoid substantially increasing costs caused by technical problems.

- The Army initiated JLENS system development in August 2005. JLENS consists of two large aerostats—over 240 feet in length—each with a 7,000 pound payload capacity for cruise missile detection and tracking. As we have previously reported, the program has

[6]Enacted in 1982, the Nunn-McCurdy statutory provision requires DOD to notify Congress whenever a major defense acquisition program's unit cost experiences cost growth that exceeds certain thresholds. A breach of the critical cost growth threshold occurs when the program acquisition unit cost or the procurement unit cost increases by at least 25 percent over the current baseline estimate or at least 50 percent over the original baseline estimate.

experienced design issues associated with the mobile mooring transport vehicle, as well as schedule delays caused by synchronization of JLENS with the Army's Integrated Air and Missile Defense program.[7] JLENS was originally scheduled to enter production in September 2010. However, that same month, an aerostat accident resulted in the loss of one of the JLENS platforms. The accident, as well as recent system integration challenges, led to a decision to not procure production units. JLENS also incurred a critical Nunn-McCurdy program acquisition unit cost breach with the submission of the fiscal year 2013 President's Budget due to a 100 percent reduction in planned procurement quantities—the program previously planned to procure 16 aerostats. Now, the program is scheduled to only acquire 2 aerostats using research and development funding, and is not expected to enter the production phase.

- ISIS is a joint Defense Advanced Research Projects Agency (DARPA) and Air Force science and technology effort initiated by DARPA in 2004. ISIS is to develop and demonstrate a radar sensor system that is fully integrated into a stratospheric airship measuring 510 feet in length and with a payload capacity of 6,600 pounds. ISIS has experienced technical challenges stemming from subsystem development and radar antennae panel manufacturing. Consequently, earlier this year DARPA temporarily delayed airframe development activities, and instead will mainly focus on radar risk reduction activities. During this time period, the ISIS team will develop an airship risk reduction plan and conduct limited airship activities. Based on the radar and airship risk reduction studies, DARPA will reassess the future plan for ISIS with the Air Force.

- The Army initiated development efforts on LEMV in 2010. At over 300 feet in length and with a goal of carrying a 2,500 pound payload, LEMV offers substantive potential ISR capabilities—if the program can meet its performance objectives. LEMV's deployment is behind schedule by at least 10 months (about a 56 percent schedule increase) due to

[7]The Army's Integrated Air and Missile Defense program is being developed to connect sensors, weapons, and a common battle command system across an integrated fire control network to support the engagement of air and missile threats. See GAO, *Defense Acquisitions: Assessments of Selected Weapon Programs*, GAO-09-326SP (Washington, D.C.: Mar. 30, 2009); and *Defense Acquisitions: Assessments of Selected Weapon Programs*, GAO-11-233SP (Washington, D.C.: Mar. 29, 2011).

issues with fabric production, getting foreign parts cleared through customs, adverse weather conditions causing the evacuation of work crews, and first-time integration and testing issues. Also, LEMV is about 12,000 pounds overweight because components, such as tail fins, exceed weight thresholds. According to program officials, the increased weight reduces the airship's estimated on-station endurance at an altitude of 20,000 feet from the required 21 days, to 4 to 5 days. However, current plans call for operating the airship at a lower altitude of 16,000 feet, which is expected to enable an on-station duration time of 16 days with minimal impacts to operational effectiveness (other than about a 24 percent reduction to on-station endurance). According to program officials, the biggest risk to program development was the ambitious 18-month initial development schedule (from June 2010 to December 2011). The Army successfully launched and recovered LEMV during its first flight in August 2012. The Army identified a fiscal year 2012 funding shortfall of $21.3 million resulting from the need for additional engineering and production support to mitigate and resolve technical issues at the LEMV assembly facility.

- The Air Force initiated development efforts on Blue Devil Block 2 in 2010. Much like LEMV, this effort was to deliver a large airship that would carry a 2,500 pound payload in support of the ISR mission. The length of the airship was 370 feet. Prior to its termination in June 2012, the Blue Devil Block 2 airship effort experienced significant technical problems resulting in cost overruns and schedule delays. According to an Air Force official, the Blue Devil Block 2 development effort had a very aggressive development schedule because it was intended to meet an urgent need for use in Afghanistan. Some of the technical problems included the tail fins, which were overweight and failed structural load design testing, rendering the airship not flyable. Other technical problems included the flight control software which experienced problems due to issues related to scaling—although the software worked well with a much smaller scale version of the airship, it did not work well with the much larger Blue Devil Block 2 airship. The Air Force terminated the Blue Devil Block 2 airship effort in June 2012 due to the technical problems experienced with the airframe and the need to avoid substantially increasing costs of the effort. For example, the contractor estimated that the 1-year post-deployment operations and maintenance costs would total $29 million, but the Air Force's cost estimate ranged between $100 and $120 million—an estimate that was at least 245 percent higher than the contractor's estimate. According to an Air Force official, the contractor's estimate did not include costs such as for spare parts and repairs.

Some Rapid Acquisitions Took on Too Much Risk

We found that DOD used its rapid acquisition process to initiate two airship efforts to quickly deliver warfighter capabilities, but significantly underestimated the risks of meeting cost, schedule, and performance goals.[8] DOD has taken a number of steps to provide urgently needed capabilities to the warfighter more quickly and to alleviate the challenges associated with the traditional acquisition process for acquiring capabilities.[9] Some of these steps include quicker requirements validation and reduced levels of oversight, including exemption from disciplined analyses that help to ensure requirements are achievable within available technologies, design, and other resources, and that programs have adequate knowledge in hand before moving forward in the acquisition process. The success of this accelerated acquisition process is predicated on efforts that do not involve high development and acquisition risks, such as limiting technology development by using mature technologies. However, in the case of LEMV and Blue Devil Block 2, the risks of these acquisitions were higher than usual for rapid acquisitions. Specifically:

- The LEMV acquisition strategy was initially approved when technologies were estimated to be at technology readiness levels 4 through 7. At the time, DOD's acquisition guidance recommended a technology readiness level 6 for product development.[10] DOD officials stated that they were willing to assume higher risk with the potential of

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[8]Section 804(b) of the Ike Skelton National Defense Authorization Act for Fiscal Year 2011, Pub. L. No. 111-383, requires, among other things, the acquisition process the Secretary of Defense develops for the fielding of urgent capabilities to be appropriate only for capabilities that can be fielded within a 2-24 month period.

[9]DOD's framework for planning, executing, and funding its weapon programs relies on three decision-making systems—the Defense Acquisition System that relies on DOD Instruction 5000.02, *Operation of the Defense Acquisition System* (Dec. 8, 2008), to guide and manage the development and procurement of major weapon capabilities; the Joint Capabilities Integration and Development System to assess gaps and recommend solutions; and the Planning, Programming, Budgeting, and Execution process to allocate funding resources—all of which involve lengthy time frames, large budgets, and development efforts that can take decades to procure weapon systems.

