NASA

National Aeronautics and Space Administration

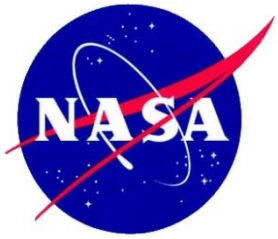
Office of Inspector General

Written Statement for the U.S. Senate Subcommittee on Commerce, Justice, and Science, Committee on Appropriations

THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION'S FISCAL YEAR 2016 BUDGET REQUEST: TOP MANAGEMENT AND PERFORMANCE CHALLENGES

Statement of Paul K. Martin
Inspector General
National Aeronautics and Space Administration

April 16, 2015



Office of Inspector General

To report, fraud, waste, abuse, or mismanagement, contact the NASA OIG Hotline at 800-424-9183 or 800-535-8134 (TDD) or visit http://oig.nasa.gov/hotline.html. You can also write to NASA Inspector General, P.O. Box 23089, L'Enfant Plaza Station, Washington, D.C. 20026. The identity of each writer and caller can be kept confidential, upon request, to the extent permitted by law.

To suggest ideas for or to request future audits contact the Assistant Inspector General for Audits at http://oig.nasa.gov/audits/staff.html.

Chairman Shelby, Ranking Member Mikulski, and Members of the Subcommittee:

The Office of Inspector General (OIG) is committed to providing independent, aggressive, and objective oversight of the National Aeronautics and Space Administration (NASA). Thank you for the opportunity to provide this written statement discussing our view of the major management and performance challenges facing NASA.

Over the past few months, NASA has advanced its space exploration and science missions with a successful December test flight of the Orion Multi-Purpose Crew Vehicle (Orion) and the January launch of the Soil Moisture Active-Passive mission. Unfortunately, the Agency also experienced some disappointments, most prominently the October 2014 failure of an Orbital Sciences Corporation (Orbital) resupply mission to the International Space Station (ISS or Station) that destroyed the company's rocket, capsule, and all NASA cargo aboard and caused at least $15 million of damage at the Wallops Flight Facility.

Prior to the failure, Orbital had five more cargo resupply flights scheduled: two in 2015 and three in 2016. After the mishap, the company proposed to fulfill its remaining contractual obligations to NASA in four resupply flights rather than five – a proposal to which NASA recently agreed. As a follow-up to our previous work on NASA's management of its commercial cargo program, we are examining the ramifications of Orbital's launch failure on the Agency's efforts to resupply the ISS and the challenges facing Orbital and NASA as the company seeks to meet its obligations under the resupply contract.

Moving forward, NASA's ability to sustain its ambitious exploration and science programs will be driven in large measure by whether it can adequately fund and manage such high-profile initiatives as the Space Launch System (SLS) rocket, Orion capsule, and related launch infrastructure at Kennedy Space Center; James Webb Space Telescope; Mars 2020 Rover; and its commercial cargo and crew programs. In a November 2014 report, we identified seven top challenges facing NASA:

- Managing NASA's Human Space Exploration Programs: the ISS, Commercial Crew Transportation, and the SLS
- Managing NASA's Science Portfolio
- Ensuring Continued Efficacy of the Space Communications Networks
- Overhauling NASA's Information Technology Governance Structure
- Ensuring the Security of NASA's Information Technology Systems
- Managing NASA's Infrastructure and Facilities
- Ensuring the Integrity of the Contracting and Grants Processes and the Proper Use of Space Act Agreements

A copy of our full report is appended to this statement.

In this statement, I will highlight three issues: (1) securing commercial transportation for astronauts to low Earth orbit; (2) developing the SLS, Orion, and Ground Systems Development and Operations (GSDO) Programs; and (3) ensuring continued efficacy of the space communications networks.

Commercial Crew Transportation

Since the end of the Space Shuttle Program in 2011, the United States has lacked a domestic capability to transport astronauts to the ISS. Between 2012 and 2017, NASA will pay Russia over $2.1 billion to ferry 36 NASA astronauts and international partners to and from the Station at prices ranging from $47 million to more than $76 million per round trip.[1] To address the lack of U.S. capacity, NASA has provided approximately $1.6 billion in funding since 2010 to several commercial spaceflight companies to spur development of a domestic crew transportation capability. The Agency originally hoped commercial flights would be operating by 2016, but later adjusted this goal to late 2017.

