

ARCHITECTURAL FRAMEWORK FOR CONCEPTUALIZING EXPLORATION CLASS MEDICAL OPERATIONS

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ABSTRACT

Currently, discrete projects within NASA's Human Research Program (HRP) take aim at providing future exploration missions with the capabilities necessary to operate within a progressively Earth-independent operative environment. Realizing an entire ecosystem that can accomplish these goals requires a clear visualization on how each project contributes to the overall objectives of Human Health and Performance (HH&P) in that context.

The Exploration Medical Capability (ExMC) Element has developed an architectural framework for exploration class medical operations by utilizing a systems engineering approach using model-based systems engineering (MBSE). This model, a System of Systems Architecture (SoSA), captures a means of integrating various independent but related efforts into a comprehensive view associated with HRP's goal of providing progressively Earth-Independent Medical Operations (EIMO).

This level of visibility is realized by identifying interfaces between development efforts and existing programs that contribute to the overall mission of EIMO even if those extend past the traditional boundary of HRP. Potential interfaces that are considered important when constructing an architecture include program/project Needs, Goals, and Objectives (NGOs), capabilities, envisioned use cases/scenarios, and system/subsystem structure.

This presentation will focus on the processes that were used to generate the SoSA along with a means to realize its utility amongst other MBSE products from ExMC. Evaluation of the best architecture moving forward can then be achieved that promotes cohesion between various functional areas of HH&P. Additionally, the SoSA is developed with a long-term vision for the dynamic integration of novel technological developments that may be implemented in the future. The SoSA is intended to enable Stakeholders the ability to view the broader interconnections that exist and begin to create avenues of communication between various efforts. The benefits of a SoSA provide an essential step towards addressing the unique challenges of attaining the goals of broader exploration class medical missions of the future.