[10]DOD uses technology readiness levels (TRL) as a tool to assess technology maturity. TRLs are measured on a scale from 1 to 9, beginning with paper studies of a technology's feasibility (TRL 1) and culminating with application of the technology in its final form and under mission conditions (TRL 9). Demonstration that pieces will work together in a test laboratory is TRL 4 and demonstrating that pieces work together in a simulated environment is TRL 5. Testing of a prototype system in a relevant environment is TRL 6 and a major step up from TRL 6 is demonstrating an actual system prototype in a realistic environment, which is TRL 7. Our best practices work has shown that TRL 7 is the level of technology maturity that constitutes low risk for starting a product development program.

developing an asset that had much greater on-station endurance and could provide capabilities on a single platform rather than on multiple aircraft. They stated that the higher risk of the effort was justified because there were multiple other efforts that were already providing surveillance capabilities in theater. DOD officials stated that, at the time the LEMV initiative was started, they expected the airship could be scaled up from a commercially existing demonstration variant and that the Army could meet the 18 month schedule to design, fabricate, assemble, test, and deploy the system. However, as noted earlier, LEMV experienced schedule delays of at least 10 months, largely rooted in technical, design, and engineering problems in scaling up the airship to the Army's needs.

- DOD also significantly underestimated the risk of the Blue Devil Block 2 development effort. The Secretary of Defense designated Blue Devil Block 2 as an urgent need solution to eliminate combat capability deficiencies that had resulted in combat fatalities. According to program officials, it was thought that the Blue Devil Block 2 airship would be a variant of commercially-available conventional airships and therefore deemed the technologies associated with the platform to be mature. However, the part of the program considered to be the lowest risk—the airship platform—turned out to be a high risk development effort. At the time of project cancelation, the Blue Devil Block 2 airship was more than 10,000 pounds overweight, which limited the airship's estimated endurance. The weight issue contributed to other design concerns, the tail fins were too heavy and were damaged during testing, and the flight control software experienced problems related to scaling to a larger airship. The Air Force terminated the acquisition in June 2012.

The experience of these two programs under the urgent needs acquisition process is not unique. We recently reported that urgent needs initiatives that required technology development took longer after contract award to field because of technical challenges and testing delays than initiatives that involved mature technologies.[11] Additionally, as reported in a 2009 Defense Science Board Task Force Study, squeezing new technology

[11]GAO, *Urgent Warfighter Needs: Opportunities Exist to Expedite Development and Fielding of Joint Capabilities,* GAO-12-385 (Washington, D.C.: Apr. 24, 2012).

development into an urgent timeframe creates risks for delays and ultimately may not adequately address an existing capability gap.[12]

DOD Has Provided Limited Oversight to Ensure Coordination of Its Aerostat and Airship Efforts

DOD has not provided effective oversight to ensure coordination of its aerostat and airship development and acquisition efforts. Consequently, these efforts have not been effectively integrated into strategic frameworks, such as investment plans and roadmaps. At the time of our review, DOD did not have comprehensive information on all its efforts nor its entire investment in aerostats and airships. Additionally, DOD's coordination efforts have been limited to specific technical activities, as opposed to having a higher level authority to ensure coordination is effective. These shortcomings may have led to an instance of duplication, which ended when one airship effort was terminated. DOD has recently taken steps to bolster oversight. Whether these steps are sufficient largely depends on the direction DOD intends to take with aerostat and airship programs. If it decides to make significant future investments in efforts, more steps may be needed to shape these investments.

Aerostat and Airship Capabilities Not Effectively Integrated into Strategic Frameworks

We have reported on the value of strategic planning for laying out goals and objectives, suggesting actions for addressing those objectives, allocating resources, identifying roles and responsibilities, and integrating relevant parties.[13] However, DOD has not effectively integrated aerostat and airship capabilities into its strategic frameworks for future acquisitions of unmanned or ISR systems. At the time of our review, DOD did not have a reliable inventory of its aerostat and airship efforts, including insight into its entire investment in aerostats and airships, or an office that could discuss the status of all of these efforts. We found several instances where aerostat and airship efforts were not well integrated into recent strategic planning documents, such as investment plans and

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

[13]GAO, *Defense Space Activities: National Security Space Strategy Needed to Guide Future DOD Space Efforts,* GAO-08-431R (Washington, D.C.: Mar. 27, 2008); and *Unmanned Aerial Vehicles: Improved Strategic and Acquisition Planning Can Help Address Emerging Challenges*, GAO-05-395T (Washington, D.C.: Mar. 9, 2005).

roadmaps, which can help guide and prioritize DOD's investments.[14] For example:

- U.S. Army Unmanned Aircraft Systems Roadmap 2010-2035—which is to inform warfighting functional concepts, contribute to capabilities-based assessments, and assist in the development of resource-informed decisions on new technologies—mentions the concept of LTA vehicles, but does not specify the potential contributions of specific aerostats or airships.
- DOD's Unmanned Systems Integrated Roadmap FY2011-2036—which is to address the recent surge in the use of unmanned systems and describe a common vision for the continued integration of unmanned systems into the DOD joint force structure—includes a description of several aerostat and airship efforts underway, but it does not specifically cover how or whether aerostats and airships could contribute to DOD's force structure.

Strategic frameworks and planning efforts can be essential to the effective oversight of portfolios, especially when they consist of multiple types of acquisitions in various stages of development, production, fielding, and sustainment. Such planning can help ensure DOD has the proper mix of platforms and a balanced investment portfolio among technology development, acquisitions, production, and sustainment activities, and thereby avoid unnecessary overlap in and duplication of effort. Adding aerostats and airships to the mix of other investments would add to the complexity of planning and oversight of relevant portfolios, but doing so could help to make (1) determinations of how aerostats and airships compare to other efforts and (2) effective trade-off decisions based on their capabilities and costs.

[14]Because of classification issues, we are not reporting on the extent to which DOD's most recent ISR Integration Roadmap includes LTA platforms. However, we reported in GAO-11-465 that this roadmap does not represent an integrated investment strategy of ISR efforts across the department. Consequently, DOD was not able to readily identify all of its urgent needs efforts—that include aerostats or airships—or associated costs, including spending on ISR, because it had limited visibility into the entirety of the urgent needs submitted by warfighters.

Coordination Efforts Limited Mainly to Technical Collaboration

Since 2007, DOD significantly increased its investment in airship and aerostat efforts, in large part to respond to the urgent warfighter ISR needs in Iraq and Afghanistan, but also to demonstrate LTA technologies and deliver new capabilities. As a result, numerous organizations throughout DOD have pursued aerostat and airship development and acquisition efforts. For example, the Army oversees and manages the GARP testbed, JLENS, LEMV, and some high altitude airship efforts; the Air Force manages TARS; DARPA and the Air Force are responsible for ISIS; the Navy undertook Star Light and is currently responsible for PGSS and AAFL; and the Office of the Assistant Secretary of Defense for Research and Engineering is responsible for Project Pelican. Given the wide variety of efforts, DOD has taken some positive steps to coordinate the various aerostat and airship development and acquisition efforts it has underway. However, these efforts have mostly occurred at technical levels where working groups, consisting of technologists from industry and government, collaboratively address technical issues, as opposed to having a higher level authority to ensure coordination is effective. DOD officials identified various examples of these coordination efforts that have taken place among the military services and departments:

- The Army formed a working group in which the U.S. Navy Naval Air Systems Command (which manages the PGSS program) participated to develop plans to merge the PGSS and PTDS aerostat rapid fielding initiatives into a Persistence Surveillance Systems-Tethered program of record. This program of record transition is expected to occur in 2014 and should help to ensure effective coordination between the efforts.

