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CONCEPTUAL DESIGN OF A MANNED PLATFORM IN THE MARTIAN SYSTEM

Abstract

Ever since the dawn of the space age, mankind has been envisioning human travel to Mars. Nevertheless, with the closure of the Apollo program in 1972, manned missions have been limited to Low Earth Orbit. According to the global exploration map, the return to the Moon, a waypoint architecture in the Earth-Moon libration points and the exploration of Near-Earth Asteroids are considered important steps on the way to the long term goal of bringing humans to our red neighbor planet. In order to investigate and evaluate different concepts for future manned platforms, the Space Station Design Workshop (SSDW) 2017 is hosted by the Institute of Space Systems (IRS) at the University of Stuttgart. In the last years, the SSDW focused on mission concepts for a space station in cis-lunar space and feasible habitats on the lunar surface. This year, two interdisciplinary teams composed of international students and young professionals, supported by experts from industries and universities, were challenged to investigate and evaluate different scenarios for a manned platform in the Martian system, ranging from a Mars surface base to an orbiting space station around the Martian moons. Crucial criteria for the assessment were given, such as interests of leading space agencies, scientific output, public outreach, complexity and feasibility. Based on the trade-off study, the participants developed a conceptual design for a human-tended platform aligned with the most suitable investigated concept. The results of the competing teams participating in the workshop will be discussed and compared in this paper. The outcome comprises technical aspects such as mission analysis, subsystems design and human factors engineering as well as project management facets such as operations planning, cost estimation and the strategic business approach.