AVIATION SAFETY/AUTOMATION PROGRAM OVERVIEW

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GOAL

PROVIDE THE TECHNOLOGY BASE LEADING TO IMPROVED SAFETY OF THE NATIONAL AIRSPACE SYSTEM THROUGH DEVELOPMENT AND INTEGRATION OF HUMAN-CENTERED AUTOMATION TECHNOLOGIES FOR AIRCRAFT CREWS AND AIR TRAFFIC CONTROLLERS
The Problems

MAN  VEHICLE/STATION

- Human Errors
- Automation Design
- Traffic/Congestion
- Weather Hazards

SYSTEM

Perspective

- Automation can improve the efficiency, capacity and dependability of the national aviation system

— BUT —

- Humans will manage, operate and assure the safety of the next generation system

— THEREFORE —

- Human-centered automation is the key to system effectiveness
Specific Objectives

- To develop the basis, consisting of philosophies and guidelines, for applying human-centered automation to the flight deck and ATC controller station

- To provide human-centered automation concepts and methods to the flight crew which ensure full situation awareness

- To provide human-centered automation concepts and methods for ATC controllers which allow integration and management of information and air-ground communications

Overview

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### HUMAN-AUTOMATION INTERACTION

#### PROGRAM SUB-ELEMENT 89 90 91 92 93 94

**PHILOSOPHY AND TOOLS FOR AIRCRAFT AUTOMATION**
- Automation Philosophy Guidelines
- Workload Metrics Guidelines
- Functional Validation of Intelligent Systems
- Validated Human/Automation Architectures

**HUMAN-CENTERED AUTOMATION PRINCIPLES**
- Function Allocation Guidelines
- Cognitive Models: Pilot/Controller Cognitive Models

**SYSTEM SAFETY ANALYSIS**
- Methodology for Human Error Analyses
- Aviation Safety Model

### INTELLIGENT ERROR-TOLERANT SYSTEMS

#### PROGRAM SUB-ELEMENT 89 90 91 92 93 94

**FLIGHT PLANNING & EXECUTION**
- Flight Planner/Replanner Interfaces
- Cockpit Procedures Monitor
- Goal-driven Flight Planning & Replanning System

**AIRCRAFT SYSTEMS MANAGEMENT**
- Fault Monitoring & Diagnosis System
- Smart Checklists

**AIRCRAFT ENVIRONMENT MANAGEMENT**
- Evaluation of Collision Avoidance Systems
- Cockpit Weather Information Displays
- Integrated Environment & Situation Advisor

### INTELLIGENT HUMAN-CENTERED COCKPIT AND CONTROLLER STATION
ATC/COCKPIT INTEGRATION

PROGRAM SUB-ELEMENT

ATC AUTOMATION & INTEGRATION

INFORMATION MANAGEMENT

TECHNOLOGY TRANSFER

Simulation and Live Traffic Tests:
NASA/FAA ATC Facilities

Integrated Evaluation of Intelligent Human-Centered Cockpit in an Automated ATC Environment

Steering Cmte; NASA/FAA/Industry Workshops and Technical Conferences
PROGRAM ELEMENT I

HUMAN/AUTOMATION INTERACTION