NASA is closing out the third phase of the Commercial Crew Program in which it worked with three companies – The Boeing Company (Boeing), Space Exploration Technologies (SpaceX), and Sierra Nevada Corporation – using a combination of funded Space Act Agreements and more traditional FAR-based contracts to develop commercial crew transportation capabilities. Both Boeing and SpaceX completed Critical Design Reviews for their systems in 2014.[2]

The fourth and final phase of the Program began in September 2014 with award of $6.8 billion in firm-fixed-price contracts to Boeing ($4.2 billion) and SpaceX ($2.6 billion) to complete development of and certify for operation the companies' spaceflight systems and provide NASA with up to six flights each to the Station.

The OIG reviewed NASA's management of the Commercial Crew Program in 2013 and identified a number of challenges facing the Agency, including unstable funding, providing timely requirement and certification guidance, and effective coordination with other Federal agencies.[3] Since that time, funding for the Program has increased with an appropriation of $805 million in fiscal year 2015 and a proposal for $1.24 billion in the President's fiscal year 2016 budget. We are planning to open a follow-on review of the Program later this year.

Space Launch System, Orion, and Ground Systems Development and Operations

Whatever its destination, successful development of the SLS, NASA's new heavy lift rocket; the accompanying Orion crew capsule; and related launch infrastructure remain critical to the overall success of NASA's human exploration effort. While I earlier mentioned a successful December test flight of Orion, NASA's current goal is to achieve first flight of an integrated SLS rocket and Orion capsule no later than November 2018.

NASA is designing the SLS with an evolvable architecture that can be tailored to accommodate progressively longer and more ambitious missions. Initial versions of the vehicle will be capable of lifting 70-metric tons, with later versions designed to lift 130-metric tons and include an upper stage to travel to deep space. Orion will be mounted atop the SLS and serve as the crew vehicle for up to four astronauts.

---

[1] NASA recently announced its intention to purchase six additional seats from the Russians for round-trip flights in 2018 and 2019 as a back-up capability to the Commercial Crew Program.

[2] NASA did not fund Sierra Nevada to complete a full Critical Design Review. A fourth company, Blue Origin, is conducting developmental work under an unfunded Space Act Agreement.

[3] NASA OIG, "NASA's Management of the Commercial Crew Program" (IG-14-001, November 13, 2013).

To support the SLS and Orion, NASA's GSDO Program is modifying launch infrastructure at Kennedy Space Center formerly used for the Space Shuttle Program. For example, the GSDO Program is refurbishing the crawler-transporter that will transport the SLS to the launch pad and modifying the mobile launcher and tower (originally built for the Constellation Program's Ares I rocket), the Vehicle Assembly Building, and Launch Pad 39B.

In a recently issued audit, we found GSDO has made steady progress on the major equipment and facilities modernization initiatives needed to launch SLS and Orion, but significant technical and programmatic challenges remain to meet a November 2018 launch date.[4] For the most part, these challenges originate from interdependencies between the GSDO, SLS, and Orion Programs. In short, GSDO cannot finalize and complete its requirements without substantial input from the other two Programs, and NASA is still finalizing the requirements for those Programs.

Moreover, coordinating and integrating development of the three individual Programs to meet a common milestone date presents a unique challenge, particularly since NASA historically has used a single program structure to manage similar efforts such as Apollo and the Space Shuttle. In lieu of central management, NASA established a cross-program integration structure that designates leaders from GSDO, SLS, and Orion to coordinate and align the Programs' development schedules. It is too early to say whether these substantial coordination challenges will result in cost or schedule issues for the Exploration Mission 1 launch. Moreover, new issues are likely to be uncovered during integration – the point at which most projects encounter technical problems that impact cost and schedule. Given these challenges, coordination efforts among the GSDO, SLS, and Orion Programs are essential to successfully meeting NASA's human exploration goals.

At the time of our audit, GSDO was scheduled to complete a significant development milestone known as Critical Design Review in March 2015, several months before SLS (May 2015) and Orion (August 2015). The purpose of the Critical Design Review is to demonstrate a project's design is sufficiently mature to proceed to full scale fabrication, assembly, integration, and testing and that technical aspects are on track to meet performance requirements within identified cost and schedule constraints. In our judgment, given the many interdependencies between the Programs, a schedule that has GSDO completing Critical Design Review prior to the other two Programs increases the risk GSDO may experience schedule delays or be required to perform costly redesign work.

