NASA HUMAN RESEARCH PROGRAM'S USE OF AI TECHNOLOGY TO MITIGATE EXPLORATION MEDICAL RISK

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INTRODUCTION: NASA's Human Research Program (HRP) has employed a rigorous approach to understanding and mitigating risk through countermeasure development to optimize crew health and performance. The scope of available artificial intelligence (AI) tools continues to expand at a remarkable pace and the use AI technologies to facilitate human system risk management has presented key opportunities including application in clinical decision support systems (CDSS).

TOPIC: The Exploration Medical Capability (ExMC) Element of HRP is leading the effort to capitalize on the strengths of AI tools through several current projects (*e.g.*, development of space medicine-literate large language models and updating a probabilistic risk assessment (PRA) tool evidence library) are that leverage AI-tools in collaboration with data scientists from Google and Microsoft to improve autonomous CDSS capability. Projects currently in the planning stages seek to foster collaboration across numerous and diverse working groups by removing barriers between organizations and our commercial partners to support the overall Agency AI goals and the vision promulgated by the Agency AI Working Group. Utilizing AI-tools to analyze directed acyclic graphs will help the Human System Risk Board track risks as they evolve from spaceflight hazards to mission-level outcomes. Development of synthetic data sets will allow multi-disciplinary Teams to conduct modeling of astronaut health and performance without the impediments related to data privacy and security. Additional efforts with data systems platforms and improvements to the AI data pipeline are envisioned using the Insight Data platform (a data pipeline "development initiative and process" based on Microsoft best practices). Future endeavors to support CDS involve utilization of commercially available tools and databases using an integrated data systems platform through a Federated, multi-modal AI system. Deployment of such Agentic-AI platforms will considerably benefit the effort to mitigate and ultimately eliminate medical risks while simultaneously reducing crew medical officer cognitive load.

APPLICATION: Implementation of the ExMC AI strategy has enabled creation of AI prototyping in Agile environments to rapidly assess viability of AI tools to reduce development cycle times and accelerate the path toward infusion for operationally relevant solutions for HRP and its stakeholders.