The Human Factors Analytical Tools Project
Key Technology-Related Human Factors Issues

- Inadequate operator understanding of the technology
- Sub-optimal physical design or location of the technology
- Sub-optimal information provision or feedback
- Distraction
- Attenuation to alarms
- Failing to act on an alarm
- Problems transitioning between different modes
Evaluating New Technology

Three analytical tools:

• Task analysis
• Situation awareness measurement
• Verbal protocol analysis

Plus resistance to technology
Task Analysis

Method:

- Focus group discussions
- Observations/think aloud protocol
- Consult subject matter experts re top 5 goals
- Categorisation/identification of goals and sub-goals

Time-consuming for researchers and participants

Recommendation:

Existing task analysis

Rose & Bearman, 2013

Subject matter expert review
Modification of task analysis
Completed task analysis
Evaluation using Task Analysis

3.0 Execute driving to maintain on-time running

3.1 Regulate power and brake applicable to track profile

3.2 Drive at safe speed but not slower than necessary

3.3 Monitor alarms
Situation Awareness Measurement

SART

LETSSA
LETSSA

• Sound theoretical underpinning
• Real world application
• Predicts performance
• Predicts SAGAT
• Same questionnaire for all scenarios – real or simulated
• Simple scoring
Verbal Protocol Analysis

• Direct measure of situation awareness?
• Differences between participants
• Difficulties in coding
• Difficulties with inter-rater reliability
• What does it tell us?
Resistance to Technology

Similarities to other domains:
• Perceived usefulness/ease of use
• Perceived personal impact
• Individual characteristics
• Social influences
• Organisational factors
Resistance to technology

Rail specific characteristics:

• Tradition
• Pride

Minimising resistance
REFLECTIONS
Making effective use of task analysis to identify human factors issues in new rail technology

*Applied Ergonomics*

J.A. Rose, C. Bearman

An Evaluation of the Low-Event Task Subjective Situation Awareness (LETSSA) Technique

*Human Aspects of Road and Rail Transportation*

J.A. Rose, C. Bearman, J. Dorrian

Constructing and Evaluating the Low-Event Task Subjective Situation Awareness (LETSSA) Measure

*Proceedings of the AAvPA Conference 2012*

J.A. Rose, C. Bearman, J. Dorrian

Cease and resist! Exploring resistance to technology in the rail environment

*Proceedings of the World Congress for Rail Research 2013*

A. Naweed, J.A. Rose
Designer/client/end-user Disconnect Model (Day 2013)
DREAM safety analysis tool
(Design Risk Error Avoidance Model - Day 2014)

Design process steps where safety hazards can occur:
1. Design Concept formation
2. Drafting specifications
3. Building, Constructing, Coding, Writing Business Rules
4. Testing
5. Deploying, Implementing
6. Training
7. Maintenance
DREAM safety analysis tool
Design Process audit
Staff training

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