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SPACE OPERATIONS SYMPOSIUM (B6)
Training Relevant for Operations, including Human Spaceflight (3)

Author: Mr. Hunt Culver
United Space Alliance, United States, hunt.c.culver@usa-spaceops.com

REDESIGN TRAINING TO REDESIGN WORK: TRAIN TO MINIMIZE HUMAN ERROR DURING THE OPERATION OF HUMAN RATED SYSTEMS

Abstract

Lessons learned from decades of spaceflight indicate human error during the operation of a space system is a leading contributor of system failure. Human rated space transportation systems demand that critical system failures, which would result in the loss of a passenger or crewmember, have an extremely low probability of occurrence. Although modern design methodologies have taken the lead to incorporate human factors considerations into system component designs with the goal of minimizing human error during operation, less attention has been paid by the space community to perform both a comprehensive redesign of the jobs and task needed for ground and flight operations as well as to implement a redesigned training program that supports those jobs. Even after years of developing a culture of safety and high quality, the shuttle program still experienced human errors that could cause critical system failure. The shuttle program's experience however does provide valuable insights and an important starting point when designing the work and the work force required for error free operation. A model was developed that categorized work by three characteristics: the frequency at which the task was performed; the criticality of the task; and the operational system knowledge required. Subsequently, development of a new training structure was instituted to implement novel concepts consistent with this model. Applying this model to specific personnel roles with different levels of decision authority, training methods must be adapted in terms of proper content, technical level of detail, and frequency of training to ensure effective work task execution that reduces the probability of human error. Training of personnel – ground, launch, or mission – needs to be tailored to the characteristics of the task based upon the model's categorization. The shuttle program was never able to capitalize on this insight nor to redesign the training to redesign the work; however shuttle experiences has validated that the categorization model can optimizes the design of the work increase productivity, reducing costs while achieving human rating safety, quality goals for operations activities.