We recommended the Associate Administrator for Human Exploration and Operations reevaluate allowing GSDO to complete Critical Design Review before the SLS and Orion Programs. NASA management concurred with our recommendation and indicated it had changed the dates of the Programs' Critical Design Reviews so that the SLS and Orion reviews (currently planned for July and October 2015, respectively) will precede the GSDO review (currently planned for December 2015).

The Space Communications Networks

NASA's Space Communications and Navigation (SCaN) Program is responsible for providing communications, navigation, and delivery of scientific data to space flight missions. SCaN is comprised of three networks: (1) the Near Earth Network, which covers low Earth orbit and portions of geosynchronous orbit; (2) the Space Network, which controls the Tracking and Data Relay Satellites through a network of geographically diverse ground systems; and (3) the Deep Space Network, which

[4] NASA OIG, "NASA's Launch Support and Infrastructure Modernization: Assessment of the Ground Systems Needed to Launch SLS and Orion" (IG-15-012, March 18, 2015).

covers NASA mission needs beyond geosynchronous orbit. Without SCaN services, NASA could not receive data transmission from its satellites and robotic missions or control such missions from Earth, and space hardware worth tens of billions of dollars would be little more than orbital debris. While NASA has provided these services for over 30 years, many of its current satellite communications systems are aging and increasingly difficult to repair.

The OIG is examining the SCaN Program in a series of audits. In the first of these reviews released last year, we assessed NASA's efforts to maintain, replenish, and modernize the Space Network.[5] Our second report, released in March 2015, focused on the Agency's Deep Space Network (DSN or Network), which provides deep space missions with tracking, telemetry, and command services.[6] In fiscal year 2014, DSN supported more than 30 missions, including the launch and orbit insertions of NASA's Mars Atmosphere and Volatile Evolution Mission and the Indian Space Agency's Mars Orbiter Mission.

To maintain continuous communications with spacecraft, DSN operates antennas and transmitters in Goldstone, California; Madrid, Spain; and Canberra, Australia. NASA has contracts with the Spanish and Australian governments to manage operations at the foreign sites and with the Jet Propulsion Laboratory (JPL) for Goldstone.

We found that although DSN is currently meeting its operational commitments, budget reductions have challenged the Network's ability to maintain performance levels and threaten future reliability. In fiscal year 2009, DSN implemented a plan to save $226 million over 10 years and use those funds to build new antennas and transmitters. However, in fiscal year 2013 NASA cut the Network's budget by $101.3 million and Agency officials are considering additional cuts that could further delay equipment maintenance and upgrade tasks. If budget reductions continue, DSN faces an increased risk that it will be unable to meet future operational commitments or complete the upgrade project on schedule.

In addition, NASA, JPL, and DSN have significantly deviated from Federal and Agency policies, standards, and governance methodologies for the security of the Network's information technology (IT) and physical infrastructure. For example, the Network's system security categorization process did not consider all DSN mission functions, vulnerability identification and mitigation practices and IT security configuration baseline application did not comply with Federal and Agency policy, and NASA's Security Operations Center is not adequately integrated into JPL's computer network operations. Further, required physical security controls were missing or inconsistently implemented at the three Complexes, procedures to assign security level designations did not comply with NASA policy, required facility security assessments had not been completed, and security waivers or other risk acceptance documentation were not consistently in place. As a result, DSN's IT and physical infrastructure may be unnecessarily vulnerable to compromise.

We made 12 recommendations, including that NASA develop a realistic, accurate, and transparent budget that supports the Network's ability to provide communication services and ensure DSN follows established IT security policies, standards, and governance methodologies. NASA management concurred with our recommendations and described planned corrective actions.

The OIG looks forward to continuing our cooperative working relationship with NASA and this Subcommittee.

---

[5] NASA OIG, "Space Communications and Navigation: NASA's Management of the Space Network" (IG-14-018, April 29, 2014).

[6] NASA OIG, "NASA's Management of the Deep Space Network" (IG-15-013, March 26, 2015).