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**NASA Quicklook: Assessing Performance,  
Progress, Trends, and Challenges Associated  
with NASA's Major Projects  
April 2015**

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## Overview of GAO

The U.S. Government Accountability Office (GAO) is an independent, nonpartisan agency that works for Congress. Our work leads to laws and acts that improve government operations, saving the government and taxpayers billions of dollars. Often called the "congressional watchdog," our work is done at the request of congressional committees or subcommittees or is mandated by public laws or committee reports.

### GAO:

- investigates how the federal government spends taxpayer dollars,
- reports on how well government programs and policies are meeting their objectives, and
- advises Congress and the heads of executive agencies about ways to make government more efficient, effective, ethical, equitable and responsive.



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## **NASA Acquisition Management has remained on GAO's High Risk List for over 20 years**

GAO's work has shown that NASA projects, while producing ground-breaking research and advancing understanding of the universe, tend to cost more and take longer to develop than planned.

Our work identified that NASA has:

- approved projects without evidence of a sound business case,
- used poor cost estimating practices, and
- underestimated risks associated with development of its major systems.

While risks are inherent in the field of space exploration, GAO's work focuses on program decisions that impact NASA's acquisition management and increase the risk of cost and schedule growth.

## NASA Quicklook

In 2009, GAO was mandated to report bi-annually on large-scale NASA projects with estimated life-cycle costs exceeding \$250 million. Since then, these reports have assessed 41 distinct projects, including the:

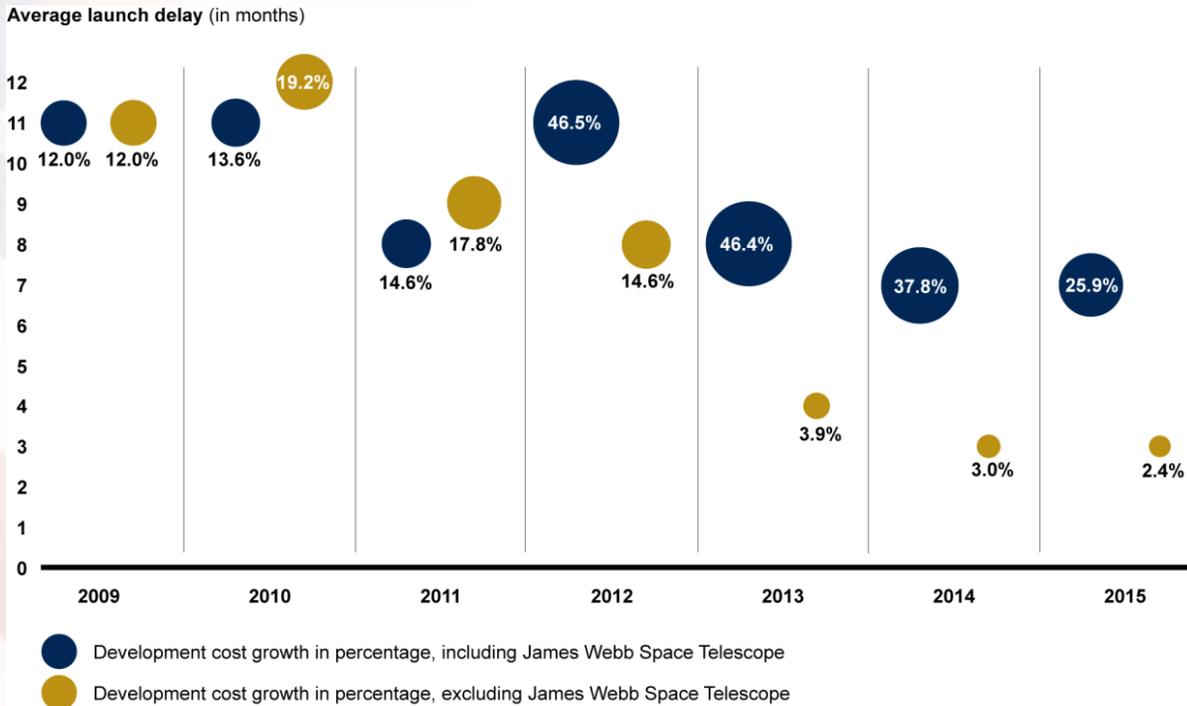
- Space Launch System,
- James Webb Space Telescope, and
- Mars Science Lab (Curiosity)

Our 2015 NASA Quicklook report:

- highlights trends in NASA's performance
- identifies factors contributing to recognized improvements, and
- discusses challenges that could impact NASA's progress.

# GAO found that NASA has improved portfolio cost and schedule growth

Development Cost and Schedule Growth of Selected Major NASA Projects in the Implementation Phase from 2009 through 2015



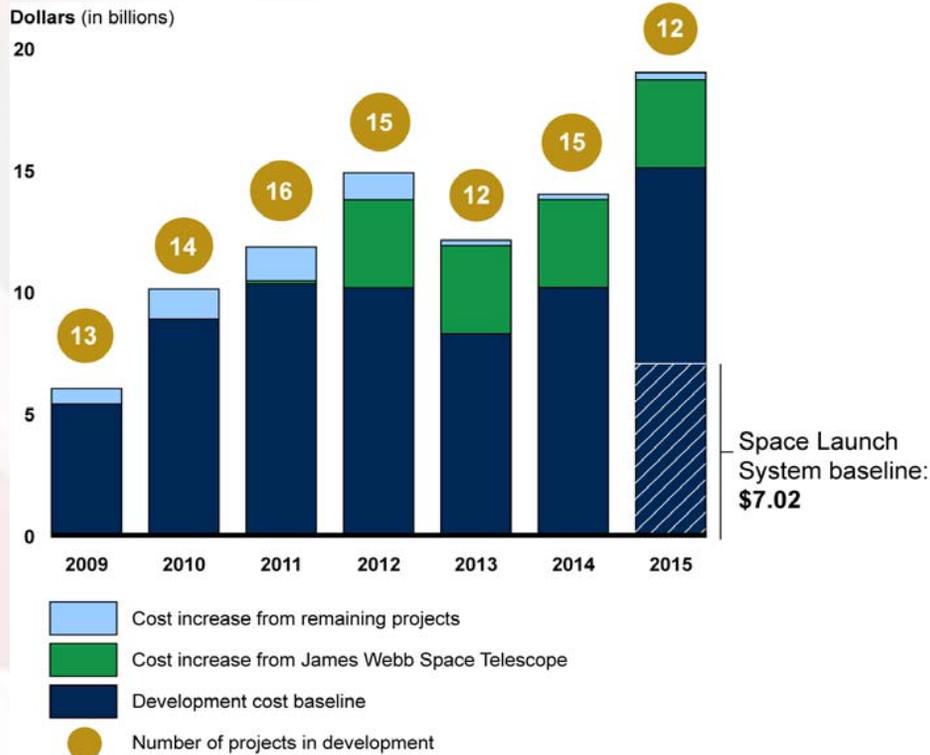
Source: GAO analysis of NASA data. | GAO-15-320SP

Cost and schedule growth has decreased over time to historic lows:

- cost growth has decreased to 2.4 percent from a high of over 19 percent, and
- average schedule growth has decreased from 12 months to 3 months.
- averages do not include the James Webb Space Telescope

# New projects lower the 2015 cost growth percentage

Total Number and Development Cost Growth of Selected NASA Major Projects with Established Cost Baselines



Source: GAO analysis of NASA data. | GAO-15-320SP

The Space Launch System and 4 other projects recently established formal cost and schedule baselines. (This is called confirmation.)

If these projects are removed from the calculation, 2015 cost growth would be 10 percent instead of 2.4 percent mainly due to significant cost growth on 2 projects.

The 2015 portfolio is small in terms of the total number of projects, but large in terms of total portfolio cost.

