NASA Advisory Council Recommendation

Advanced Exploration Systems
2022-02-02

Name of Committee:	Human Exploration and Operations Committee
Chair of Committee:	Mr. Wayne Hale
Date of Council Public Deliberation:	August 10, 2022
Short Title of Recommendation:	Advanced Exploration Systems

Recommendation:
NASA should consider reconstituting the Advanced Exploration Systems group as part of the new Exploration Systems Development Mission Directorate organization to provide a single focus to the concept development of systems needed for sustained lunar presence and transition to Mars.

Major Reasons for the Recommendation:
Responsibility for concept development of new systems beyond Lunar Terrain Vehicle (LTV), like habitats, surface systems, In Situ Resource Utilization (ISRU), etc. are buried within the technical integration or under Mars Campaign within the Exploration capabilities. To provide the essential focus these new systems need, a single level 2 organization should be created. This organization should also provide a single point of technology pull from the Space Technology Mission Directorate.

Consequences of No Action on the Recommendation:
Systems and capabilities required for lunar sustainability and Mars transition will not be available when needed.

NASA Response:
NASA concurs that sustainable lunar and Mars systems need to be available to meet mission timelines. NASA, with concurrence from Congress, has elevated the functions for architecture and integration to Exploration Systems Development Mission Directorate (ESDMD) Level 0 to put more focus on the future systems. NASA has organized in a way to ensure that the future systems have a direct connection to the Moon-to-Mars architecture. These systems and their places in the architecture are documented in the Moon-to-Mars Architecture Definition Document (ADD), which was released in May 2023 and can be found online at www.nasa.gov/MoonToMarsArchitecture. By elevating concept development and pre-formulation for future lunar and Martian systems to Level 0, ESDMD

is able to make earlier decisions about technology development pathways through counterpart-level coordination with the Space Technology Mission Directorate (STMD), which strategically advances technologies through Technology Readiness Levels 1-9. The current organization construct also allows ESDMD to engage with the Science Mission Directorate (SMD) and STMD to implement science and technology utilization goals into the architecture from the very beginning of concept development at Level 0.

Moon and Mars requirements are managed as ESDMD Level 0 requirements. Requirements are flowed to implementing ESDMD campaign divisions (Artemis Campaign Division and Mars Campaign Division) via previous directives (such as HEOMD-004, -007, et al), current directives (such as ADD), and future directives that the ESDMD mission director may issue. New elements are identified in the architecture and early systems engineering work is matured for transition prior to System Requirements Review, after which the new elements are issued to the appropriate implementing Campaign Division to develop the hardware.