- The National Aeronautics and Space Administration (NASA) Ames Research Center signed an interagency agreement in July 2011 with the DOD Office of the Director of Defense Research and Engineering's Rapid Reaction Technology Office to develop a prototype airship referred to as Project Pelican. Project Pelican is the U.S. government's only airship effort to demonstrate ballast-free variable-buoyancy control technology through which the vehicle can control its buoyancy (and therefore go up and down) without the use of ballast and/or ground personnel and ropes. Both agencies agreed to mitigate long-term technical risk by demonstrating this technology. NASA is providing acquisition support services to DOD by overseeing the contractor's technical efforts and DOD is funding the effort.

- The Air Force and DARPA are currently collaborating on the ISIS project. A February 2009 memorandum of agreement between the Air

Force and DARPA outlines their respective roles, responsibilities, and development objectives. The project involves developing a large radar aperture that is integrated into the structure of a station-keeping stratospheric airship supporting wide-area persistent surveillance, tracking, and engagement of ground, maritime, air, and space targets. DARPA is providing program management, technical direction, security management, and contracting support. The Air Force is providing resources for program management, demonstration efforts, equipment, and base operations and support. Additionally, the project has used lessons learned from the Army's HALE-D project, as they are both designed to operate at a high altitude. However, ISIS is unique in that the radar system is integrated into the airship's platform—the radar is part of the airship structure.

- LEMV coordination is occurring among various Army organizations and military services and agencies. For example, the Army obtained lessons learned and best practices for its development of LEMV by leveraging the Navy's AAFL program and the Army's HALE-D effort, and the Navy developed flight-to-ground operational procedures for LEMV. Additionally, the Army has had informal coordination with the Blue Devil Block 2 effort in the past. For example, originally both airships had several diesel engine commonalities (they used the same type of engine), and program officials shared challenges and solutions they discovered as part of the process to modify the engines to meet their respective requirements.

- The Navy's AAFL serves as a flying laboratory and risk reduction test-bed for sensors and other components and has assisted the Air Force with its Blue Devil Block 2 airship development. In 2011, the Air Force provided funding to the Navy to provide training to airship pilots to qualify them to fly the Blue Devil Block 2 airship.

While these efforts indicate some military services and organizations are sharing lessons learned and technical solutions, DOD may be able to realize additional opportunities for coordination within the agency and throughout the government. For example, DOD officials told us that coordination between the LEMV and Blue Devil Block 2 projects and opportunities to share lessons learned had been limited because of their concurrent and accelerated development pace. Also, according to a U.S. Central Command official, information sharing between the PTDS and

PGSS efforts has been limited, because the efforts are managed by different services, in areas such as test reports and operational impacts resulting from adverse weather.[15] According to this official, better sharing of information could help to inform solutions for making aerostats more survivable. PGSS and PTDS program officials stated that the respective programs have steadily increased information sharing (including daily system status reports, aerostat incident reports, contracting information, budgets, and training programs of instruction) and collaboration on common aerostat issues (such as in-theater force protection for system operators, helium supply priorities, aerostat safety and weather information, and staff and crew tactical training).

Potential Duplication Ended with Termination of Airship Effort

The shortcomings in planning, insight, and collaboration may have made some airship efforts susceptible to duplication. We identified two airship development efforts—LEMV and Blue Devil Block 2—that were potentially duplicative at the time of our review. However, the potential duplication ended when the Air Force terminated the Blue Devil Block 2 program in June 2012. Most of the desired capabilities for LEMV and Blue Devil Block 2 were similar, as shown in table 3. According to DOD officials, these two programs were expected to demonstrate ISR capabilities; however, they are two different types of vehicles with different design objectives. LEMV is a hybrid airship demonstration that is developing a new platform and the Blue Devil Block 2 was a conventional airship that was to place sensors on a mature commercial-based platform. However, both were expected to have the capability to conduct ISR missions at low altitude, and share other operational characteristics. For example, both airships were to operate at the same operational altitude of 20,000 feet, were expected to handle a payload weight capacity of 2,500 pounds, and shared some of the same types of sensors. The two airship efforts also were being developed concurrently and were expected to be deployed to Afghanistan for testing and operations around the same time.

[15]The U.S. Central Command has a specific area of responsibility that covers 20 countries in the central area of the globe, including Afghanistan, Bahrain, Iran, and Iraq. U.S. Central Command is currently assessing how these assets are used differently across the military bases. Aerostats are vulnerable to adverse weather conditions in Iraq and especially Afghanistan. From April 2010 to June 2012, there were 58 PGSS and PTDS weather related major incidents.

Table 2: Comparison of LEMV and Blue Devil Block 2 Capabilities as of June 2012[a]

Airships	Long Endurance Multi-Intelligence Vehicle[b]	Blue Devil Block 2
Payload weight capacity (pounds)	2,500	2,500
Operational altitude (feet above mean sea level)	20,000[c]	20,000
Envelope volume (cubic feet)	1,342,000	1,400,000
Sensor type		
Electro-optical/infrared full motion video cameras	x	x
Wide area surveillance sensor		x
Signals intelligence sensor	x	x
Ground motion target indicator radar	x	
Communications relay system	x	x

Source: GAO analysis of DOD data.

[a]The Air Force terminated Blue Devil Block 2 in June 2012.

[b]According to the LEMV program office, the payload is flexible, as LEMV sensors are interchangeable based upon mission need.

[c]According to the LEMV program office, the current operational altitude requirement is 16,000 feet above mean sea level.

DOD Is Bolstering Its Oversight and Coordination but Future Investments Are Not Known

The National Defense Authorization Act for Fiscal Year 2012 directed the Secretary of Defense to designate a senior official with principal responsibility for DOD's airship programs.[16] In June 2012, the Deputy Secretary of Defense designated the Assistant Secretary of Defense for Research and Engineering as the senior official who will be responsible for the oversight and coordination of various airship-related programs across DOD. The statutory direction and appointment of the senior official are positive steps, but it is too early to assess the effectiveness of this official's authorities and responsibilities in integrating and overseeing these activities. As of August 2012, the Office of the Assistant Secretary of Defense for Research and Engineering was defining the details relating to the authority, scope, and responsibilities of this new position. The overarching direction by the Deputy Secretary of Defense, in accordance with the statutory mandate, provides the senior official with authority over

[16]Pub. L. No. 112-81, § 903 (2011).

airship-related efforts. Because aerostat efforts respond to some of the same warfighter requirements as airships, such as for persistent ISR, and share some of the same technologies used in airship development efforts, such as materials, design, and fabrication, common oversight of both airships and aerostats could enable DOD to have better visibility over all of its aerostat and airship efforts and help to ensure these efforts are effectively overseen, planned, and coordinated.

