IAF/IAA SPACE LIFE SCIENCES SYMPOSIUM (A1)
Medical Care for Humans in Space (3)

Author: Dr. Ilaria Cinelli
AIKO S.r.l., Italy, i_cinelli@yahoo.it

INNOVATION IN SPACE MEDICAL TECHNOLOGY

Abstract

Official exploration roadmaps of governmental entities (such as the Global Exploration Roadmap or the ESA Terrae Novae Exploration Strategy) tend to include advanced algorithms (such as artificial intelligence techniques) in several layers of incoming missions for reaching their objectives. NASA standards, released in 2015, shows the need for *autonomous medical care* when the estimated levels of potential risk for medical problems are high. That is estimated to occur in long-duration planetary crewed missions (like that on the Moon and Mars) lasting more than 200 days. The need for such technology, currently not existing, shows that current capabilities and knowledge are not enough to mitigate hazards to human health. Adopting new healthcare capabilities leads to a shift in planning, managing, and executing health-related practices. Standard safety tests for general medical technology are not enough to ensure safety, and new capabilities are safe when meeting space safety requirements only. Furthermore, the same roadmaps share the need to account for private companies for delivering or commissioning services and products in space, not excluding the involvement of commercial astronauts. It is reasonable to think: what is it used for? And, who will be the end-user? Medical technology is closely related to specific services and the end-user, two factors highly variable in incoming missions. Consequently, innovating in such a field could be extremely challenging and not practical. This work explores the driving factors of innovation in space medical technology, starting with the first human spaceflight. The objective is to investigate interrelated aspects of such driving factors concerning three significant elements: (i) space medical research discoveries, (ii) parameters of the astronaut population (such as background, age, gender, in-flight hours, among others) and (iii) mission concepts. The significance of this work is in understanding the fit of technology and systems under development when mission constraints (such as budget and delivery time) vary. It is essential to raise awareness that such an innovation process may not be practical if the resources needed for reaching expected performance will not match constraints imposed by governmental entities. There is a need to adjust such a process to limit resource waste while ensuring safety in space.