

Enhancing Distributed Team Performance in Exploration Missions

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Outline

- Opening statement
- Questions

Experience base - Training

- Astronaut training (computer engineering, EVA pre-familiarisation, Human Behaviour and Performance)
- Ground personnel training (instructor training, HBP training)
- Analogue environment HBP training (Italo-French Antarctic base)
- Instructional Design and Quality Assurance for ESA Training
- Human-Interface design standards for ISS Onboard Training (ISS Media Requirements Document and CBT template)

Experience base – Engineering and Ops

- ESA and German MIR missions (payload and crew support computer facility development, acceptance, training, procedures and operations)
- Human Mars Mission studies (Aurora exploration preparatory programme - HMM design study)
- Human Factors Lesson Learned (HF tool project: converting lessons learned into experience-based guidelines)

Questions

1. What are the primary impediments to achieving effective distributed teams?
 - Team situational awareness due to
 - cultural heritage (national, educational, organisational, social)
 - experience base
 - Distributed teams have partial, distorted, perspective on the tasks and constraints of other teams, which impacts
 - team SA
 - ability to interact effectively

Questions

2. Culture issues

- What are advantages/disadvantages of multicultural crews and mission control?
- What cultural differences make a difference?
- Crewmembers are forced to train together for a long time before a mission
- Cultural differences due to long forced co-habitation in a constrained environment, less related to the professional performance
- Language can play a large role (ability to communicate effectively)
- Ground teams have larger issues (lack of shared SA)

Questions

3. What approaches are most likely to enhance distributed team performance?
 - Travel to IP location, work with colleague
 - Create common tools for visualization of current situation (VR, displays)
 - Create common mental model
 - Share experience
 - Enable effective communication based on common mental models

Questions

4. What must NASA, ESA and other international partners do to reach these goals?
- Technical Interchange Meetings
 - Cross training (technical)
 - Joint training (HBP+technical)
 - Exchange of personnel
 - Shared common goals and procedures
 - Shared visualization tools (VR, displays)



Backup slides

Questions

1. What are the primary impediments to achieving effective distributed teams?
 - The majority of issues impeding effective distributed team performance are associated with team situational awareness, in a broad sense. Every team involved has its own cultural heritage (national, educational, organisational, social), mostly shared within a team, because of processes, procedures, regulations, and training, but also because of on-the-job sharing of expertise via continuous interactions. Distributed teams tend to have their own partial, and often distorted, perspective on the tasks and constraints of other teams. This strongly affects the overall team SA, and therefore the ability to communicate and interact effectively. Methods and tools that increase distributed team SA would enhance overall team performance.

Questions

2. Culture issues

- What are advantages/disadvantages of multicultural crews and mission control?
- What cultural differences make a difference?
- Focusing on a specific crew, and due to the fact that crewmembers are forced to train together for a long time before a mission, cultural differences still play a role, but more due to long forced co-habitation in a constrained environment, and are less related to the professional performance (although they have an impact on it). With respect to crews, joined behavioral training in forced group living conditions and continuous reinforcement of effective behaviors during technical training, as well as individual coaching make a difference. A key issue is helping the crew to appreciate cultural differences and their contributions to the team.

Questions

3. What approaches are most likely to enhance distributed team performance?
 - In terms of ways to overcome impediments to team performance, no factor can be separated from the others, and they are extremely interdependent. However, organisational factors are the most likely to overcome impediments, and the most complex to change. Procedures are strongly influenced by organisational factors, and training mostly overcomes, through individual and team interactions what organisations, rules, procedures and overall operational constraints impose. If organisational (and political) issues could be resolved, procedures and training could enhance performance instead of merely avoiding errors.

Questions

4. What must NASA, ESA and other international partners do to reach these goals?
 - To reach the overall mission goals, setting challenging and achievable common goals, and communicating them to all employees strikes me as being mandatory. In addition, I think that applying the ideal team behavioral model to the overall agencies, as distributed teams would do its best