Human factors track report

ATM 2001 Seminar

Friday December 7th

Santa Fe

Human Factors Report

- Rapporteur : A Printemps CENA
- Session chairs :
  - Mark Rodgers (FAA) (3 papers)
  - S Chatty (CENA) (1 paper)
  - J P Nicolaon (Eurocontrol) (2 papers)
  - J Hansman (MIT) (3 papers)
- 9 presentations

Session 1 Automation design :
Flexibility, attitude and understanding

- **Main research outputs**
  - - Need to meet variability in controller strategies
    - Airspace structure
    - Local differences (cultural or training reasons)
    - Working methods…
  - Managers and controllers disagree on main threat to ATC safety
    - Managers : automation
    - Controller : excessive traffic
    - Controller demand to be part of the ATC automation process
  - Existing system, ground based or airborne (FMS), are not used to their optimum capability

Session 1 (2) Automation design : flexibility, attitude and understanding

- **Recommendations**
  - Need of a better understanding of the flexibility required in automation to support controller variability
  - Need of a better understanding of the opportunities to leverage the capability of existing and future automation systems (airborne or not)
  - Need to review the automation design process
    - Earlier user involvement (prototypes)
    - Selection of human factor best practices
    - Human factors aspects put at a higher rank by managers

Sessions 2 and 3

Controller activity measurement

- **Main research outputs**
  - Tools and techniques are needed to get objective measurements of key controller activities
    - Situation awareness
    - Workload
    - Controller acceptability of a system evolution
  - Were highlighted :
    - Benefits of an on line (in simulations) situation awareness assesment tool
    - Benefits of a Controller Acceptance Rating scale methodology
    - Objective task load measures, excluding communication task load, predicts subjective workload
      - Need to verify in high communication task load.

Sessions 2 and 3 (2)

Controller activity measurement

- **Recommendations**
  - There is a need to achieve a commonly agreed upon set of criteria (parameters, tools, techniques) to measure some key controller activity
    - Wide variability of situations make this task highly complex
    - Quite difficult to achieve
  - The ATM R&D community should better interchange to achieve this common goal and make partial R&D results widely available.

Session 4

Need for cognitive models that accommodate the variability of controller activity

- **Main research outputs**

  When designing automation or system behaviour modelling, controller activity is to be described

  – Quite essential for airport capacity modelling

  – Speech recognition tools requires further enhancement :

    - ATC domain knowledge
    - Speech recognition technology

  – Use of paper strip in control tower need to be better understood before alternative information display approaches can be realized

Session 4 (2)

Need for cognitive models that accommodate the variability of controller activity

- **Recommendations** : need to achieve valid models of controller cognitive activity
  - Work conducted is often embedded in tool or system evolution projects and is often lost when these projects conclude.
  - A lot of research, but incomplete.
  - Poor and « local » bibliography availability creates lack of continuity
  - Understanding the variability in controller activity is the foundation of automation
  - Large variety of possible models : need to achieve common modeling concepts

General findings

- Most of the research presented involved controller through experiments

  – The importance to leave the lab and go on the terrain should be highlighted.

- A lot of interesting research… but results are partial and bibliography often inadequate

  – Difficulty to have firm conclusions

  – Need to build on past findings, not replicate…

General finding (2)

- Need to recognize the need to get consolidated findings on some key basic issues on controller activity and their measurement.

- Need to recognize the importance of this activity **as a research goal** (and not the tool).

- Today automation is build on sand… there is no clear answer to some basic foundation questions

- Need for a more organized research community, for improved results exchange and access to past experience.