While DOD's overall investment in this area has totaled nearly $7 billion in the past 6 years, near term funding estimates sharply decline beyond fiscal year 2012 and the level of future investment beyond fiscal year 2016 is not known. Until DOD makes the decisions regarding its investments in this area, the proper role of the senior oversight official will not be known. If DOD decides to make significant future investments in aerostat and airship capabilities, the senior official could play a key role in shaping those investments. If no future investments are anticipated, the role of the senior official may necessarily be focused more narrowly on the systems that are fielded or already in development.

Conclusions

Aerostat and airship platforms are not a new concept, but they have recently been embraced in DOD because of their potential to provide continuous coverage capabilities quickly, especially in current military operations. Consequently, numerous organizations throughout DOD have pursued aerostat and airship development and acquisition efforts. DOD quickly initiated some of the larger programs with an eye toward leveraging commercial technologies and delivering capabilities to warfighters quickly to support current operations. But this rush came with high acquisition risk—particularly since there was a lack of knowledge about the amount of modifications and technology development that was required. Moreover, DOD's limited oversight to ensure coordination of all of these efforts has resulted in ineffective integration of capabilities into broader strategic frameworks and limited investment knowledge and collaboration, making them susceptible to duplication. The appointment of the Assistant Secretary of Defense for Research and Engineering as the senior official responsible for the oversight and coordination of various airship-related programs is a positive step, but the role of the position remains to be clearly defined. Yet, the future is uncertain; at this point, no substantive investment is planned for aerostat and airship capabilities. If significant future investment is planned, the senior official could play a valuable role in shaping investments, ensuring they maximize return by integrating them into broader plans so that their capabilities can be leveraged and not unnecessarily duplicative.

Recommendations for Executive Action

To address shortcomings in oversight to improve coordination, we recommend that the Secretary of Defense take the following three actions based on the extent of the department's future investments in aerostats and airships.

- If DOD decides to curtail future investment, focus on ensuring that it has an inventory and knowledge of all current and planned efforts in the short term.
- If DOD decides to significantly increase future investment, include aerostat and airship capabilities in strategic frameworks to ensure visibility into and coordination with relevant efforts, guide innovation, and prioritize investments.
- Ensure the roles and responsibilities of the Assistant Secretary of Defense for Research and Engineering, as the senior official responsible for the oversight and coordination of various airship-related programs, are defined and commensurate with the level of future investment.

Agency Comments and Our Evaluation

We provided a draft copy of this report to DOD, DHS, and NASA for comment. In written comments on a draft of this report, DOD concurred with all three of our recommendations to address shortcomings in oversight to improve coordination of aerostat and airship development and acquisition efforts. DHS and NASA did not have formal comments on the draft report. Additionally, DOD, DHS, and NASA provided technical comments which were incorporated as appropriate.

DOD's written comments are reprinted in appendix V.

We are sending copies of this report to appropriate congressional committees, the Secretaries of Defense and Homeland Security, and the Administrator of the National Aeronautics and Space Administration. In addition, the report will be available at no charge on GAO's website at http://www.gao.gov.

If you have any questions about this report, please contact me at (202) 512-4841 or chaplainc@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Key contributors to this report are provided in appendix VI.

Cristina T. Chaplain
Director
Acquisition and Sourcing Management

Appendix I: Scope and Methodology

To determine what key aerostat and airship systems across the federal government are being developed and acquired, including funding, purpose, and status of these systems, we reviewed documentation and interviewed officials on the status and progress of aerostat and airship development efforts in areas such as requirements, funding, costs, budgets, schedule, contracting, technology maturation, and actual or planned operational characteristics. In doing so, we developed an inventory of key airship and aerostat development and acquisition efforts which enabled a comparison of platform types, performance attributes, and costs. As part of identifying the universe of aerostat and airship efforts in the federal government, we interviewed agency officials and asked them about any knowledge they have regarding other systems that may currently exist. We also conducted Federal Procurement Data System—Next Generation (FPDS-NG) database and internet searches to inform ourselves about existing efforts; the internet searches included unclassified searches and background research. We corroborated and confirmed the accuracy of the FPDS-NG and internet search information with applicable agencies. Based on a review of funding data collected from agencies that we contacted as well as from presidential budget estimates and Selected Acquisition Reports as available, we determined that our definition of “key aerostat and airship systems being planned, developed, and acquired” includes two key criteria (1) total funding of $1 million or more from fiscal years 2007 to 2012, and (2) efforts to plan, develop or acquire systems that include both a platform and payload (such as sensors or cargo) capability. We analyzed documentation and interviewed officials from various offices of the Secretary of Defense; various offices within the Army, Navy, and Air Force; U.S. Central Command; Defense Advanced Research Projects Agency; Defense Logistics Agency; and offices of the Joint Chiefs of Staff. We also analyzed documentation and interviewed officials from civil agencies, including the Department of Homeland Security, Department of Energy, Environmental Protection Agency, National Oceanic and Atmospheric Administration, National Aeronautics and Space Administration, and Office of the Director of National Intelligence. We did not examine the development and utilization of lighter-than-air (LTA) technologies outside of the federal government.

To identify any technical challenges these key aerostat and airship efforts may be facing, we analyzed documentation and interviewed officials from the organizations mentioned above. We used the collected information to assess any identified technical problems impacting the funding, cost, schedule, and performance of airships and aerostats.

To determine how effectively the various key aerostat and airship efforts are being overseen to ensure coordination, and identify any potential for duplication, we assessed aerostat and airship investments, acquisitions, capabilities, and operations by analyzing documents and interviewing officials from the organizations listed above, analyzing the inventory of key efforts developed under our first objective, and reviewing prior GAO work for relevant criteria. Specifically, we assessed oversight at the programmatic and enterprise levels by reviewing organizational roles, responsibilities, and authorities as they relate to aerostat and airship development, acquisition, and operations efforts. We also determined the extent to which plans and planning activities integrated aerostat and airship development and acquisition efforts and capabilities within the Department of Defense (DOD). Reviewed plans and planning activities included architectures, roadmaps, investment plans, and requirements development. We also used the information relating to various aspects of the development and acquisition efforts, such as requirements, and actual or planned performance attributes, to assess whether any of the efforts are potentially duplicative.

We conducted this performance audit from June 2011 to October 2012 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 reasonable basis for 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.

