

GAO Highlights

Highlights of [GAO-15-248T](#), a testimony before the Subcommittee on Space, Committee on Science, Space, and Technology, House of Representatives

Why GAO Did This Study

NASA is undertaking a trio of closely related programs to continue human space exploration beyond low-Earth orbit: the SLS vehicle; the Orion capsule, which will launch atop the SLS and carry astronauts; and GSDO, the supporting ground systems. As a whole, the efforts represent NASA's largest exploration investment over the next decade, approaching \$23 billion, to demonstrate initial capabilities.

In May 2014, GAO found that NASA's preliminary life-cycle cost estimates for human exploration were incomplete and recommended that NASA establish life-cycle cost and schedule baselines for each upgraded block of SLS, Orion, and GSDO; NASA partially concurred. In July 2014, GAO issued a report on SLS's progress toward its first test flight and recommended that NASA match SLS's resources to its requirements and define specific missions beyond the second test flight, among other actions. NASA concurred with these recommendations.

This testimony is based on GAO's May 2014 report ([GAO-14-385](#)), July 2014 report ([GAO-14-631](#)), and ongoing audit work related to SLS and Orion. It discusses NASA's efforts to match resources to requirements for the SLS program and developmental challenges facing the SLS and Orion programs. To conduct this work, GAO reviewed relevant design, development, cost, and schedule documents and interviewed program officials.

View [GAO-15-248T](#). For more information, contact Cristina T. Chaplain at (202) 512-4841 or chaplainc@gao.gov.

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NASA

Human Space Exploration Programs Face Challenges

What GAO Found

In 2014, GAO reported on a number of issues related to the National Aeronautics and Space Administration's (NASA) human exploration programs: the Space Launch System (SLS) vehicle, the Orion Multi-Purpose Crew Vehicle (Orion), and the Ground Systems Development and Operations (GSDO). For example, in July 2014, GAO found that NASA had not matched resources to requirements for the SLS program and was pursuing an aggressive development schedule—a situation compounded by the agency's reluctance to request funding commensurate with the program's needs. In August 2014, NASA established formal cost and schedule baselines for the SLS program at the agency-required 70 percent joint cost and schedule confidence level (JCL), which satisfied one recommendation from GAO's July 2014 report. The JCL is a calculation NASA uses to estimate the probable success of a program meeting its cost and schedule targets. To satisfy the 70 percent JCL requirement, the SLS program delayed its committed launch readiness date for its first test flight from December 2017 to November 2018. The program is still pursuing December 2017 as an internal goal, or target date, for the test flight, even though NASA calculated the JCL associated with launching SLS on this date at 30 percent. Moreover, neither the Orion nor GSDO program expects to be ready for the December 2017 launch date. With these programs likely unable to meet the December 2017 date, NASA risks exhausting limited human exploration resources to achieve an accelerated SLS program schedule when those resources may be needed to resolve challenges on other human exploration programs.

NASA's Target and Baseline Launch Readiness Dates and Associated Confidence Levels for Human Space Exploration Programs

	Target date	Confidence level for target date	Committed date	Confidence level for committed date
Space Launch System	December 2017	30%	November 2018	70%
Ground Systems Development and Operations	June 2018	30%	November 2018	80%
Orion Multi-Purpose Crew Vehicle ^a	TBD	TBD	TBD	TBD

Source: GAO analysis of NASA data. | [GAO-15-248T](#)

^aOrion has yet to establish formal cost and schedule baseline commitments.

In addition, GAO's ongoing work has found that the Orion program is facing significant technical and funding issues. Orion just completed its first test flight, and data from this flight is required to address several risks that must be resolved before the second test flight in 2021 because they represent risks to crew safety. For example, during parachute testing, NASA discovered that when only two of the three main parachutes are deployed, they begin to swing past each other creating a "pendulum" effect. This effect could cause the capsule to increase speed and to hit the water at an angle that may damage the capsule, thereby endangering the crew. In addition, data from the test is necessary to inform NASA's design solution to address heat shield cracking issues, which NASA has been working to resolve since August 2013. The heat shield is integral to crew safety during re-entry.