Life Support and Environmental Monitoring International System Maturation Team Considerations

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Human exploration of the solar system is an ambitious goal. Future human missions to Mars or other planets will require the cooperation of many nations to be feasible. Exploration goals and concepts have been gathered by the International Space Exploration Coordination Group (ISECG) at a very high level, representing the overall goals and strategies of each participating space agency. The Global Exploration Roadmap published by ISECG states that international partnerships are part of what drives the the mission scenarios. It states "Collaborations will be established at all levels (missions, capabilities, technologies), with various levels of interdependency among the partners." To make missions with interdependency successful, technologists and system experts need to share information early, before agencies have made concrete plans and binding agreements.

This paper provides an overview of possible ways of integrating NASA, ESA, and JAXA work into a conceptual roadmap of life support and environmental monitoring capabilities for future exploration missions. Agencies may have immediate plans as well as long term goals or new ideas that are not part of official policy. But relationships between plans and capabilities may influence the strategies for the best ways to achieve partner goals.

Without commitments and an organized program like the International Space Station, requirements for future missions are unclear. Experience from ISS has shown that standards and an early understanding of requirements are an important part of international partnerships. Attempting to integrate systems that were not designed together can create many problems. Several areas have been identified that could be important to discuss and understand early: units of measure, cabin CO_2 levels, and the definition and description of fluids like high purity oxygen, potable water and residual biocide, and crew urine and urine pretreat. Each of the partners is exploring different kinds of technologies. Different specific parameters may important to define or explore possible ranges depending on the system concepts.

Early coordination between technology developers can create new possibilities for collaboration, and provide input to determine what combined options may provide the best overall system architecture.