MEDICAL DATA ARCHITECTURE PROTOTYPE DEVELOPMENT - SUMMARY OF RECENT WORK AND PROPOSED IDEAS FOR UPCOMING WORK

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ABSTRACT

The Medical Data Architecture (MDA) project supports the Exploration Medical Capability (ExMC) risk to minimize or reduce the risk of adverse health outcomes and decrements in performance due to in-flight medical capabilities on human exploration missions. To mitigate this risk, the ExMC MDA project addresses the technical limitations identified in ExMC Gap Med 07: We do not have the capability to comprehensively process medically-relevant information to support medical operations during exploration missions, and in ExMC Gap Med 10: We do not have the capability to provide computed medical decision support during exploration missions. These gaps recognize the need for a comprehensive medical data management system and the accompanying computational support to provide autonomous medical care during long duration exploration missions.

As the MDA matures—including the capability to comprehensively process and discover medically-relevant information to support medical operations during exploration missions—project focus will shift to maturing and extending the MDA platform to enable clinical decision support and real-time guidance. To date, the MDA foundational architecture has recommended exploration medical system Level of Care IV requirements through a series of test bed prototype developments and analog demonstrations. The next stage in the development will focus on more autonomous clinical decision making necessary to address challenges in executing a self-contained medical system that enables health care both with and without assistance from ground support. A thorough understanding of current state of medical decision support systems, advanced machine learning algorithms and vast and varied data sources is required. The development of a clinical decision support for exploration missions (Level of Care V) roadmap is needed: one that assesses of current state of the art of clinical decision support systems (CDSS), interoperability issues, identification of challenges in health and performance monitoring, obtaining and processing information from biosensors, knowledge and data management, data integration and fusion, and advanced algorithm development. This roadmap must also include rapid prototype development in the areas of data processing, advanced analysis and prediction of medical events, and treatment based on medically relevant information processing and evidence-based best practices. In this presentation, an overview of the relevant issues and the beginning framework of a Level of Care V CDSS development roadmap will be provided.