

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS (D2)  
Upper Stages, Space Transfer, Entry and Landing Systems (3)

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ORION CREW EXPLORATION VEHICLE DESIGN EVOLUTION

**Abstract**

The Orion Crew Exploration Vehicle was planned to serve as the next generation human carrying spacecraft for the United States. The purpose was to provide crew transportation beyond low earth orbit for future space exploration missions. The Orion is a centerpiece of the Constellation Program under the United States National Aeronautics and Space Administration (NASA) Exploration Systems Mission Directorate. Although Constellation has been proposed for cancellation in the President's Fiscal-Year 2011 budget, a substantial body of Orion work has been accomplished enabling successful Preliminary Design Review, development planning, and initiation of detailed design. Planning for the Orion began as a result of the Vision for Space Exploration announced in January 2004. Preliminary Design Review was completed in August 2009. The design efforts have drawn from a national team of NASA, Lockheed Martin, its subcontractors, and many supporting organizations. During the period from initiation of planning through preliminary design, there were several evolutions in requirements and concepts and many design trade-off studies conducted to inform the many decisions that were necessary to establish the preliminary design. This was accomplished through a systematic approach based on requirements and design analysis cycles with review and decision gates. This paper provides highlights of the trade-offs, requirements cycles, design cycles, and major decisions that led to the preliminary design.