

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Private Human Access to Space: Sub-orbital and Orbital missions: Joint session D2 with Commercial
Spaceflight Safety Commission D6 (9)

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SPACEX CREWED DRAGON: PROVIDING THE SAFEST, MOST RELIABLE AND MOST
ECONOMICAL ACCESS TO SPACE

Abstract

With the retirement of the Space Shuttle, the United States lacks a domestic method of space transport to the International Space Station (ISS). Space Exploration Technologies Corp. (SpaceX) is developing the human-capable Dragon spacecraft to launch aboard the Falcon 9 launch vehicle and safely, rapidly and economically provide a United States (U.S.) method of space transport to the ISS, and eventually beyond. To meet this commitment, SpaceX has designed and built a space vehicle from the ground up with reliability as the key driver. The company embraced a test-like-you-fly philosophy and used controlled processes to test technology developments and maintain mission assurance. As a result, high reliability and low cost are simultaneously achieved in space technologies. In many cases, they are inextricably linked: lower costs are achieved by maintaining design simplicity, which drives high reliability. Safety and sustainability are important customer concerns for vehicles built under contract. The National Aeronautics and Space Administration (NASA)-funded Commercial Crew Development program utilizes a nontraditional method of U.S. Government contracting, in which payments are awarded based on achievement of agreed-upon milestones. These milestones are not adjusted in the event of cost or schedule overrun. In other words, if agreed-upon work is not completed on budget or on schedule, the contractor must make up the difference without additional Government support. SpaceX believes this method of doing business drives the development of sustainable space architectures and has uniquely influenced the design of its crew vehicle. Developing a system that will rapidly and efficiently fill the gap in U.S. manned spaceflight requires a focus on safety, reliability, and sustainably low costs, combined with the demonstrated ability to execute rapid development. This paper examines lessons learned during crewed space architecture development and sustainable space systems design. The paper concludes with a set of guiding recommendations that the authors feel will drive safe, reliable and sustainable crew transportation starting with the ISS and moving beyond.