HUMAN SPACE ENDEAVOURS SYMPOSIUM (B3)
Astronauts: Those Who Make it Happen (5)

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SYSTEM APPROACH TO DECISION-MAKING PROCESS ABOARD A HUMAN SPACECRAFT: PRIORITIES AND OPTIMIZATION OF DECISION-MAKING STRING

Abstract

For fifty years after the historic flight of Yuri Gagarin people have been flying to space, mainly to the low Earth orbit. In spaceflight we need to strive for the optimization of the crewmember operations. As a rule it is a creative process, sometimes of intuitive character, individual, related to the freedom of choice. On the other hand, selection of the optimum solution may be considered as a process of getting closer to the deterministic decision. But in both cases crewmember needs in strong assistance from the side of onboard Data-control System (in other words - the "System of decision-making process support", or "System of crewmembers activity support"). The computing and intellectual potential of the Mission Control Center's (MCC) control specialists should be moved to the spacecraft. For this purpose we need to develop an onboard Data-control System that will have the following functions: automated planning, implementation of the mission plan, telemetry data processing, analysis of the on-board systems status and functionality and execution of the control tasks. Besides, Data-control System should have a capability to automatically counteract designed contingencies and to make recovery recommendations for the crew. The additional function of the system is to provide to the crew data required for housekeeping and utilization activities on board. The functions of the multiple MCC specialists on different systems should be distributed between the other spacecraft's crewmembers: each of them based on the information from the Data-control System monitors the systems for which he/she is responsible and takes decisions within his/her competence. And only in case of contingency crewmember involves the commander ("flight director") in taking a recovery decision. The paper explores operations onboard a human spacecraft on the basis of system approach to decision-making process and suggests methods of decision-making string optimization. The paper outlines approaches, principles, and ideology of the "System of crewmembers activity support" designing, with prospective to increase autonomy, flexibility, operability, and, therefore efficiency of future space programs implementation.