Appendix II: Examples of Civil Government Use of Aerostats

Table 3: Civil Government Agencies' Aerostat Usage

Essentials	Purpose and status
Lead agency: Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA) Number of units: 2 Total costs: $35,475	The purpose of DOC's NOAA aerostats is to collect wind data up to approximately 1,641 feet above the ground. NOAA procured the aerostats, ground station, and supporting equipment in September 2011.
Lead agency: Department of Energy (DOE), Office of Science Number of units: 1 Fiscal year (FY) 10 to FY12 operations and maintenance costs: $275,529	Over the past 20 years, DOE's Office of Science has supported a national scientific user facility called the Atmospheric Radiation Measurement Climate Research Facility, which is a unique system for continuous observations, capturing fundamental data on atmospheric radiation, cloud and aerosol properties. Since fiscal year 2010, DOE's Office of Science has funded the use of a contracted aerostat to support research carried out through the Atmospheric Radiation Measurement Climate Research Facility.
Lead agency: Environmental Protection Agency (EPA) Number of units: 5 FY09 to FY11 aerostats and equipment purchase costs: $35,135	In 2009 EPA developed a tethered, aerostat-lofted sampling package for the purpose of sampling air emissions from open sources. Multiple aerostats have been purchased to support increasing payloads. EPA's program has been largely funded through a project with DOD's Strategic Environmental Research and Development Program to characterize emissions from open burning and open detonation of military ordnance. EPA will continue its emissions monitoring program using aerostats only if it can secure additional funding. Otherwise, the program will cease to exist.
Lead agency: National Aeronautics and Space Administration (NASA) Number of units: For the most part, NASA does not own aerostats, but funds research using them Costs: NASA reported funding a total of $150,000 for research using aerostats and approximately $35,000 for aerostats at the Wallops Flight Facility	According to NASA, they occasionally fund research that deploys tethered balloons for atmospheric and weather observations. Also, NASA's Jet Propulsion Laboratory continues to use tethered balloons for climate research. NASA plans to continue funding atmospheric and weather research using tethered balloons. For example, in fiscal year 2013, NASA plans to fund atmospheric and weather research that will use two tethered balloons in Yen Bai, Vietnam. Furthermore, NASA Goddard Space Flight Center's Wallops Flight Facility owns and operates small commercially produced tethered blimps (advertising type) within the restricted airspace over Wallops Island. These aerostat systems are used for visibility markers during range operations and for lifting miniature experimental instrument packages.

Source: GAO analysis of U.S. government data.

Appendix III: DOD Aerostat and Airship Development, Acquisition, and Operations Efforts

Table 4: Aerostat and Airships Essentials, Purpose, and Status

Essentials[a]	**Purpose and status**
Aerostats	
Name: Geospatial Airship Research Platform (GARP) Lead service/agency: Army Prime contractor: Aerostar and Lindstrand Technologies Total number of operational contractor personnel: 8; 4 each for launch operation Number of units: 2 Operational altitude (feet above mean sea level): Up to 3,000 above ground level Sensor type: various, including electro-optical, infrared, and spectral cameras; radars; and communication relay payloads Fiscal Year (FY) 08-FY10 costs: $9.4 million	According to an official from the Army's U.S. Army Space and Missile Defense Command Battle Laboratory, the facility uses GARP as a testing platform for intelligence, surveillance, and reconnaissance (ISR) and communications payloads.
Name: Joint Land Attack Cruise Missile Defense Elevated Netted Sensor (JLENS) Lead service/agency: Army Prime contractor: Raytheon Total number of operational contractor personnel: not applicable, because system is not yet fielded Number of units: 2 Operational altitude (feet above mean sea level): 10,000 Sensor type: radars FY07-FY16 costs: $2,555.6 million	The Army's JLENS major defense acquisition program, established in 1996 as the Joint Aerostat Project, will provide over-the-horizon detection and tracking of land-attack cruise missiles and other targets. The Army is developing JLENS in two spirals. Spiral 1 is complete and served as a test bed to demonstrate the concept. Spiral 2 will utilize two aerostats with advanced sensors for surveillance and tracking, as well as mobile mooring stations, communications payloads, and processing stations. JLENS will provide surveillance and engagement support to other systems. JLENS entered the system development phase in August 2005. As we previously reported, the program has experienced design issues associated with the mobile mooring transport vehicle, as well as schedule delays caused by synchronization of JLENS with the Army's Integrated Air and Missile Defense program. According to program acquisition documentation, JLENS was originally scheduled to enter production in September 2010. However, that same month, an aerostat accident resulted in the loss of one of the JLENS platforms. The accident, as well as recent system integration challenges, caused delays to the program's production decision. Moreover, according to program acquisition documentation, the JLENS program incurred a critical Nunn-McCurdy breach for program acquisition unit cost with the submission of the fiscal year 2013 President's Budget due to a 100 percent reduction in planned procurement quantities. The total program quantity was reduced from 16 to 2 aerostats. In May 2012, the Under Secretary of Defense for Acquisition, Technology and Logistics directed the Secretary of the Army to restructure the JLENS program to consist of two aerostats. The Secretary of the Army was also directed to provide a status of the program, based on development test and evaluation results, during an interim program review scheduled for the third quarter of fiscal year 2013.

Essentials[a]	Purpose and status
Name: Persistent Ground Surveillance System (PGSS) Lead service/agency: Navy Prime contractor: Aerostar and TCOM Total number of operational contractor personnel: 400; 7 to 8 contractors needed per site Number of units: 59 Operational altitude (feet above mean sea level): 6,000 to 9,000 Sensor type: electro-optical/ infrared sensors; unattended transient acoustic measurement and signatures intelligence sensor, wide-area sensor system, and communications relay system FY09-FY13 costs: $2,108.4 million	The Office of the Secretary of Defense for Acquisition, Technology and Logistics initiated PGSS in fiscal year 2010 as a joint capability technology demonstration in response to a series of commanders' urgent requests for additional ISR support in Afghanistan. PGSS is intended to provide a family of affordable and small footprint aerostat surveillance systems. A total of 59 PGSS aerostats have been purchased by the Navy for deployment to forward operating bases in Afghanistan: 31 were built in fiscal year 2010, and 28 in fiscal year 2011. Although the Navy acquires and operates PGSS aerostats, the Army funds the program and has proposed its inclusion in a new program of record—named Persistent Surveillance System-Tethered (PSST). A capability development document for PSST should be finalized by the end of the summer. According to DOD, PGSS aerostats deployed in the U.S. Central Command area of responsibility have been effective ISR assets.
Name: Persistent Threat Detection System (PTDS) Lead service/agency: Army Prime contractor: Lockheed Martin Total number of operational contractor personnel: About 650; 8 to 10 contractors needed per site Number of units: 66 Operational altitude (feet above mean sea level): 8,000 Sensor type: electro-optical/ infrared cameras, unattended transient acoustic measurement and signatures intelligence sensor, ground moving target indicator/dismount moving target indicator radar, and a wide-area sensor system FY07-FY16 costs: $3,170.5 million	Like the PGSS aerostats, PTDS aerostats were deployed (to Iraq in 2004 and Afghanistan in 2007) in response to a series of commanders' urgent requests for additional ISR support. However, PTDS is a bigger system than PGSS that is practically immobile. The Army plans to have a total of 66 PTDS aerostats; 34 have been deployed to Afghanistan, one is used for testing in the United States, and the remainder are in production or in transit for use in Afghanistan. According to DOD, PTDS aerostats deployed in the U.S. Central Command area of responsibility have been effective ISR assets. Like PGSS, the Army also proposed PTDS for inclusion in the PSST program of record. However, the Army is expected to keep the PGSS aerostats and phase out PTDS. Upon completion of operations in Afghanistan, the Army is considering deploying a few PTDS for training and for use by the Department of Homeland Security (DHS).
Name: Rapid Aerostat Initial Development (RAID) Lead service/agency: Army Prime contractor: Raytheon Total number of operational contractor personnel: 252 Number of units: 21 Operational altitude (feet above mean sea level): 1,000 above ground level Sensor type: thermal imaging sensors FY07-FY16 costs: $225.0 million	The RAID aerostats were first deployed to Afghanistan in 2001 to provide force protection in response to an urgent need request. However, due its small size, it was never ideal for use in inclement weather. As a result, the Army acquired a larger aerostat—PTDS. The Army procured a total of 21 RAID aerostats—19 were deployed to Iraq and 2 were used as training assets in the United States. The 19 RAID aerostats deployed to Iraq were moved to Kuwait and are no longer in use.

