

## Commercial Crew Program

Goal Leader: Philip McAlister, Director, Commercial Spaceflight  
Development Division (CSDD)

Deputy Goal Leader: Marc Timm, Program Executive, CSDD

Theme: General Science, Space and Technology

# Overview

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## Goal Statement

- Facilitate the development of and certify U.S. industry-based crew transportation systems while maintaining competition, returning International Space Station (ISS) crew transportation to the United States. By September 30, 2019, the Commercial Crew Program, along with its industry partners, will complete at least one Certification Review, following uncrewed and crewed test flights to the ISS.

## Challenge

- Achieve safe, reliable, and cost-effective access to and from low Earth orbit and the ISS through the development of U.S. commercial crew space transportation capabilities.

## Opportunity

- Enabling a U.S. industry-based capability can facilitate development of a commercial market, providing new high-technology jobs and reducing the cost of human access to space.
- A successful commercial market will further open the frontier for space exploration.

# Goal Structure & Strategies

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On September 16, 2014, NASA announced the selection of The Boeing Company and Space Explorations Technologies Corporation (SpaceX) to continue development and certification efforts under Commercial Crew Transportation. Work began in earnest in January 2015, after an unsuccessful protest. Activities to support these efforts include the following:

- NASA and its partners are working to define verification closure items, alternate standards, and variances needed to complete certification efforts.
- NASA's partners are identifying safety hazards and closures needed to ensure crew safety through all mission phases.
- NASA's partners are continuing systems development efforts, including subsystem and system level testing.
- Both of NASA's partners have chosen to fly two pre-certification missions to the ISS, one un-crewed and one crewed.

Partner progress is reported regularly to the Commercial Crew Program Control Board, at the Human Exploration and Operations Directorate Program Management Council, and at the Agency Baseline Performance Review.

# Summary of Progress – FY18 Q2

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The Boeing Company (Boeing) and Space Explorations Technologies Corporation (SpaceX) continue making technical and programmatic progress under their respective Commercial Crew Transportation Capability contracts.

- Both Boeing and SpaceX continue to define requirements closure plans, identify and update hazard reports, and work with NASA to process variances and alternate standards.
- Boeing conducted the ISS Design Certification Review (DCR) to establish design baseline for Post Certification Mission (PCM) missions.
- Boeing completed White Sands Test Facility (WSTF) hot fire testing, including Launch Abort Engine acceptance testing for Crew Flight Test engines.
- Boeing completed Mockup Trainer (BMT) outfitting in January and the associated Test Readiness review in March.
- Boeing's Orbital Flight Test launch vehicle and spacecraft are well into production.
- SpaceX completed fire suppression test campaign.
- SpaceX performed Crew Display Evaluation #5.
- SpaceX performed end-to-end spacesuit communications test.
- SpaceX completed Octaweb 3.0 qualification testing. The Octaweb is an engine arrangement in which eight Merlin engines are arrayed in a circle around the center engine, designed to streamline the manufacturing process.
- SpaceX's Demo 1 spacecraft and launch vehicle are well into production.

# 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
SpaceX completes its Integrated Systems Review milestone	FY 2018 Q1	Green	• Completed
SpaceX completes the Merlin Engine Qualification Checkpoint	FY 2018 Q2	Yellow	• Partially completed in December. Final closure planned for June.
Boeing completes its ISS Design Certification Review	FY 2018 Q3	Green	• On Track
Boeing conducts its Pad Abort Test	FY 2018 Q4	Green	• On Track
At least one Partner attempts its un-crewed demonstration flight to the ISS	FY 2019 Q1	Green	• On Track
At least one Partner completes multiple mission-specific Verification Events	FY 2019 Q2	Green	• On Track
At least one Partner attempts its crewed demonstration flight to the ISS	FY 2019 Q3	Green	• On Track
At least one Partner completes its NASA Certification Review	FY 2019 Q4	Green	• On Track

# Data Accuracy and Reliability

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## 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, reports from the industry partners, and other program-internal documents.

## Data Source(s):

- Email(s), press releases, and program-internal documents indicating that NASA's industry partners continue to make progress maturing their transportation system technical and certification/verification efforts.

## 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 provided by NASA's industry partners may include company-proprietary information. Data are sufficiently accurate for their intended use.

## 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

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## Contributing Programs

### NASA Program Activities:

- Commercial Crew Program: Facilitates the development of safe, reliable, and cost-effective human space transportation by the U.S. commercial industry to and from low Earth orbit and the International Space Station (ISS).
- ISS Program: Develops and maintains the transportation service, interface, and safety requirements associated with crewed flights to and from the ISS.
- Launch Services Program (LSP): Manages NASA's launch vehicle services, dedicated to launching all types of science and operational spacecraft.

### Other Federal Activities:

- Federal Aviation Administration (FAA), Office of Commercial Space Transportation: Ensures that commercially-developed, human-rated transportation systems meet FAA licensing requirements for launch and entry, and works with NASA on cross-agency licensing issues.
- United States Air Force, 45th Space Wing: Addresses launch range safety and crew rescue.

## Stakeholder/Congressional Consultations

NASA works with its industry partners to provide quarterly updates to Congress on the status of required milestones under the Commercial Crew Transportation Capability contracts. NASA also consults regularly with experts from industry and academia, such as the NASA Advisory Council.