

Proposal for Forming an IAA Study Group SG 3.25

Title of Study:

The Maintainability and Supportability of Manned Spacecrafts in Deep Space

Proposer(s):

YANG Hong (IAA member of Academy M, chief designer of Chinese Space Station)

Primary IAA Commission Preference:

COMMISSION 3

Secondary IAA Commission Interests:

No

Members of Study Team

Chair(s):

Chair(s): YANG Hong (China)

Co-Chair(s): TBD

Secretary:

ZHANG Dapeng (China)

Other Members:

China: WEI Chuanfeng, ZHANG Dapeng, Li Zhihai

USA: Pedro Lopez Jr. (TBC), Eric Schultz(TBC), Bryan Mattfeld(TBC), Chel Stromgren (TBC)

Japan: Masato Sakurai

TBD

Short Description of Scope of Study

During long-term flight for deep space manned spacecraft, the flight resources are limited. It is different to LEO space station whose repairs and maintenance can be ensured by regular supply from Launch Vehicle, and the number of astronauts is also limited to carry out repairs and maintenance by EVA. Therefore, it is necessary to research the maintainability and supportability of manned spacecrafts in deep space with the flight constraints of limited flight resources. Manned spacecraft to Mars will be as the object, we will base on the mainstream scenarios of international manned programs for Mars , analyze needs of the maintainability and supportability in manned programs of Mars and the more distant manned space exploration taken into account meanwhile, construct the maintainability and supportability system of deep space manned spacecraft. And typical system of manned spacecraft in deep space will be selected to make detailed analysis and design of maintainability and supportability, and implement the technology of maintainability and supportability.

International Academy of Astronautics (IAA)

-2-

Instructions and application form: see: "Scientific Activity" section at <http://iaaweb.org/content/view/256/393/>

Overall Goal:

Aiming at characteristics of manned exploring in deep space about long period, considering roundly the problems faced to solve with maintenance and repairs, spares carrying and supplying, reliability and fault-tolerant redundant of manned spacecrafts in deep space, carrying out analysis of maintainability and supportability with different strategies, forming multi-parameter optimization design; based on the analysis results, research the implementation of maintainability and supportability with new technologies, providing different solutions and schemes.

Intermediate Goals:

Sorting out the problems need to be solved and making certain the research contents and scope.

Requirement analysis to maintenance and repair in deep space.

Analysis of maintainability and supportability with manned spacecraft in deep space.

Implementation of maintainability and supportability with manned spacecraft in deep space, including in-situ resources utilization (ISRU), Waste management and recycling, Virtual reality (VR) for maintenance, etc.

To analyze the adaptability of the maintainability and supportability with different manned space mission.

Methodology:

Setup an international study group, draft a detailed schedule of the study.

Establish a working website to upload and publish the research status and reports up to date.

Agreement on a study report outline.

Assigning individual responsibility for the study report.

Assigning editor to coordinate individual parts and compile a coherent study report.

Work to be conducted through email, on-line collaboration, and study group meetings held in the course of annual International Astronautical Congresses and the IAA meetings.

Time Line:

2015.10: Set up our study group.

2016.3: Outline of our study group.

2017.9: an interim report to the IAA.

2018.9: Submission of a Final Report to the IAA.

Final Product (Report, Publication, etc.):

Report

Target Community:

International space community, Space Agencies, Industry, related Universities

International Academy of Astronautics (IAA)

-3-

Instructions and application form: see: "Scientific Activity" section at <http://iaaweb.org/content/view/256/393/>

Support Needed:

Communication of workshop opportunities.

Potential Sponsors:

Universities, Space Agencies

To be returned to the IAA Secretary General Paris

by fax: 33 1 47 23 82 16 or

by email: sgeneral@iaamail.org

Date:

Name:

(No Signature required if document authenticated).

International Academy of Astronautics (IAA)

-4-

Instructions and application form: see: "Scientific Activity" section at <http://iaaweb.org/content/view/256/393/>

Follow-up Section for IAA use only

Initial Phase

Application received:

Commission Approved:

SAC Approved:

Web Site Section opened:

Members Formally Appointed by IAA:

Final Phase

Peer Review by Commission Completed:

Recommended by the Commission:

Final Report Received:

SAC Approved:

BOT Accepted:

Publisher Selected:

Study Published: