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WHAT CAME FIRST, SPACE SAFETY OR MEDICAL STANDARDS?

Abstract

Sending humans beyond low-Earth orbit is a shared goal of official roadmaps (such as the Global Exploration Roadmap and the ESA Terrae Novae Exploration Strategy). Soon, human presence in outer space will move from being continuous, as on the International Space Station (ISS), to being permanent, as on the surface of a celestial body. Here, ISS missions will become the most recent reference of new concepts of operations. Running new operations requires relying on advanced technology to contain human health hazards, leading to a profound innovation of standard approaches for planning and executing space missions. NASA standards, released in 2015, identified the necessary medical technology to have in incoming operations based on the estimated levels of potential risk for medical problems. Particularly, long-duration spaceflights (lasting more than 200 days) require artificial intelligence-based technology, currently not existing, showing that existing capabilities and knowledge are not enough to preserve human health. This work aims at investigating the relation between space safety and medical standards. The objective is to create a database for listing astronauts' information (such as age, background, gender, etc., of cosmonauts, parastronauts, taikonauts, analogue astronauts and more) together with information on mission operations and significant capabilities. The goal is to understand the importance of the current astronaut selection and training programme when mission operations and capabilities differ profoundly. This analysis is the first step to explore the need for space safety culture changes. In new operations, impairments or accidents may drastically alter astronaut performance, and immediate re-entry on Earth may likely be not an option. Existing medical standards of the astronaut's programme cannot prevent an astronaut from being incapacitated in a mission, and safety, instead, ensures mission success. Additionally, exploration roadmaps show that such new missions will run thanks to a close international collaboration that accounts for private companies. Consequently, it is possible to have in-flight crews with a broad range of performance. Issues that may arise from this context can be anticipated if leading entities are willing to explore alternative medical standards (as in the case of Crew Inpiration4 and the ESA Parastronaut Feasibility Project) or invest in ground activities (such as analogue missions). Yet, both ways may not have implications for space safety, which should be part of the profound innovation accompanying new operations.