**Alignment of NASA’s Human System Risks with Technological Capability Gaps to Enable Integrated Research and Technology Development Strategic Planning**

Andrew F. J. Abercromby1 & James L. Broyan1

1 National Aeronautics & Space Administration

BACKGROUND: Radiation, reduced gravity, distance from earth, isolation and confinement, and habitation within artificially created and controlled life support environments are hazards that present risk to human space explorers. NASA’s Human System Risk Board (HSRB) maintains a set of twenty-nine different Human System Risks with subject matter experts from across the agency providing regular updates to the estimated likelihood and consequence associated with each risk. The Human Research Program (HRP) has historically used these risk classifications as a primary basis for identifying and prioritizing human research investments aimed at characterizing and/or mitigating the respective human system risks. In many cases, technology development is required to mature and validate risk mitigation strategies, however, NASA’s primary technology development programs have not typically used Human System Risks as a basis for strategic planning. A primary function of the Environmental Control and Life Support Systems (ECLSS) – Crew Health and Performance (CHP) System Capability Leadership Team (SCLT) is to continually identify, review, and update technological capability gaps and to establish and oversee multiyear strategic roadmaps aimed at guiding NASA’s technology development priorities in these areas. These roadmaps are intended to be agency-wide and independent of any program, directorate, or other organization within NASA.

DESCRIPTION: The SCLT and HRP collaborated to establish a set of Human System Capability Gaps, which establish a formal linkage between the capability gaps used to prioritize investments across much of NASA, and the Human System Risks that are primarily used to inform and prioritize human research. This set of twenty-eight gaps was developed by subject matter experts, and each gap mapped to the primary associated Human System Risks. The gaps and risk mapping were then reviewed and approved via the HSRB, thereby formally aligning the research-focused Human System Risks with the technology-focused capability gaps.

DISCUSSION: This effort has enabled development of integrated roadmaps and budget coordination with research and technology development activities that are formally linked to agency-recognized capability gaps and Human System Risks. Close and ongoing coordination between the SCLT, HRP, Mars Campaign Office, and the Health & Medical Technical Authority (HMTA) is essential to ensure alignment and prioritization of CHP-related research and technology development to enable NASA’s future exploration missions.