Essentials[a]	Purpose and status
Name: Rapidly Elevated Aerostat Platform (REAP)-XL B Lead service/agency: Army and Navy Prime contractor: Information Systems Laboratories Total number of operational contractor personnel: Army: 4, 2 per unit; Navy: unknown Number of units: 3 Operational altitude (feet above mean sea level): Army: 1,000 above ground level; Navy: Up to 1,000 Sensor type: Army: electro-optical/infrared/short wave infrared cameras; Navy: communication equipment Navy Working Capital Fund Capital Investment Program FY 10 costs: $668,000 Army: FY 11 costs: $4.7 million	The Army needed a smaller aerostat for persistent surveillance during short duration missions, for example, to rebuild a bridge, or at a polling location during elections, in response to an urgent need request. REAP-XL B can be launched from the back of a High Mobility Multipurpose Wheeled Vehicle (Humvee) by two people in 10 minutes. The Navy tested a REAP-XL B platform as an extended communications relay system that can be operated from shore to reduce testing and integration costs. Two REAP-XL B prototype aerostats were deployed to Afghanistan. According to an Army official, officials from U.S. Central Command and the Army are conducting a 90-day assessment of REAP-XL's operational performance. Although it is too early to determine if REAP-XL will be part of a program of record, as many as 35 more could be acquired if it is determined that they can operate in Afghanistan's high altitude, according to an Army Intelligence Futures Directorate official. The Navy's REAP-XL B aerostat is currently in storage, according to the Navy.
Name: Tethered Aerostat Radar System (TARS) Lead service/agency: Air Force Current sustainment service contractor: ITT Systems Total number of operational contractor personnel: approximately 249 at 8 operational sites, logistics center, and program management office Number of units: 8 Operational altitude (feet above mean sea level): 14,000 to 15,000 depending on model type Sensor type: radars and communication systems FY07-FY16 costs: $350.0 million	The TARS aerostat radar network began operations identifying low-flying, small aircraft involved in drug trafficking along the southern U.S. border in 1978. Currently, there are eight operational TARS sites supporting DOD's counterdrug detection and monitoring mission, as well as North American Aerospace Defense Command's air sovereignty mission. TARS sites are treated as remote surveillance sensor sources. Surveillance data from each radar is transmitted to DOD and DHS operations centers. TARS is in the operational sustainment phase of the acquisition life-cycle and there are currently no plans to replace, augment, or complement its baseline capabilities. DHS is funding science and technology research that could enhance future TARS sensor imaging capabilities.
Airships	
Name: Advanced Airship Flying Laboratory (AAFL) Lead service/agency: Navy Prime contractor: Integrated Systems Solutions, Inc. Total number of operational contractor personnel: 20 Number of units: 1 Operational altitude (feet above mean sea level): 1,000 to 7,500 Sensor type: AAFL operates as a surrogate test-bed for various communications and sensor systems FY07-FY12 costs: $14.1 million	Since 2007, the surrogate test-bed airship has been used across the country to evaluate a variety of DOD and other U.S. government sensor and communication systems (including intelligence, surveillance, and reconnaissance (ISR) assets) in an airborne environment. The airship also assisted in the search for oil and distressed wildlife during the 2010 Deepwater Horizon disaster. The Navy is conducting pilot training in the United States in support of Army programs. The Army has provided sufficient funding for continued operations through March 2013.

Essentials[a]	Purpose and status
Name: Blue Devil Block 2 Lead service/agency: Air Force Prime contractor: MAV6 Total number of operational contractor personnel: to be determined Number of units: 1 Operational altitude (feet above mean sea level): 20,000 Sensor type: Wide area field of view electro-optical and infrared cameras; narrow field of view electro-optical and infrared full motion video cameras; and signals intelligence sensor FY10-FY12 costs: $243.6 million	A contract was awarded in October 2010 to begin the Blue Devil Block 2 airship development initiative in response to U.S. Central Command urgent requirements for ISR capabilities to address the growing need for persistent improvised explosive device surveillance and detection in Afghanistan. The Blue Devil Block 2 airship is intended to demonstrate persistent multi-intelligence ISR capabilities for 3 to 7 days, at an altitude of 20,000 feet. The program was terminated effective June 2012. It had been scheduled to deploy “beyond September 2012,” at least one year later than originally scheduled. However, the contractor has been directed to pack and crate the airframe and transport it to an Air Force storage facility at the end of the contract period. As a result, the Air Force will not deploy the Blue Devil Block 2 airship to Afghanistan as planned.
Name: High Altitude Endurance-Demonstrator (HALE-D) Lead service/agency: Army Prime contractor: Lockheed Martin Total number of operational contractor personnel: not applicable, HALE-D is a science and technology effort Number of units: 1 Operational altitude (feet above mean sea level): 60,000 Sensor type: high resolution electro-optical camera FY08-FY11 costs: $36.3 million	HALE-D is a science and technology effort that is part of the Army’s High Altitude Airship program, intended to demonstrate persistent on-station ISR capabilities at high altitudes. A solar powered airship, HALE-D is supposed to fly at an altitude of 60,000 feet for more than 14 days. In July 2011, on its first flight, HALE-D experienced a technical failure 3 hours into a planned 14-day mission. Its envelope and solar cells were destroyed, and its payload was damaged by a fire during recovery operations. According to the program office, the project does not currently have funding for continued demonstration efforts.
Name: HiSentinel Lead service/agency: Army Prime contractor: Southwest Research Institute Total number of operational contractor personnel: not applicable, HiSentinel is a science and technology effort Number of units: 2; HiSentinel50 and HiSentinel80 Operational altitude (feet above mean sea level): HiSentinel50: 66,300; HiSentinel80: 66,000 Sensor type: HiSentinel50: High resolution camera and communication system; HiSentinel80: Hi-resolution electro-optical camera and communications system FY07-FY11 costs: $11.2 million	Like HALE-D, HiSentinel is a science and technology effort that is part of the Army’s High Altitude Airship program, intended to demonstrate persistent on-station ISR capabilities at high altitudes. Specifically, both HiSentinel 50 and 80 are solar-powered airships intended to fly at altitudes of approximately 66,000 feet for greater than one day. They are both in a flaccid state on the ground prior to launch and the envelopes achieve their final shape as the helium gas within expands with increasing altitudes. In June 2008, HiSentinel50 flew up to an altitude of 66,400 feet, and maintained that altitude for a total of 3 minutes. In November 2010, the follow-on demonstrator, HiSentinel80, experienced a propulsion system failure and landed 8 hours into a planned 24-hour mission. Like Hale-D, the program office stated that the project does not currently have funding for continued demonstration efforts.