## **Why has NASA's performance on its major systems improved?**

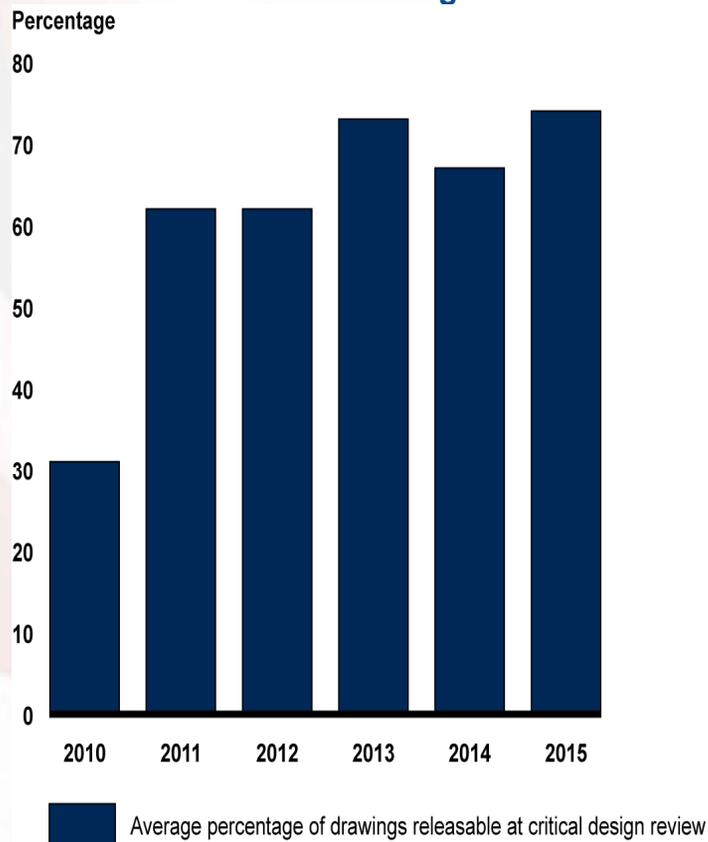
Some factors contributing to improved performance are:

- Increased stability of project designs
- Increased maturity of critical technologies
- Less technology development
- Improved cost and schedule estimating

These actions, among others, have helped NASA maximize science and exploration objectives and launch more projects on time and within cost.

# NASA continues a positive trend toward meeting best practices for design stability

Average Percentage of Releasable Engineering Drawings for Selected NASA Major Projects at Critical Design Review



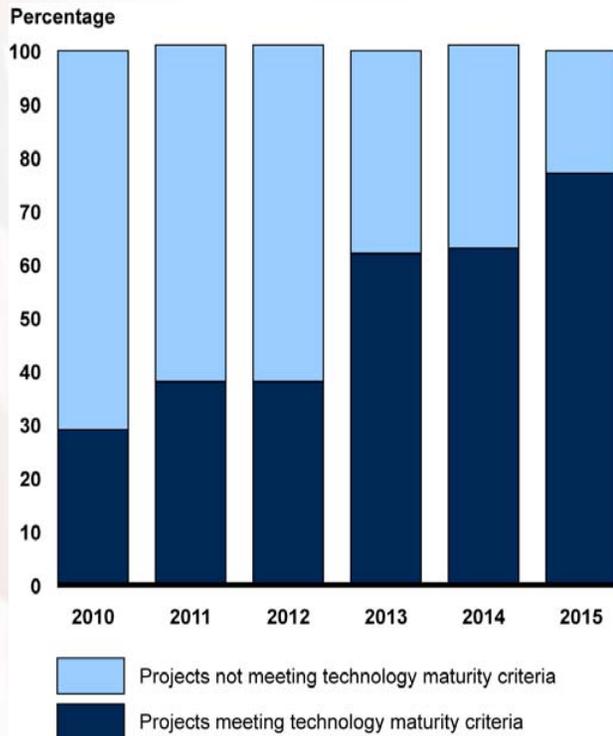
Our best practices work provides that maturing project designs prior to the critical design review (as evidenced by the release of 90 percent of design drawings) lowers the risk of subsequent cost growth and schedule delays.

The NASA portfolio has yet to reach the 90 percent best practices standard for design stability. However, in 2015, the percentage of drawings releasable at critical design review averaged 74 percent. This is a significant improvement from 2010.

