

HUMAN SPACE ENDEAVOURS SYMPOSIUM (B3)

Human Space Endeavour - Overview (1)

Author: Dr. Jennifer Rhatigan

National Aeronautics and Space Administration (NASA), Johnson Space Center, United States

Dr. Dale Thomas

National Aeronautics and Space Administration (NASA), Marshall Space Flight Center, United States

Mr. Jeffrey Hanley

National Aeronautics and Space Administration (NASA), Johnson Space Center, United States

NASA'S CONSTELLATION PROGRAM: MILESTONES TOWARD THE FRONTIER

Abstract

Purpose: NASA's Constellation Program, formulated to achieve the objectives of maintaining American presence in low Earth orbit, returning to the Moon for purposes of establishing an outpost, and exploring Mars and beyond in the first half of the 21st century is progressing this year through preliminary design and into developmental testing. This paper describes the progress and accomplishments achieved during the second half of 2008 and the first half of 2009; including completion of requirements; integrated test program development; and refinements in organization, planning, budget formulation, risk management, operational philosophies, and procurement strategies. Initial planning for the lunar phase of the program is also described.

Methodology: The Constellation Program is phased as a stepwise capability build-up largely based upon Space Shuttle heritage components. The Initial Capability (IC) build comprises elements necessary to service the International Space Station (ISS) by 2015 with crew rotations: including the Orion Crew Exploration Vehicle, the Ares I Crew Launch Vehicle, and the supporting ground and mission infrastructure to enable these missions. The Constellation Lunar Capability (LC) builds upon the IC; adding the Ares V Cargo Launch Vehicle, the Altair Lunar Lander, and space suits designed for partial gravity exploration. Lunar Outpost elements and capabilities will follow, including mobility elements such as rovers; permanent or semi-permanent habitats, and power and communication elements to support a sustained exploration presence.

Results: The Constellation Program will assure readiness for the integrated program to enter preliminary design during 2009. Integrated testing of the IC continues this year, with a series of flight tests of the Orion Launch Abort System commencing in 2009. The Ares 1-X flight, scheduled for mid 2009, will test the integrated flight control system and stage separation dynamics on a simulated flight vehicle "stack". Follow-on integrated test planning is described, culminating in human test flights to certify the spacecraft for human rating in 2015. The Constellation Program conducted a successful Lunar Capability Concept Review in 2008. Activities in 2009 are focussed upon preparations for a Human Lunar Return System Requirements Review (SRR) in 2010. The LC transportation components (Ares V and Altair), are well into conceptual design, and will conduct contractor selection in 2009 for a series of study contracts to support conceptual planning. These projects are targeting Systems Requirements Reviews for 2011. NASA has initiated studies with interested international space agencies, under the Global Exploration Strategy (GES) Framework Document, focussed on possible architecture scenarios for lunar sortie missions, extended stays, and lunar outposts.

Conclusion: All of the critical Initial Capability development activities this year lay the foundation for build up of the Lunar Capability that will enable humans to again depart low earth orbit for missions to explore the solar system.