Essentials[a]	Purpose and status
Name: Integrated Sensor is Structure (ISIS) Lead service/agency: Defense Advanced Research Projects Agency (DARPA) and Air Force Prime contractor: Lockheed Martin Total number of operational contractor personnel: not applicable, ISIS is a demonstration prototype Number of units: 1 Operational altitude (feet above mean sea level): 65,000 Sensor type: air, ground, and surface moving target indicator radar system FY07-FY14 costs: $506.1 million	The joint DARPA and Air Force ISIS project, initiated in 2004 as a science and technology effort, is intended to develop and demonstrate a radar sensor of unprecedented proportions that is fully integrated into a stratospheric airship to support the need for persistent wide-area surveillance, tracking, and engagement of time-critical air and ground targets in urban and rural environments. The demonstrator airship is expected to fly for 365 days at an altitude of 65,000 feet. ISIS has experienced technical challenges stemming from subsystem development and radar antennae panel manufacturing. Consequently, earlier this year DARPA temporarily delayed airframe development activities, and instead will mainly focus on radar risk reduction activities. During this time period, the ISIS team will develop an airship risk reduction plan and conduct limited airship activities. Based on the radar and airship risk reduction studies, DARPA will reassess the future plan for ISIS with the Air Force.
Name: Long Endurance Multi-Intelligence Vehicle (LEMV) Lead service/agency: Army Prime contractor: Northrop Grumman Total number of operational contractor personnel: 35 Number of units: 1 Operational altitude (feet above mean sea level): 20,000 Sensor type: Electro-optical/infrared full motion video cameras; ground motion target indicator radar; communication relay package; and signal intelligence system. According to the LEMV program office, the payload is flexible based upon mission need as LEMV sensors are interchangeable, based upon mission need. FY07-FY15 costs: $356.2 million	LEMV is a technology demonstration project, expected to develop a hybrid prototype airship for ISR purposes in a forward combat environment. The project was initiated in response to an urgent need request. The Army is supposed to complete system level development and testing within the United States within 18 months after contract award (June 2010) and be ready for transport to Afghanistan for a joint military utility assessment and follow-on demonstration. The required on-station duration time is 21 days at an altitude of 20,000 feet. Pending the results of the joint military utility assessment and other reviews and evaluations, the Army will determine whether or not to pursue a program of record. According to the program office, the LEMV hybrid airship is scheduled to undergo 33 manned flights totaling approximately 500 hours. The Army successfully launched and recovered LEMV during its first flight in August 2012. The initial date for deployment was January 2012; currently, the deployment date is indefinite. LEMV development is behind schedule 10 months (representing about a 56 percent schedule increase) due to issues with fabric production, getting foreign parts through customs, adverse weather conditions causing the evacuation of work crews, and first time integration and testing issues. Also, LEMV is 12,000 pounds overweight because it has weight issues with sub-systems, such as tailfins, exceeding weight thresholds. According to the program, the increased weight reduces the airship's estimated on-station endurance at an altitude of 20,000 feet from the required 21 days to 4 to 5 days, representing at least a 76 percent reduction However, current plans, according to program officials, call for operating the airship at 16,000, feet which should enable on-station duration time to be 16 days with minimal impacts to operational effectiveness (other than about a 24 percent reduction to on-station endurance). The biggest risk to program development is the ambitious schedule of 18 months. The Army identified a fiscal year 2012 funding shortfall of $21.3 million resulting from the need for additional engineering and production support to mitigate and resolve technical issues at the LEMV assembly facility.

Essentials[a]	Purpose and status
Name: Project Pelican Lead service/agency: Office of the Assistant Secretary of Defense for Research and Engineering (OASDR&E), National Aeronautics and Space Administration (NASA), and the Air Force Research Laboratory Prime contractor: Aeros Aeronautical Systems Corporation Total number of operational contractor personnel: not applicable, the airship is a technology demonstrator and is not intended for operational performance beyond the requirements of the demonstration activities Number of units: 1 Operational altitude (feet above mean sea level): not applicable, the airship is a technology demonstrator and is not intended for operational performance beyond the requirements of the demonstration activities Sensor type: not applicable, the airship is a technology demonstrator and is not intended for operational performance beyond the requirements of the demonstration activities FY08-FY11 costs: $42.4 million	According to OASDR&E program officials, Project Pelican was initiated in 2008 as a science and technology demonstration effort intended to develop a hybrid airship with a rigid internal structure and test airship buoyancy control technologies. NASA's Ames Research Center, the contract servicing agent for OASDR&E, and the Air Force Research Laboratory are also involved in the management and oversight of this project that, according to the NASA Ames Research Center program office, "is considered a game changer in the airship world" because the key effort is to control buoyancy without using external ballast. The airship built under Project Pelican is not intended for operational performance beyond the requirements of the demonstration activities. But, according to OASDR&E program officials, once all the necessary technologies have been proven to work together, the effort will be scaled to provide ISR or heavy lift capabilities in the long-term. According to the NASA Ames Research Center program office, the Project Pelican demonstrator airship is expected to be tested at the end of fiscal year 2012.
Name: Star Light Lead service/agency: Navy Prime contractor: Global Near Space Services Total number of operational contractor personnel: 8 Number of units: 1 Operational altitude (feet above mean sea level): 65,000 to 85,000 Sensor type: no specific sensor was identified under the demonstration effort FY10 costs: $2.1 million	The Star Light airship, initiated as a science and technology effort, was expected to operate at between 65,000 to 85,000 feet, with an on station duration of between 30 to 120 days, depending on the time of year and the wind speed. A specific sensor was never identified. The program began and was terminated in 2010 due to insufficient funding.

Source: GAO analysis of DOD data.

[a]Funding data have been adjusted to fiscal year 2012 dollars.

Appendix IV: Funding Calculations for Aerostats and Airships, Fiscal Years 2007 through 2016

Table 5: Total Aerostat Funding, Fiscal Years 2007 through 2016

(In millions of fiscal year 2012 dollars, rounded to nearest tenth)

	Fiscal year										
Effort	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**Total**
Geospatial Airship Research Platform (GARP)											**$9.4**
Research, development, test, and evaluation (RDT&E)		$3.2	$2.9	$3.3							
Joint Land Attack Cruise Missile Defense Elevated Netted Sensor (JLENS)											**$2,555.6**
RDT&E	$255.9	$488.6	$357.1	$325.7	$405.1	$327.3	$187.4	$92.4	$30.9	$22.6	**$2,493.1**
Military Construction				$20.5		$42.0					**$62.5**
Persistent Ground Surveillance System (PGSS)											**$2,108.4**
RDT&E			$1.5	$1.5		$20.0					**$23.1**
Procurement			$105.7	$454.6	$182.9	$191.0	$182.1				**$1,116.4**
Operations and Maintenance (O&M)			$7.8	$13.68	$163.3	$366.0	$418.3				**$968.9**
Persistent Threat Detection System (PTDS)											**$3,170.5**
RDT&E	$0.3	$0.4	$4. 6	$0.0	$0.1						**$5.4**
Procurement		$26.3	$299.1	$776.1	$181.9	$28.0	$15.7	$15.5	$17.1	$16.8	**$1,376.5**
O&M		$47.4	$60.9	$79.4	$104.7	$108.0	$339.6	$350.3	$349.3	$349.0	**$1,788.6**
Rapid Aerostat Initial Development (RAID)											**$225.0**
Procurement	$7.4										**$7.4**
O&M	$12.2	$20.0	$20.7	$21.6	$22.3	$23.0	$23.6	$24.2	$24.7	$25.3	**$217.5**
Rapidly Elevated Aerostat Platform (REAP)-XL B											**$5.3**
Navy Working Capital Fund Capital Investment Program				$0.7							
RDT&E					$4.7						

