

Why GAO Did This Study

This is GAO's fourth annual assessment of the National Aeronautics and Space Administration's (NASA) large-scale projects. GAO's work has shown that these projects, while producing ground-breaking research and advancing our understanding of the universe, tend to cost more and take longer to develop than planned, and are often approved without evidence of a sound business case. GAO has designated NASA's acquisition management a high risk area.

In response to congressional direction, GAO reviewed NASA's major projects. Specifically, this report provides observations about the performance of NASA's major projects, assesses knowledge attained at key junctures of development, identifies challenges that can contribute to cost and schedule growth, and outlines steps NASA is taking to improve its acquisitions. To conduct this review, GAO assessed data on 21 projects with an estimated life-cycle cost of over \$250 million, including data on projects' cost, schedule, technology maturity, design stability, and contracts; analyzed monthly project status reports; and interviewed NASA and contractor officials. GAO also reviewed project cost estimates and interviewed officials responsible for NASA's cost estimation policy.

What GAO Recommends

GAO is not making any new recommendations in this report, but has made prior recommendations to address transparency in project costs and the lack of consistent design metrics; NASA concurred and is taking steps to address them.

View [GAO-12-207SP](#). For more information, contact Cristina Chaplain at (202) 512-4841 or chaplainc@gao.gov.

NASA

Assessments of Selected Large-Scale Projects

What GAO Found

GAO assessed 21 NASA projects with a combined life-cycle cost that exceeds \$43 billion. Of those 21 projects, 6 were in an early phase of development called formulation, and 15 had entered the implementation phase where cost and schedule baselines were established. Five of the 15 projects in implementation successfully launched in 2011, and two of them met their cost and schedule baselines. NASA's largest science project—the James Webb Space Telescope (JWST)—however, has experienced development cost growth of \$3.6 billion—or 140 percent—and a schedule delay of over 4 years. While the development cost and schedule for most of the projects in implementation remained relatively stable, the impact of the JWST increases on the portfolio is significant. For example, 14 of the 15 projects currently in implementation, excluding JWST, had an average development cost growth of \$79 million—or 14.6 percent—and schedule growth of 8 months from their baselines. With JWST, these numbers increase dramatically to almost 47 percent and 11 months, respectively. Cost and schedule increases within NASA's most technologically advanced and costly projects, such as JWST, can have cascading effects on the rest of NASA's portfolio. For example, the administration has proposed to terminate funding for the joint NASA/ESA EMTGO project, and another large project in our review—the Mars Science Laboratory (MSL)—experienced substantial cost overruns that led NASA to take funding from other projects. MSL and JWST account for approximately \$11.4 billion—or 51 percent—of the total life-cycle costs for the 15 projects in implementation during our review.

Most of the projects that GAO reviewed did not meet technology maturity and design stability best practices criteria, which if followed can lessen cost and schedule risks faced by the project. Specifically, 10 of the 16 projects that held a preliminary design review moved forward without first maturing technologies. In addition, 13 of the 14 projects that held a critical design review did so without first achieving design stability. Some projects reported using other methods to assess design stability. Many of the projects GAO reviewed for this report also experienced challenges in the areas of launch vehicles, contractor management, parts, development partner performance, and funding. For example, nine projects we reviewed reported challenges with launch vehicles, including their increasing cost and availability. New launch vehicles are in development, but have not yet been certified, and another vehicle has failed on its two most recent flights.

The agency is continuing its implementation of initiatives to reduce acquisition management risk. One prominent effort is the Joint Cost and Schedule Confidence Level (JCL), a new cost estimation tool that involves a probabilistic analysis of cost, schedule, and risk inputs to arrive at development cost and schedule estimates associated with various confidence levels. Five projects GAO reviewed have completed a JCL. NASA officials stated a few projects have excluded or not fully considered relevant cost inputs and risks, such as launch vehicle costs. GAO was unable to confirm that the five projects that prepared estimates using the JCL were budgeted at the approved confidence level. NASA has not yet launched a project that prepared a JCL; therefore, NASA officials stated it will take several years to evaluate the impact and effectiveness of the JCL in improving cost and schedule estimating for its major projects.