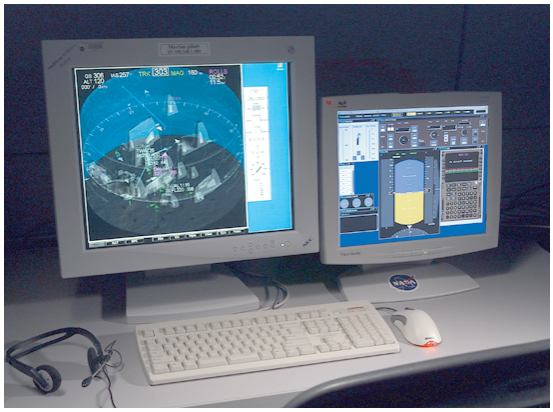
Human Factors

research and technology division

Human-Centered Cockpit Information & Flight Path Management Concepts for Airborne Traffic Management

Objective

The Flight Deck Display Research Group (FDDRG) develops both prototypes and guidelines for advanced interfaces which integrate displays, decision support tools, and flight deck automation. A primary goal of the FDDRG is to provide human-centered solutions and concepts which address projected changes in roles and responsibilities on future flight decks. Chief among these are real-time flight replanning which takes into account Air Traffic Management constraints, such as required times of arrival, as well as surrounding air traffic, weather, and terrain.



Approach

Low-, medium- and high-fidelity simulations are used to develop guidelines and test concepts. Low-fidelity simulations include traditional part-task research studies of specific interface design features and concepts, while mid- and high-fidelity simulations are used to test more integrated interface principles and concepts.

Impact

This research enables the proposed evolution of the National Airspace System into a system where many more roles and responsibilities are shared between the air traffic controller and the flight deck. These interface technologies are currently being employed to allow testing of multiple new airspace management concepts.

Information Technology

The advanced CDTI interface has pilot-selectable 2-D and 3-D viewing orientations with dynamic 4-D flight plan depiction and altitude color coding for 2-D depiction. 2-D and 3-D weather depictions are included, as well as anti-clutter features to manage display overload. Using conflict detection algorithms and alerting displays, pilots are provided with manual and automated conflict resolution tools, as well as 4-D flight path modification tools coupled with conflict detection logic to identify conflict-free routes. Graphical FMS flight plan changes are coordinated with ATC through FANS links, and approach spacing and merging algorithms are coupled to FMS. Required time of arrival management tools are included. The interface allows voice input for information management and display functions.

NASA Programs and Collaborations

This work is an element of the Distributed Air/Ground Traffic Management (DAG-TM) research being developed in collaboration with NASA Langley Research Center. It is sponsored and managed by the Advanced Air Transportation Technologies Project, part of the Airspace Systems Program.

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