Eurocontrol/FAA: ATM2000

Human Factors Issues / Human - Machine Interfaces

Report of the Rapporteurs and Session Chairs

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Human Factors Issues / Human-Machine Interfaces

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Human Factors Issues / Human-Machine Interfaces

- 13 Papers Presented in HF Track
- 3 Sessions within the HF Track
  - **Session 1:** CHI and Human Performance
    - 3 European and 2 US Presentations
  - **Session 2:** ASAS / Air-Ground Integration
    - 2 European and 2 US Presentations
  - **Session 3:** Transition and Training
    - 4 European Presentations
B1: CHI and Human Performance

Issues: Preference Mgmt. vs. Performance Mgmt.
- Performance is not always discriminable between any two specific display attributes and we need to accommodate user preferences in order to focus on attributes that impact HP.
- Traceable requirements allow one to address design issues associated with preferences that may impact HP and integration of new capabilities.
  - In particular, design attributes that supports cognitive processing.

Needs: Definition and Application
- Expand research on the development of human performance measures and continue their refinement so they can be applied proactively in evaluating new systems designs.
- Apply a traceable requirements process that support the development of rich requirements.
B1: CHI and Human Performance (cont.)

Issues: HMI Technical Advances
  - Animation and Transparency
    • Elegance in Design/Efficiency
    • Shared Awareness
  - Touch Screens
    • Gestural Memory
    • Shared Awareness

Needs: Application
  - Techniques (animation, transparency, touch screens, etc.) are available for advanced HMI development, however we need to explore their use relative to specific ATM applications.
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- B2: ASAS and Air-Ground Integration
  - Issues: Research Approaches and Concept Definition
    - Realistic HITL simulations and fast-time models complement each other.
    - Exploratory work still needed to define and select ASAS applications to be further developed.
      - Still lack of clarity in Free Flight definition (e.g., self separation, shared separation resp., delegation of authority).
      - Self Separation Concept differs relative to pairwise resolution vs. all equipped A/C resolution.
  - Needs: Concept Clarity, Metrics, and Safety
    - Clarify definition of FF so we can understand the problems and where solutions are applicable.
    - Common metrics
    - Safety not usually considered: Failure modes, non-standard operations, emergencies, wx.
      - Separation Standards have to be established.
B3: Transition and Training

- Issues: Human Performance Evaluation
  - HMI is the tip of the iceberg
    - Don’t know whether HP issues are related to HMI or underlying attributes of the system design
  - Tool Implementation
    - It’s how the user thinks about and uses the tool that is important in the overall performance of the system
    - Training is important for evaluation and feedback from evaluation is essential to improve training
    - Trust in system is important in evaluation and reliability of the data must support the trust

- Needs:
  - Consider HMI requirements early in the system design
  - Make use of the evaluation data to improve training
B3: Transition and Training (cont.)

- **Issues:** Sector Team Load Balancing
  - Different allocation of tasks among the sector team may relieve the TC and thereby increase the overall sector capacity

- **Needs:** Definition and Validation
  - Elaborate and evaluate the allocation tasks among the sector team in multi-tool environments
Conclusions

- Concept Definition:
  - Continue to understand the implications of new concepts of operation involving changes in roles, responsibilities, and procedures and their impact on human performance.

- HMI Design:
  - Given the potential for new information to affect human performance, it is important that we explore information presentation formats and principles of operation to ensure safety and efficiency of operations.

- Human Performance Assessment:
  - Understanding what we measure, interpreting interactions, and applying measurement proactively are the biggest challenges facing us today in human measurement and analysis.