builds a bridge between the medical and engineering domains, and how these processes may be applied more broadly to a crew health and performance system and other system domains.

Learning Objectives

1. Understand the rationale and strategy for establishing foundation models for future missions.
2. Understand how foundation models trace NASA standards to establish model requirements.
3. Understand how foundation models may build a bridge between the medical and engineering domains, and how these processes may be applied more broadly to a crew health and performance system and other system domains.

[426] DESIGN FOR TRUST AND TRUSTWORTHINESS OF FUTURE SPACE MEDICAL SYSTEMS IN HUMAN-AGENT TEAMING: A TRANSDISCIPLINARY APPROACH

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(Original Research)

INTRODUCTION: Exploration-class missions and future commercial space stations will require increased medical autonomy from earth-based support. Integrating emerging technologies, including machine agents and robotics, can open new pathways to crew self-reliance in medical decision-making, just-in-time training, and treatment delivery by enabling the shift towards astronauts working together with smart agents as Cyber-Physical-Human (CPH) teams. The design of new CPH-teams-oriented system architecture will require involving a wide range of stakeholder perspectives in a transdisciplinary approach. Incorporating human-centered design considerations alongside the optimization of occupied mass, volume, and reliability will play a crucial role in designing-in trust within the agent-crew interactions and facilitating a synergistic human-agent collaboration, maximizing safety and minimizing mission risks. **METHODS:** Within a human-centered design approach, we conducted expert interviews, design workshops and reviewed the state of the art. Twenty-five Subject Matter Experts (SMEs) participated in two rounds of qualitative interviews, focusing on identifying challenges and opportunities related to astronaut medical systems and defining trust components within agent-crew interactions. The SMEs represented diverse backgrounds and expertise: Space Medicine (Flight Surgeons, Exploration and Emergency Medicine), Astronauts and Training (public and private sector), Space Systems and Engineering, Architecture and Human Factors, Computing and Human-Computer Interaction. **RESULTS:** Thematic analysis of the interviews highlighted key themes around trust, challenges of medical interfaces, and performance gaps, which we present in the context of three dimensions of trust: human>agent, agent>human, and agent>database. A preliminary high-level model of future space system architecture has been developed, which illustrates data flow within the proposed Exploration Medical Ecosystem Infrastructure (ExMEDI), including the identified key data input sources. **DISCUSSION:** The results stress the importance of the interaction design in building trust relationships. Our next steps involve an iterative design of the agent-team interface of the ExMEDI clinical decision support to facilitate autonomy. Key opportunity areas of focus include the dynamic context-aware interfaces, design for medical privacy, shared decision-making, and explainability of the interface through visualizing risks.

Learning Objectives

1. The audience will learn about the identified key themes around trust, challenges of medical interfaces, and performance gaps, which we present in the context of three dimensions of trust.
2. The audience will learn about the developed preliminary high-level model of future CPH-teams-oriented space system architecture.

[427] INVESTIGATING THE POTENTIAL FOR PARASTRONAUTS: SUPPORT FOR THE ESA PARASTRONAUT PROJECT

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(Education - Program/Process Review)

BACKGROUND: The degree of disability that a person experiences depends on the condition or limitation and the environment. The environment changes dramatically in space. Our work supports the ESA parastronaut project to investigate the physiological feasibility of space missions being undertaken by people with a physical disability. The aim is to investigate the physiological challenges, risks and benefits associated with parastronauts' participation in space missions. **OVERVIEW**: We have established a multidisciplinary team to review the literature and investigate existing practices relating to people with physical disability and the aerospace environment. We investigate the feasibility of a parastronaut's space mission considering requirements and processes occurring before, during and after a mission. We ask three questions: What are the physiological limitations and considerations for safety? What are the environmental and technological adaptations needed? Is the space environment better suited for individuals with specific disabilities? As this field is unexplored, the lessons from para-athletes' training and recovery, and adaptations for pilots with disabilities are used as a foundation to define the problem, and to suggest relevant technological solutions and adjustments to existing processes. Given the diversity of disabilities, a personalised-medicine approach is followed. In the preliminary stage of the project, two additional tools are used, surveys and focus groups, where people with disabilities, charities, aerospace and medical experts share their insights on current practices and unmet needs. **DISCUSSION:** This work is in line with the ESA parastronaut feasibility project, which has global relevance. Our ambition is to show that space can be for everyone and every body. Space exploration has driven innovation in a variety of fields, and this project will show new solutions to make space exploration more accessible, supporting the development of tools that can lower the level of disability experienced in aviation and on Earth. This work is increasingly relevant for the civilian field, with the advent of commercial space flight and space tourism, where more heterogeneous groups of individuals may seek access to aerospace related opportunities. The work of our team will be fundamental in advancing our understanding of the human body adaptability to changes in environment and to make space travel more inclusive.

Learning Objectives

1. To discuss the differences in level of physical disability experienced on Earth and during a space mission.
2. To identify the risks and benefits of parastronaut missions, with a focus on adjustments before, during and after a mission.

Thursday, 05/25/2023 ***1:30 PM***
Grand Ballroom D-E

[S-76]: SLIDES: BODY OF KNOWLEDGE: PHYSIOLOGY UPDATES

Chair: Amanda Lippert
Co-Chair: Katie Samoil

[428] ASSESSMENT OF CARDIAC OUTPUT DURING PHYSICAL EXERCISE USING NONINVASIVE TECHNIQUE

Munna Khan, Kashif Sherwani
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