Source: GAO analysis of NASA data. | GAO-15-320SP

# NASA projects have focused on maturing critical technologies

Percentage of NASA's Major Projects Attaining Technology Maturity at the Preliminary Design Review



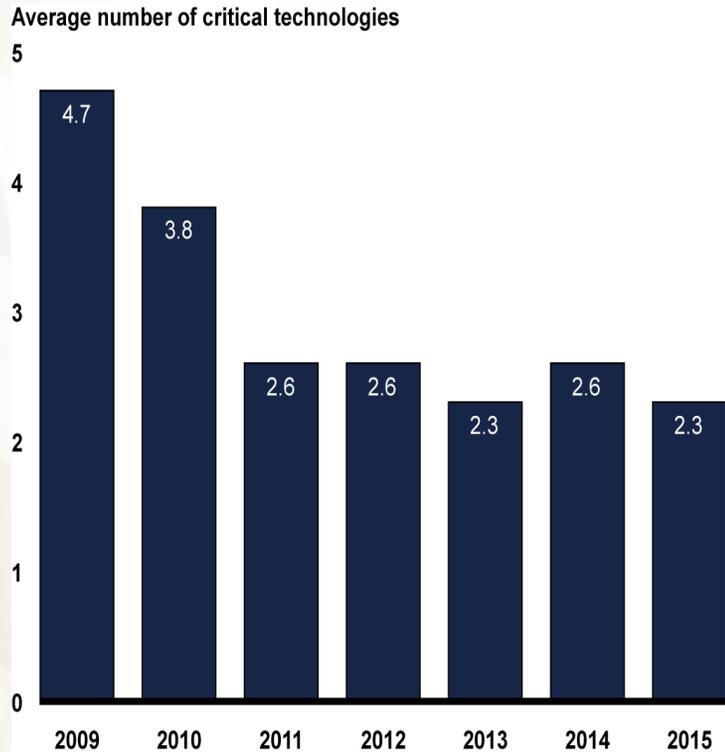
Our best practices work provides that maturing technologies (technology readiness level 6) prior to the preliminary design review lowers the risk of subsequent cost growth and schedule delays.

In 2015, 77 percent of NASA major projects met the best practices standard for technology maturity. This is a significant improvement over prior years, and reflects a continued increased focus by NASA.

Source: GAO analysis of NASA data. | GAO-15-320SP

# Fewer NASA projects rely on the development of critical technologies

Average Number of NASA's Critical Technologies for Selected Major Projects in Implementation



Source: GAO analysis of NASA data. | GAO-15-320SP

NASA continues to develop fewer critical technologies than it has historically.

Over the past 7 years, most of NASA's new projects have

- used primarily existing technology, and
- have planned less technology development.

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## **NASA has implemented tools and approaches to more realistically establish cost and schedule baselines and improve monitoring of progress**

To reduce risk, NASA has taken some noteworthy steps:

- Required all projects to develop a joint cost and schedule confidence level. The JCL assigns a likelihood of a project meeting its cost and schedule estimates.
- Began phased rollout of earned value management. EVM is designed to help project managers monitor progress and risks.

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## **Effective management of complex, expensive projects is key to sustained positive performance**

