Human Research Program
Space Human Factors Engineering

SHFE Mapping of IRP Rev B Risks to IRP Rev C Risks

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Organization of Presentation

• Overview of Rev B to Rev C Risk Restructuring, Gap Mapping
  – Includes Full Risk Titles
  – Includes recommended Short Risk Titles
• Detailed Gap Mapping of Gaps from Rev B (Old) to Rev C (New)
  – Clear identification of FROM/TO for each Gap
• Rationale for the Change
  – Cleaner Risk Statements, Less overlap among Risks
  – Alignment with DoD’s Human Factors Analysis Classification System (HFACS)
• Schedule for updating Evidence Reports
• Status/plans for RMAT vetting at HSRB
SHFE Rev B Risks

Risk of Error Due to Inadequate Information (10 Gaps)

Risk of Reduced Safety and Efficiency Due to an Inadequately Designed Vehicle, Environment, Tools, or Equipment (8 Gaps)

Risk of Error Due to Poor Task Design (5 Gaps)

SHFE Rev C Risks

SHFE-HAB
Risk of an Incompatible Vehicle/Habitat Design (6 Gaps)

SHFE-HARI
Risk of Inadequate Design of Human and Automation/Robotic Integration (4 Gaps)

SHFE-HCI
Risk of Inadequate Human-Computer Interaction (7 Gaps)

SHFE-TASK
Risk of Poor Critical Task Design (3 Gaps)

SHFE-TRAIN
Risk of Performance Errors Due to Training Deficiencies (3 Gaps)
SHFE Rev B Risks

- Risk of Error Due to Inadequate Information (11 Gaps)
- Risk of Reduced Safety and Efficiency Due to an Inadequately Designed Vehicle, Environment, Tools, or Equipment (8 Gaps)
- Risk of Error Due to Poor Task Design (5 Gaps)

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- SHFE-TASK
  Risk of Poor Critical Task Design (3 Gaps)
- SHFE-TRAIN
  Risk of Performance Errors Due to Training Deficiencies (3 Gaps)
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<td>SHFE 2.3.b: How can existing models be modified to adequately represent the specified user population (e.g., field of view, visibility) in reduced gravity and be portable to other simulations environments?</td>
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DoD’s HFACS Based on Reason’s “Swiss Cheese Model of Human Error
SHFE Research and HFACS

• The primary focus of SHFE research is on Preconditions
  – minimize the likelihood of these preconditions through relevant research
• We have the knowledge to control some preconditions; further research is not required
  – This knowledge is captured in the Human System Integration Requirements and the Space Flight Human Systems Standards, vol 2
  – We don’t know enough about other preconditions to ensure they won’t occur, especially for long duration
• Two SHFE topics, workload and training, are captured at the Organizational Influences level
DOD HFACS

Risk of injury or inefficiency due to human error

Organizational Influences

Resource / Acquisition Mgmt
Organizational Climate
Organizational Process

Ops Tempo / Workload
Organizational Training Issues / Programs

Supervision

Inadequate Supervision
Planned Inappropriate Operations
Failure to Correct Known Problem
Supervisory Violation

Preconditions

Environmental Factors (Phys & Tech)
Condition of Individuals
Personnel Factors

Acts
Errors
Violations

SHFE research risks fall here.
The two highest HFACS tiers (Organizational Influences and Supervision) are generally policy level or organizational level factors
- These need to be addressed in order to implement a safety program or a risk reduction program
- These are generally beyond the current scope of the SHFE Project (and HRP)

Some categories are entirely within the domain of SHFE, while some categories are shared with other HRP Elements

Some of the HFACS categories are primarily the province of other HRP Elements
- Psycho-Behavioral Factors, Adverse Physiological States, Sensorimotor Adaptation, Self-Imposed Stress
Status of Evidence Reports and RMAT Vetting

• Draft Evidence Reports have been completed; Final versions scheduled for completion in May, to allow for Export Control processing prior to HRP’s NRA solicitation.

• All new Risks entered in the RMAT system
• CR presented to HSRB
  – RID resolution close to completion