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

Human Factors Issues / Human - Machine Interfaces

- 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.

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- 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.

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- 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

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- 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

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- 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