

James Webb Space Telescope

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Theme: General Science, Space and Technology

Overview

Goal Statement

- Revolutionize humankind's understanding of the Cosmos and humanity's place in it. The James Webb Space Telescope (Webb) will study every phase in the history of our universe, ranging from the first luminous glows after the Big Bang, to the formation of other stellar systems capable of supporting life on planets like Earth, to the evolution of our own solar system. By September 30, 2019, NASA will initiate on-orbit commissioning of Webb after launch.

Challenge

- Complete integration and test of largest cryogenic telescope ever to be launched.

Opportunity

- The Webb program will produce an astronomical observatory capable of watching the universe light up after the Big Bang. It will revolutionize humankind's understanding of the Cosmos and our place in it.
- This observatory is key for meeting NASA's strategic goal to expand human knowledge through new scientific discoveries.
- Webb is NASA's new telescope that will allow us to explore deeper into space and see things that even the Hubble Space Telescope cannot see.

Goal Structure & Strategies

In continuing to work with its partners toward completion of Spacecraft Element (SCE) environmental testing, OTIS* integration to the SCE, and observatory-level environmental testing, NASA will:

- Conduct high-level (corporate Vice President and above) quarterly meetings of all mission partners to ensure accurate, consistent knowledge of program status and challenges.
- Conduct quarterly discussions between the NASA Administrator and the Northrop Grumman Chief Executive Officer.
- Provide quarterly updates to the Office of Management and Budget (OMB) and the Office of Science and Technology Policy (OSTP).
- Employ Estimate-at-Complete analyses that incorporate the current risk posture, independent analysis of those data, and detailed tracking of lower-level milestones that lead up to the APG, as well as schedule health assessments. (The project receives monthly earned value management and schedule health reports that detail how the work is progressing with respect to the plan and budget.)
- Continue practice of Standing Review Board (SRB) member participation in key reviews. The SRB subject matter experts provide independent impartial assessments of the project's readiness to support the major upcoming activities along the APG schedule. Examples of such reviews include the System Integration Review (SIR) in June 2018 and the Operations Readiness Review in March 2019.

**OTIS is the combined Optical Telescope Element (OTE) and Integrated Science Instrument Module (ISIM)*

Summary of Progress – FY18 Q1

On March 27, 2018, NASA announced that it was rescheduling the Webb launch window for approximately May 2020 to allow more time for testing and evaluation. Further information on the delay will be provided in the FY 2018 Q2 update.

Key Q1 Accomplishments:

- Completed the cryovacuum testing of the Optical Telescope Element (OTE) plus Integrated Science Instrument Module (ISIM), known as OTIS, October.
- Completed sunshield pre-environmental deployment and folding activities. Problems encountered during the first avionics-driven deployment included small tears in the sunshield and covers that needed to be repaired, and membrane tensioning system modifications required to keep sunshield cables from becoming snagged in the mid-boom elbows.
- Early Release Science proposals selected by the Space Telescope Science Institute (STScI).
- Call for Cycle 1 General Observers released by STScI.
- Spacecraft Element Dual Thruster Modules found to have leaks were removed and repaired. (Installed in FY 2018 Q2.)

Key Milestones

NASA follows an “alternative form,” or milestone-based, approach to reporting on its goals. Following are key quarterly milestones that NASA tracks in support of this goal:

Milestone Summary			
Key Milestone	Milestone Due Date	Milestone Status	Comments
Complete pre-environmental testing of sunshield deployment.	FY 2018 Q1	Green	<ul style="list-style-type: none"> Completed October 23, 2017.
Ship telescope from Johnson Space Center to Northrop Grumman.	FY 2018 Q2	Green	<ul style="list-style-type: none"> Shipped February 1, arrived February 2.
Deliver results from spacecraft element acoustic and vibration tests.	FY 2018 Q3	Green	<ul style="list-style-type: none"> On track.
Complete integration of the telescope onto the spacecraft element.	FY 2018 Q4	Red	<ul style="list-style-type: none"> Milestone will slip; schedule under review.
Conduct Test Readiness Review (TRR) for observatory-level environmental test.	FY 2019 Q1	Red	<ul style="list-style-type: none"> Milestone will slip; schedule under review.
Initiate observatory-level environmental testing.	FY 2019 Q2	Red	<ul style="list-style-type: none"> Milestone will slip; schedule under review.
Ship observatory to launch site.	FY 2019 Q3	Red	<ul style="list-style-type: none"> Milestone will slip; schedule under review.
Initiate commissioning.	FY 2019 Q4	Red	<ul style="list-style-type: none"> Milestone will slip; schedule under review.

Data Accuracy and Reliability

- Verification and Validation:
 - NASA monitors and tracks its progress towards this goal using various Agency documents and reports, including Directorate Program Management Council (DPMC) materials, monthly reports from the project and industry partners, and other program-internal documents.
- Data Source(s):
 - Emails and program-internal documents indicating progress NASA's industry partners make toward the James Webb Space Telescope integration, test and launch.
- Level of Accuracy Required for Intended Use:
 - Using the documents and reports referenced above, the Agency is able to accurately report at the end of each quarter on whether or not it has met its planned milestones.
- Data Limitations:
 - Materials from the industry partners may include company proprietary information; such information cannot be released publicly.
- How the Agency Compensates for Data Limitations:
 - NASA has not identified any data limitations that would preclude it from reporting accurate, reliable, and timely performance information.

Additional Information

Contributing Programs

NASA:

- James Webb Space Telescope (Webb) Program
- Space Communications and Navigation

Other: Webb is an international collaboration among NASA, the European Space Agency (ESA), and the Canadian Space Agency (CSA).

- ESA is providing the Ariane launch vehicle and some of the scientific instruments, including the Near Infrared Spectrometer and Mid-Infrared Instrument.
- CSA is providing the Fine Guidance Sensor, which will enable Webb to point precisely, so that it can obtain high-quality images
- Northrop-Grumman Aerospace Systems (NGAS) is the main NASA industrial contractor, responsible for building the optical telescope, spacecraft bus, and sunshield, and preparing the observatory for launch. NGAS has led a team including three major sub-contractors: Ball Aerospace, Orbital-ATK, and Harris (formerly ITT Exelis).

Stakeholder/Congressional Consultations

NASA provides updates to Congress on the status of required milestones, in addition to quarterly updates to the Office of Management and Budget (OMB) and the Office of Science and Technology Policy (OSTP). NASA also routinely provides status to the Government Accountability Office (GAO).