

## Air Traffic Control Human Factors

### Research and Development Human Factors Laboratory

**Overview: The air traffic control (ATC) human factors program examines longer term issues and concepts that relate to human performance in the National Airspace System.**

This program developed measurement tools and methods that are being used to evaluate new procedures and hardware as the system evolves towards the 21st century. The following paragraphs describe some of this work.

#### **Controller Performance and Workload Measurement**

Researchers designed a new performance rating form for over-the-shoulder observational evaluations. Form designers assessed reliability and validity against objective system measures in real-time simulations. Researchers have also developed multiple measures of controller workload. The Human Factors Branch consolidated ATC measurement tools into a database which is available to researchers working on any current or future systems issues.

#### **Controller Visual Scanning**

Controller visual scanning is a potential source of human error. The Human Factors Laboratory uses state-of-the-art eye-tracking equipment to evaluate scanning behavior. Controller scanning patterns change over time, as a function of systems loads and as influenced by overflights that the controller is not actively controlling. Controllers obtain the majority of their visual information only when looking directly at and fixating a specific object or event. Eye-tracking equipment can be used to evaluate the impact of new displays on controller scanning behavior.

#### **Situation Awareness**

Human factors researchers have developed and are currently evaluating different techniques for assessing the situation awareness of air traffic controllers. The purpose is to develop reliable indicators of situation awareness that are not intrusive so they could be used to evaluate the effects of changes in system design and operational procedures. As new automated decision aids are developed, researchers will determine the degree to which they support operator situation awareness.

#### **Controller Communications**

Laboratory researchers completed an applied study to evaluate the performance impact of digital ground-to-air communications technology known as vocoders. The results indicated that controllers could use vocoders without any measurable change in controller performance. The research also established clear controller preferences between two alternative vocoder systems.

#### **Operations Concepts**

Researchers completed several simulation studies to investigate the effects of new operational concepts, such as user preferred routes and shared separation responsibility, on air traffic controller performance, situation awareness, and workload.

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# System Efficiency