

## Why GAO Did This Study

JWST is one of NASA's most complex and costly science projects. Effective execution of the project is critical given the potential effect further cost increases could have on NASA's science portfolio. The project was rebaselined in 2011 with a 78 percent life-cycle cost estimate increase—now \$8.8 billion—and a launch delay of 52 months—now October 2018. GAO has made a number of prior recommendations, including that the project perform an updated cost and schedule risk analysis to improve cost estimates. GAO was mandated to assess the program annually and report on its progress. This is the second such report.

This report assesses the (1) extent to which the JWST project is meeting its cost and schedule commitments and maintaining oversight, (2) current major technological challenges facing the project, (3) extent to which cost risks exist that may threaten the project's ability to execute as planned, and (4) extent to which the JWST project schedule is reliable based on scheduling best practices. GAO reviewed relevant NASA and contractor documents, interviewed NASA and contractor officials, and compared the project schedule with best practices criteria.

## What GAO Recommends

Congress should consider directing NASA to perform an updated integrated cost/schedule risk analysis. GAO recommends that NASA address issues related to low cost reserves and perform schedule risk analyses on the three subsystem schedules GAO reviewed. NASA concurred with GAO's recommendations.

View [GAO-14-72](#). For more information, contact Cristina Chaplain at (202) 512-4841 or [chaplainc@gao.gov](mailto:chaplainc@gao.gov).

## JAMES WEBB SPACE TELESCOPE

### Project Meeting Commitments but Current Technical, Cost, and Schedule Challenges Could Affect Continued Progress

## What GAO Found

The James Webb Space Telescope (JWST) project is generally executing to its September 2011 revised cost and schedule baseline; however, several challenges remain that could affect continued progress. The National Aeronautics and Space Administration (NASA) has requested funding that is in line with the rebaseline and the project is maintaining 14 months of schedule reserve prior to its launch date. Performance data from the prime contractor indicate that generally work is being accomplished on schedule and at the cost expected; however, monthly performance declined in fiscal year 2013. Project officials have maintained and enhanced project oversight by, for example, continuing quarterly NASA and contractor management meetings and instituting a tool to update cost estimates for internal efforts. Program officials, however, are not planning to perform an updated integrated cost/schedule risk analysis, as GAO recommended in 2012, stating that the project performs monthly integrated risk analyses they believe are adequate. Updating the more comprehensive analysis with a more refined schedule and current risks, however, would provide management and stakeholders with better information to gauge progress.

The JWST project has made progress addressing some technical challenges that GAO reported in 2012, such as inadequate spacecraft mass margin, but others have persisted, causing subsystem development delays and cost increases. For example, the development and delivery schedule of the cryocooler—which cools one instrument—was deemed unattainable by the subcontractor due to technical issues and its contract was modified in August 2013 for the second time in less than 2 years, leading to a cumulative 120 percent increase in contract costs. While recent modifications have been made, execution of the cryocooler remains a concern given that technical performance and schedule issues persist.

Overall the project is maintaining a significant amount of cost reserves; however, low levels of near-term cost reserves could limit its ability to continue to meet future cost and schedule commitments. Development challenges have required the project to allocate a significant portion of cost reserves in fiscal year 2014. Adequate cost reserves for the prime contractor are also a concern in fiscal years 2014 and 2015 given the rate at which these cost reserves are being used. Limited reserves could require work to be extended or work to address project risks to be deferred—a contributing factor to the project's prior performance issues. Potential sequestration and funding challenges on other major NASA projects could limit the project's ability to address near-term challenges.

GAO's analysis of three subsystem schedules determined that the reliability of the project's integrated master schedule—which is dependent on the reliability of JWST's subsystem schedules—is questionable. GAO's analysis found that the Optical Telescope Element (OTE) schedule was unreliable because it could not adequately identify a critical path—the earliest completion date or minimum duration it will take to complete all project activities, which informs officials of the effects that a slip of one activity may have on other activities. In addition, reliable schedule risk analyses of the OTE, the cryocooler, or the Integrated Science Instrument Module schedules were not performed. A schedule risk analysis is a best practice that gives confidence that estimates are credible based on known risks so the schedule can be relied upon to track progress.