

HUMAN SPACE ENDEAVOURS SYMPOSIUM (B3)  
How Can We Best Apply Our Experience to Future Human Missions? (2)

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USER-ORIENTED DESIGN STRATEGIES FOR SAFETY AND WELL-BEING DURING SPACE  
MISSIONS

**Abstract**

The paper explores the concept of optimal crew performance during space missions from the perspectives of user oriented design and ergonomics, and the theory of Flow (Csikszentmihalyi). People as decision-makers in complex systems are the most critical element for system safety, reliability and performance. According to empirical evidence chances for accidents and human mistakes are greater when people perform under psychological or physical stress, while tired, hungry or bored. Uncomfortable temperature, constant noise and general spatial chaos of objects and devices, and the lack of volume or spatial quality of private, semi-public and public living and work zones make the environment stressful. Stress can make the work situation not only less productive and enjoyable but even dangerous. It is easier to direct full motivation and concentration for tasks that requires special focus, skills and action than for normal routine matters. Furthermore, during work assignments in remote extreme locations the optimal performance level drops, when a person begins to miss family and friends, old habits, customs and the homely living environment. The paper proposes that by upgrading the focus from safety to general well-being, superior crew performance and safer missions can be accomplished. The spatial experience becomes even more meaningful when people are obliged to live and perform in very limited spatial quality, or in extreme hostile conditions and in isolation. A team of industrial designers and engineers is the key for successful product and service design from automobiles and aircraft to personal computers and condition training devices for sports. The most ambitious housing projects and public buildings are designed by teams of architects, interior designers, industrial designers, experts in ergonomics and numerous engineers with sub-specialities. The traditional architectural and spatial design principles assist in achieving dynamically changing positive and energetic, calming and harmonious atmospheres. Mass-customization and customization enables people to modify objects and spaces according to their personal needs and desires. When the user is given the opportunity and the freedom to choose and to improve one's own work and living environment, the user-experience becomes more enjoyable and the human performance improves. The hallmark of Flow is a feeling of spontaneous joy, even rapture, while performing a task. The paper is based firstly on author's professional experience as a designer, secondly on narratives by astronauts and pilots, people who have worked longer periods of time in remote locations.