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SPACESHIP FR A NEW CONTRIBUTOR TO SPACE EXPLORATION & HUMAN SPACEFLIGHT

Abstract

During the last decades, space exploration has seen an incredible development and has become a source of inspiration to all humankind. However, there are still challenges that are yet to be solved. To help in this matter, CNES (French Space Agency) has decided to create a structure, "Spaceship FR," that enables the development of new technologies and promotes innovation processes to improve critical technologies. The Spaceship FR structure is expected to contribute to the next missions that will take humankind back to the Moon and later to Mars by reproducing a work environment similar to that encountered in such missions.

This investigation aims to define objectives that will ensure that the work performed at Spaceship FR is directed towards the significant challenges that lie ahead concerning our solar system's exploration. These objectives will be extracted in two steps, starting with a study on analog facilities and simulators used to imitate space missions and the space environment's effects, followed by a review of the lessons learned from the ISS's management and operation. Another purpose of this research is to evaluate the status and focus of the space sector concerning technology development and scientific research, which will allow us to identify the main actors and contributors and prepare future collaboration strategies, to expand into a network of Spaceships.

The research paper begins by describing the initial vision of the Spaceship FR structure, stating the questions that motivated the objectives assessment. It then discusses the results obtained, describing their impact on the original plan. The results are then reviewed from a systems engineering perspective, focusing on introducing MBSE techniques to perform verification and validation processes, offering a new and innovative approach to designing and analyzing future space systems. A set of lessons learned covering a summary of the project's current progress will be offered at the conclusion.