

GAO Highlights

Highlights of [GAO-14-631](#), a report to the Ranking Member, Committee on Homeland Security and Governmental Affairs
U.S. Senate

Why GAO Did This Study

SLS is NASA's first exploration-class heavy lift launch vehicle in over 40 years. Predecessor programs, such as Constellation, were canceled in the face of acquisition problems and funding shortfalls. NASA estimates it could spend almost \$12 billion developing the first of three SLS vehicle variants and associated ground systems through initial launch in late 2017 and potentially billions more to develop increasingly capable vehicles. Ensuring that this program is affordable and sustainable for the long term is a key goal of the 2013 National Space Transportation Policy.

GAO was asked to evaluate SLS program challenges. This report examines (1) the SLS program's progress toward and risks for its first test flight in 2017 and (2) the extent to which the SLS program has plans in place to achieve its long-term goals and promote affordability. To do this, GAO reviewed relevant design, development, cost, and schedule documents; interviewed program officials; and evaluated SLS program actions using acquisition and cost estimating best practices.

What GAO Recommends

Among other actions to reduce risk and allow for continued assessment of SLS progress and affordability, GAO recommends that NASA develop an executable business case for SLS that matches resources to requirements, and provide to the Congress an assessment of the SLS elements that could be competitively procured for future SLS variants before finalizing acquisition plans for those variants. NASA concurred with GAO's recommendations.

View [GAO-14-631](#). For more information, contact Cristina Chaplain at (202) 512-4841 or chaplainc@gao.gov.

July 2014

SPACE LAUNCH SYSTEM

Resources Need to be Matched to Requirements to Decrease Risk and Support Long Term Affordability

What GAO Found

The Space Launch System (SLS) program is making solid progress on the SLS design. However, the National Aeronautics and Space Administration (NASA) has not developed an executable business case based on matching the program's cost and schedule resources with the requirement to develop the vehicle and conduct the first flight test in December 2017 at the required confidence level of 70 percent. NASA uses a calculation referred to as the "joint cost and schedule confidence level" to estimate the probable success of a program meeting its cost and schedule targets. NASA policy usually requires a 70 percent confidence level for a program to proceed with final design and fabrication. GAO's work on best practices has shown that programs that do not establish an executable business case that matches requirements—or customer needs—to resources, such as schedule and funding—are at increased risk of cost and schedule growth. The program is satisfying many of NASA's metrics that measure progress against design goals, such as requirements for design maturity. According to the program's risk analysis, however, the agency's current funding plan for SLS may be \$400 million short of what the program needs to launch by 2017. Furthermore, the development schedule of the core stage—which drives the SLS schedule—is compressed to meet the 2017 launch date. NASA also faces challenges integrating existing hardware that was not originally designed to fly on SLS. For example, SLS is using solid rocket boosters from the Constellation program, but integrating a new non-asbestos insulating material into the booster design has proven difficult and required changes to the booster manufacturing processes.

The SLS program has not yet defined specific mission requirements beyond the second flight test in 2021 or defined specific plans for achieving long-term goals, but the program has opportunities to promote affordability moving forward. NASA plans to incrementally develop more capable SLS launch vehicles to satisfy long-term goals, but future missions have not been determined, which will directly affect the program's future development path and flight schedule. Mission selection will likely determine which element the program decides to develop next, as the program can afford to develop only one element at a time. The magnitude of these development efforts could be significant but is currently unknown as the program has not developed complete life-cycle cost estimates for the initial or future SLS launch vehicles. In May 2014, GAO recommended that NASA address this issue, and NASA partially concurred, citing that actions taken to structure the programs and track costs met the intent of the recommendations. However, GAO believes NASA's responses do not fully address the concerns about the program's cost estimates. There are opportunities, however, to improve long-term affordability through competition once the development path has been determined and NASA can finalize its acquisition approach. For example, the program plans to compete the procurement of one element; however, the agency has not finalized assessments of options for competitively procuring other future elements. Such assessments could better position NASA to sustain competition, control costs, and better inform Congress about the long-term affordability of the program. GAO's body of work on contracting has shown that competition in contracting is a key factor in controlling cost.