Effort	Fiscal year 2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total
Tethered Aerostat Radar System (TARS)											**$350.0**
RDT&E				$2.0							**$2.0**
Procurement	$5.4	$5.4	$7.2	$5.3	$5.4	$5.6	$5.8	$5.5	$2.8	$3.8	**$52.3**
O&M	$31.3	$28.9	$28.1	$29.7	$29.5	$29.7	$29.6	$29.3	$29.7	$29.8	**$295.7**

Source: GAO analysis of DOD data.

Table 6: Total Airship Funding, Fiscal Years 2007 through 2016

(In millions of fiscal year 2012 dollars, rounded to nearest tenth)

Effort	Fiscal year 2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	TOTAL
Advanced Airship Flying Laboratory (AAFL, also known as MZ-3A)											$14.1
RDT&E	$0.2		$0.6	$1.6							$2.4
O&M				$6.2		$5.6					$11.7
Blue Devil Block 2											$243.6
RDT&E				$54.4	$126.2	$63.0					$243.6
High Altitude Endurance-Demonstrator (HALE-D)											$36.3
RDT&E		$16.7	$11.5	$5.3	$2.8						$36.3
Hi-Sentinel											$11.2
RDT&E	$1.3	$4.1	$0.7	$2.2	$2.8						$11.2
Integrated Sensor is Structure (ISIS)											$506.1
RDT&E	$25.1	$30.5	$81.2	$250.3	$24.1	$60.2	$34.7				$506.1
Long Endurance Multi-Intelligence Vehicle (LEMV)											$356.2
RDT&E				$130.9	$101.4	$43.6	$25.8	$28.1	$26.5		$356.2
Project Pelican											$42.4
RDT&E		$6.3	$10.9	$14.4	$10.9						$42.4
Starlight											$2.1
RDT&E				$2.1							$2.1

Source: GAO analysis of DOD data.

Appendix V: Comments from the Department of Defense

The report number changed from GAO-12-906 to GAO-13-81.

OFFICE OF THE UNDER SECRETARY OF DEFENSE
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WASHINGTON, DC 20301-5000

INTELLIGENCE

11 Oct 2012

Ms. Cristina T. Chaplain
Director
Acquisition and Sourcing Management
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548

Ms. Chaplain

This is the Department of Defense response to the GAO draft report, GAO-12-906, "DEFENSE ACQUISITIONS: Future Aerostat and Airship Investment Decisions Drive Oversight and Coordination Needs," dated September 5, 2012 (GAO Code 121000).

The contribution of airships to the ongoing warfight, especially the Army's Persistent Threat Detection System and the Persistent Ground Surveillance System, could be better stated. This would ensure the reader received a more balanced perspective on the life-saving value of these systems. A sensitivity review was accomplished and this report contains no information which should not be released to the public.

The Department concurs with the GAO report and is actively addressing these recommendations as outlined in the attachment. Thank you for the opportunity to review and comment on this GAO report.

Sincerely,

Kevin P. Meiners
Deputy Under Secretary of Defense
(Intelligence Strategy, Programs and Resources)

Attachment(s):
DoD Comments to GAO Recommendations

GAO DRAFT REPORT DATED SEPTEMBER 5, 2012
GAO-12-906 (GAO CODE 121000)

"DEFENSE ACQUISITIONS: FUTURE AEROSTAT AND AIRSHIP INVESTMENT DECISIONS DRIVE OVERSIGHT AND COORDINATION NEEDS"

DEPARTMENT OF DEFENSE COMMENTS
TO THE GAO RECOMMENDATIONS

RECOMMENDATION 1: The GAO recommends that the Secretary of Defense, if DoD decides to curtail future investment, focus on ensuring that DoD has an inventory and knowledge of all current and planned efforts in the short term.

DoD RESPONSE: Concur. While DoD acknowledges an intent to reduce its airship investment in the short term, it also believes that hybrid airship design and similar emerging technologies show great promise in closing current capability gaps; particularly in the areas of persistent Intelligence, Surveillance and Reconnaissance (ISR) and logistics. The reduction of committed resources is a reflection of current fiscal realities and Department priorities. DoD agrees that the investment and technical information from airship efforts across the department needs to be captured and cataloged. This action is currently underway and will provide a sound stepping off point to develop a future strategic Lighter-Than-Air (airships and aerostats) roadmap and assist decision makers in maximizing the efficacy of future investments.

RECOMMENDATION 2: The GAO recommends that the Secretary of Defense, if DoD decides to significantly increase future investment, include aerostat and airship capabilities in strategic frameworks to ensure visibility into and coordination with relevant efforts, guide innovation, and prioritize investments.

DoD RESPONSE: Concur. Despite no intent for robust short term investment, the DoD is still committed to staying abreast of developments in the airship community, identifying potential airship solutions to capability gaps, monitoring commercial activity and engaging in collaborative efforts when appropriate.

RECOMMENDATION 3: The GAO recommends that the Secretary of Defense ensure the roles and responsibilities of the Assistant Secretary of Defense for Research and Engineering, as the senior official responsible for the oversight and coordination of various airship-related programs, are defined and commensurate with the level of future investment.

2

DoD RESPONSE: Concur. The DoD recognizes the significant investment already made in airship technology and the imperative for strong Department oversight and guidance. The Senior Executive for Airship Programs is responsible for:

- Oversight and coordination of airship related activities across DoD.
- Ensure cross-fertilization of technology.
- Identifying duplicative efforts and initiating redirection or termination as required.
- Coordinating interagency efforts, especially with DoE, DoT and DHS.
- Exploring additional DoD missions made possible by evolving airship technologies.
- Directing areas of research that target the most salient technical challenges.
- Sponsoring airship related conferences, reviews, table top exercises, and academic studies as appropriate.
- Providing an annual status report that outlines airship related developments and suggests areas for future Doctrine, Organization, Training, Material, Leadership and Education, Personnel and Facilities (DOTMLPF) efforts.
- Creating subordinate task specific activities or assigning individual duties as required to ensure successful execution of these responsibilities.

Appendix VI: GAO Contact and Staff Acknowledgments

GAO Contact

Cristina T. Chaplain, (202) 512-4841 or chaplainc@gao.gov.

Staff Acknowledgments

In addition to the contact named above, key contributors to this report were Art Gallegos, Assistant Director; Ami Ballenger; Jenny Chanley; Maria Durant; Arturo Holguín; Rich Horiuchi; Julia Kennon; Tim Persons; Sylvia Schatz; Roxanna Sun; and Bob Swierczek.

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