

SG 1.4

PROPOSAL FOR FORMING AN IAA STUDY GROUP

Title of Study: The Next Steps for Human Space Exploration:  
What are the Alternatives?

Proposer: Robert Farquhar

Primary IAA Commission Preference:

Commission One, Space Physical Sciences

Secondary IAA Commission Interests:

Commission Three, Space Technology & System Development  
Commission Four, Space System Operation & Utilization

Members of Study Team:

Chair: Robert Farquhar

Other Members: (additional members are under consideration)

Joe Veverka	Cornell University
Tom Jones	NASA Astronaut (retired)
Alain Dupas	College de Polytechnique (Paris)
David Dunham	Applied Physics Laboratory
Jim McAdams	Applied Physics Laboratory
Hiroshi Yamakawa	Japan Aerospace Exploration Agency (JAXA)
Jozef van der Ha	European Space Agency (retired)
Douglas Stetson	Jet Propulsion Laboratory
Bobby Williams	Kinetx Corporation
John Mather	NASA/Goddard Space Flight Center
Ben Clark	Lockheed Martin
Doug O'Handley	NASA/Ames Research Center

## SHORT DESCRIPTION OF SCOPE OF STUDY

### Overall Goal:

To compare two different approaches for human exploration beyond low Earth orbit leading ultimately to the human exploration of Mars. Both concepts utilize evolutionary architectures to achieve the Mars goal. One concept, proposed by U.S. President George W. Bush in January 2004, and subsequently adopted by NASA, would utilize the Moon for testing operational techniques and the demonstration of technologies needed for Mars. An alternative concept, described in an IAA Cosmic Study entitled, "The Next Steps in Exploring Deep Space", would use the Sun-Earth L2 libration point and near-Earth asteroids as stepping stones to Mars. The primary factors that are used to evaluate the two concepts are:

- (1) Science value
- (2) Cost effectiveness
- (3) Mission risk
- (4) Extension to other exploration destinations (especially Mars)

### Intermediate Goals:

- (1) Define program of astronomical missions at Sun-Earth L2 that would be enabled by human construction and servicing.
- (2) Determine architecture requirements for SE-L2/NEA approach (e.g., would a launch vehicle with a capability of delivering 125 metric tons to low Earth orbit be required).
- (3) Define potential areas of international participation.

Methodology: Study assumes that NASA will develop the following systems:

- (1) Crew Exploration Vehicle (CEV)
- (2) Crew launch vehicle with a capability of delivering 25 to 32 metric tons to low Earth orbit.
- (3) Earth departure stage (expendable)

The study will then determine what hardware elements are needed for the two alternative approaches.

Time Line:

- Fall 2006: Presentation package of preliminary findings
  - \* Scheduled for presentation at Applied Physics Laboratory (Colloquium on December 1, 2006)
  - \* Possible presentation at IAA Meeting in Paris (March 2007)
- Fall 2007: Presentation of interim report at IAA Day (IAC in New Dehli, India)
- Fall 2008: Special Session at IAC (Glasgow, Scotland)
- December 2008: Submit Final Report to IAA

Final Product:

IAA Final Report  
Publication in Acta Astronautica

Target Community:

International Space Organizations (IAA, ESA, JAXA, NASA, .....)  
NASA's Exploration Systems Mission Directorate

Support Needed:

Preparation of presentations, publications.

Potential Sponsors:

Johns Hopkins Univ./Applied Physics Laboratory  
Kinetx Corporation