Canceled Project (2011 - 2013)

Deep Space Habitat Project

Advanced Exploration Systems Program | Human Exploration And Operations Mission Directorate (HEOMD)

ABSTRACT

The Deep Space Habitat was closed out at the end of Fiscal Year 2013 (September 30, 2013). Results and select content have been incorporated into the new Exploration Augmentation Module (EAM) Project.

The Deep Space Habitat project charter is to 1) Define and mature space habitat concepts and architectures; 2) Transition habitat-related products into demonstration prototypes; 3) Mature habitat-related concepts, technologies and systems; and 4) Focus and infuse habitat-related technologies.

ANTICIPATED BENEFITS

To NASA funded missions:

A deep space habitat is a technically greater challenge than ISS in the areas of logistics, radiation, communication, autonomous systems, storage & disposal, and volume utilization. Advancing the state of the art to meet Deep Space Habitat project objectives will make available enhancing technologies for ISS as well. For interplanetary exploration, the Multi-Purpose Crew Vehicle (MPCV) is only the Earth-to-orbit "dinghy". A deep space habitat is part of the architecture for a true deep spacegoing vessel.

To NASA unfunded & planned missions:

A deep space habitat is a key enabling feature for a majority of the destinations outlined in NASA's capability-driven architecture. One serendipitous mission capture afforded by such a capability is service and repair of Earth orbiting or Sun orbiting satellites. For simple servicing, a deep space habitat need not be crew tended -- being remotely commanded from the ground. For complex repairs, crew/robotic spacewalks would be well within its capacity.

To other government agencies:

The Deep Space Habitat project is already realizing synergies in

Deep Space Habitat Project

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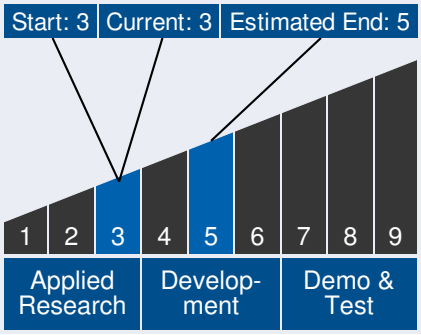
Technology Maturity



Management Team

Program Director:

- Jason Crusan

Program Executive:

- Barry Epstein

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advancing remote habitation capabilities with the US Navy and the US Army.

To the commercial space industry:

The development of deep space habitation systems technologies in cis-lunar space offers an incremental extension of the business opportunities for commercial space at ISS -- especially with respect to commercial cargo. The Deep Space Habitat project is exploring opportunities for intelligent automated systems and remote location Internet access with Google, Inc.

To the nation:

Deep Space Habitat technologies enable extending human presence beyond low earth orbit. The development of deep space habitation systems technologies in cis-lunar space offers an incremental extension of the business opportunities for commercial space at ISS -- especially with respect to commercial cargo. The Deep Space Habitat project is already realizing synergies in advancing remote habitation capabilities with the US Navy and the US Army, and is exploring opportunities for intelligent automated systems and remote location Internet access with Google, Inc.

DETAILED DESCRIPTION

The Deep Space Habitat project delivers concepts for light-weight, safe and reliable exploration habitats capable of:

o Supporting humans living and working in space and on planetary bodies
o Autonomous operation
o Systems failure detection, analysis, and self-repair

The Deep Space Habitat project investigates habitation concepts for multiple destinations such as:

o Cis-lunar space
o Interplanetary Space (to include Near Earth Asteroids)

Management Team *(cont.)*

Project Manager:
- Lora Bailey

Principal Investigator:
- Paul Bookout

Technology Areas

Primary Technology Area:
Human Exploration Destination Systems (TA 7)
└ Habitat Systems (TA 7.4)

Secondary Technology Area:
Human Health, Life Support, and Habitation Systems (TA 6)

This is to drive out opportunities for commonality, early development investment, and early risk mitigation. This project also focuses on maturing exploration habitation subsystems such as:

- o Structures and mechanisms
- o Environmental control and life support systems
- o Active and passive thermal control systems
- o Power management and distribution
- o Avionics
- o Software management system
- o Communications
- o Environmental protection & particulate (dust) mitigation
- o Mission operations/command & control
- o Crew systems/interfaces: displays & controls, galleys, quarters
- o Extravehicular activity & robotics
- o Instrumentation & sensors
- o Food supplementation

The process for the Deep Space Habitat project to deliver on these objectives include iterative loops of:

- o Concept definition and development
- o Systems integration
- o Testing
- o Building and outfitting habitation prototypes

The habitat prototypes function as a(n)

- o Technology pull
- o Test bed
- o Integration capability

to advance NASA's understanding of alternative

- o Mission architectures
- o Requirements
- o Operations concepts definition and validation

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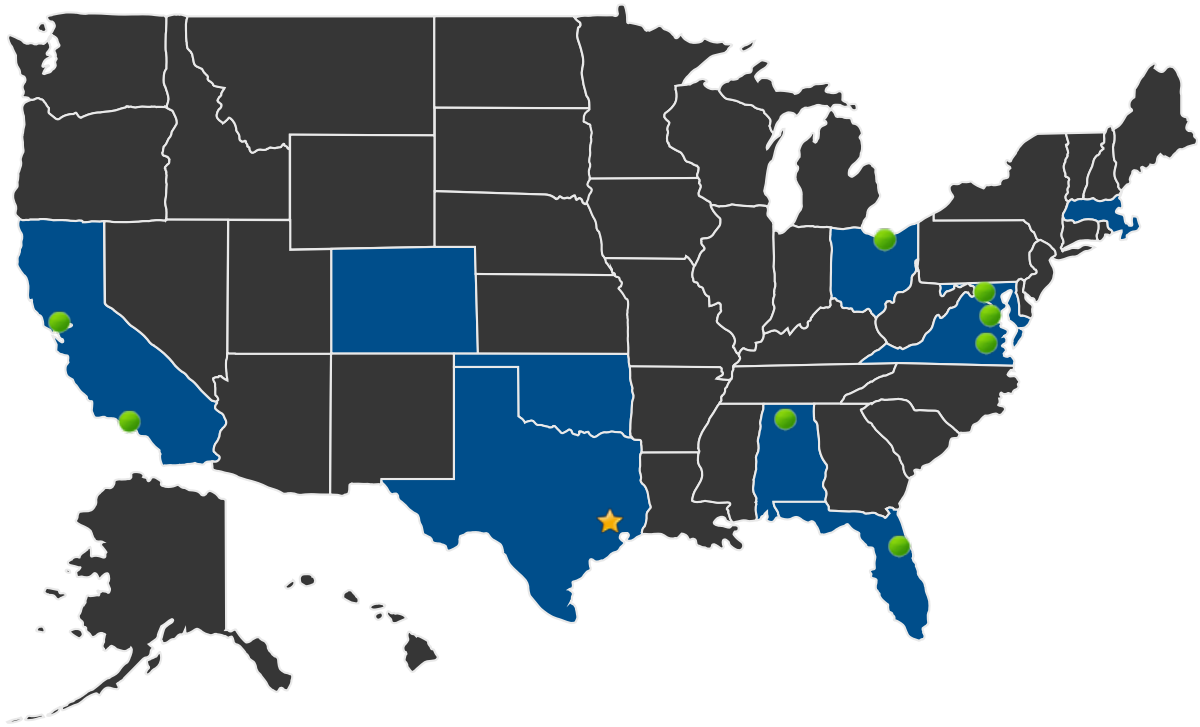
U.S. WORK LOCATIONS AND KEY PARTNERS



U.S. States With Work

Lead Center:
Johnson Space Center

Supporting Centers:

- Ames Research Center
- Glenn Research Center
- Goddard Space Flight Center
- Jet Propulsion Laboratory
- Johnson Space Center
- Kennedy Space Center
- Langley Research Center
- Marshall Space Flight Center
- NASA Headquarters

Other Organizations Performing Work:

- California Poly - Pomona
- ESCG - Jacobs Engineering
- Oklahoma State
- Texas A&M
- University of Alabama - Huntsville
- University of Colorado

Contributing Partners:

- U.S. Navy
- US Army

DETAILS FOR TECHNOLOGY 1

Technology Title

Deep Space Habitat Project

Technology Description

This technology is categorized as a hardware system for manned spaceflight

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Capabilities Provided

Deep Space Habitat technologies enable extending human presence beyond low earth orbit. The current endurance of the Multi-Purpose Crew Vehicle is 21 days of consumables. This permits only brief stays in cis-lunar space. The life support, logistics, radiation protection, autonomy & robotics, and crew systems & interfaces technologies of a deep space habitat will allow mission capture of near Earth asteroids, Sun-Earth L2 libration point, and interplanetary destinations such as Mars' moons.

Potential Applications

Deep Space Habitat technologies enable extending human presence beyond low earth orbit.