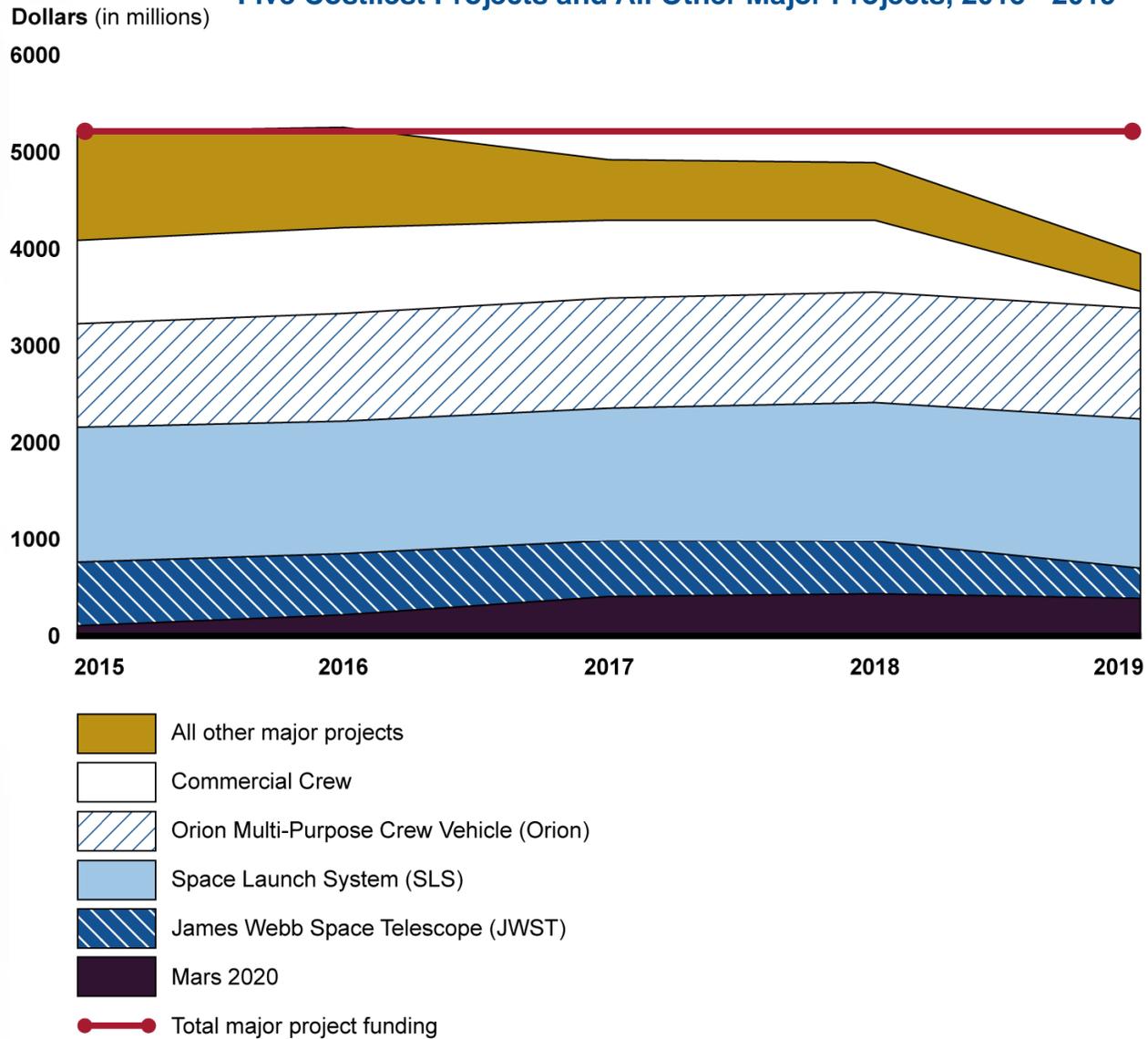
NASA's ability to execute a series of expensive and complex projects effectively, within constrained budgets and competing priorities, is key to continued progress in improving acquisition management.

In 2015, these five projects are expected to consume almost 80 percent of anticipated funds for NASA's major projects:

- Commercial Crew
- James Webb Space Telescope
- Mars 2020
- Orion
- Space Launch System

Any cost or schedule overrun in these expensive, complex projects could have cascading effects other NASA projects.

### Fiscal Year NASA 2015 Budget Request for Five Costliest Projects and All Other Major Projects, 2015 - 2019



Source: GAO analysis of NASA data. | GAO-15-320SP

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# Questions

For more information, please see our 2015 NASA Quicklook report at <http://www.gao.gov/products/GAO-15-320SP> and our Key Issues Summary Page on NASA Acquisitions at [http://www.gao.gov/key\\_issues/nasa\\_acquisitions/issue\\_summary](http://www.gao.gov/key_issues/nasa_acquisitions/issue_summary)



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