



Agency Priority Goal Action Plan

# Commercial Crew Program

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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.



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.



The Boeing Company (Boeing) and Space Explorations Technologies Corporation (SpaceX) continue making tangible technical and programmatic progress under their respective Commercial Crew Transportation Capability contracts, and are executing to their assigned budgets.

- Demonstration test flight and Post Certification Mission flight hardware manufacturing, testing and qualification are underway by both partners.
- Both partners continue performing critical test and verification events, as well as making progress in the burn down (completion and closure) of key certification products.
- Boeing
  - The Orbital Flight Test (OFT) Vehicle is in final integration and test.
  - Continuing critical parachute development, certification and reliability testing.
  - Launch vehicle production activities are nearing completion.
- SpaceX
  - Currently conducting their anomaly investigation related to the Dragon In-flight abort test static fire test. SpaceX is currently developing their recovery plan to accomplish their in-flight abort test and Demo-2 mission to the ISS.
  - Demo-2 Falcon 9 (Launch vehicle) is nearing completion.
  - Demo-2, Crew-1 and Crew-2 spacecraft are in production.
  - Continuing parachute development, certification and reliability testing campaign.

# 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:

Key Milestone	Milestone Due Date	Milestone Status	Trend	Comments
SpaceX completes its Integrated Systems Review milestone	FY 2018 Q1	Green	n/a	<ul style="list-style-type: none"> <li>SpaceX conducted their Integrated Systems Review November 2017.</li> </ul>
SpaceX completes the Merlin Engine Qualification Checkpoint	FY 2018 Q2	Yellow	↑	<ul style="list-style-type: none"> <li>This milestone has been approved as completed by the Program Control Board. Closure occurred September 2018.</li> </ul>
Boeing completes its ISS Design Certification Review	FY 2018 Q3	Green	n/a	<ul style="list-style-type: none"> <li>Boeing conducted their ISS Design Certification Review December 2017.</li> </ul>
Boeing conducts its Pad Abort Test	FY 2018 Q4	Yellow	↑	<ul style="list-style-type: none"> <li>Delayed. The date of this milestone will change primarily as a result of the Service Module Hot Fire Test anomaly that occurred at the White Sands Test Facility. Boeing is analyzing the test data, working through root causes, and will provide NASA an updated schedule for this milestone in the future.</li> </ul>

Trend Legend					
↑	Improving	→	No Change	↓	Declining

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Key Milestone	Milestone Due Date	Milestone Status	Trend	Comments
At least one Partner attempts its un-crewed demonstration flight to the ISS	FY 2019 Q1	Green	↑	<ul style="list-style-type: none"> <li>SpaceX successfully completed their Demo-1 un-crewed demonstration flight to the ISS. The flight launched on March 2 and landed March 8, 2019.</li> </ul>
At least one Partner completes multiple, mission-specific Verification Events	FY 2019 Q2	Green	→	<ul style="list-style-type: none"> <li>SpaceX completed multiple verification events over the quarter, leading up to their successful Demo-1 flight. Both partners continue completing multiple Verification Events as their respecting crew transportation systems proceed toward to related to their demonstration and PCM flights.</li> </ul>
At least one Partner attempts its crewed demonstration flight to the ISS	FY 2019 Q3	Red	↓	<ul style="list-style-type: none"> <li>SpaceX encountered an anomaly during their in-flight abort test static fire test. The anomaly investigation is underway and impacts to their future schedule are under review pending anomaly resolution.</li> </ul>
At least one Partner completes its NASA Certification Review	FY 2019 Q4	Yellow	↓	<ul style="list-style-type: none"> <li>The Certification review is tied to partner crewed demonstration flights and will move accordingly. Both partners are continuing to assess schedules due to redesign and development activities.</li> </ul>

Trend Legend					
↑	Improving	→	No Change	↓	Declining



## 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.



## 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.