



Aviation Weather Information

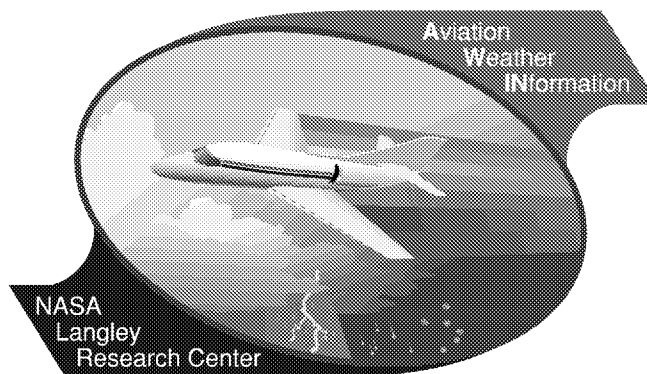
Aviation Weather Information Overview and Status

Weather Accident Prevention Project Review

Cleveland, Ohio

June 5 to 7, 2001

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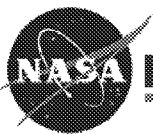




Aviation Weather Information

Outline

- **Background**
- **Research Areas**
- **Progress since last year**



Background

Aviation Weather Information

- **Weather is a major contributing factor in accidents:**
 - **33% Commercial carrier**
 - **27% General aviation**
- **Many accidents are due to lack of weather situation awareness and poor decisions.**
- **Provision of strategic weather information during the en route phase enables avoidance of adverse conditions.**



Guidance

Aviation Weather Information

- **NASA Aviation Safety Program**
 - Aviation Safety Investment Strategy Team
 - Executive Council
- **National Aviation Weather Program Council**
 - National Aviation Weather Program Strategic Plan
 - National Aviation Weather Initiatives
- **FAA Safer Skies: Focused Safety Agenda**
 - Weather Joint Safety Analysis Teams
 - Weather Joint Safety Implementation Teams
- **FAA Aviation Weather Research Program**
- **Friends of Aviation Weather**
- **WxAP Project Review**



Aviation Weather Information

Plan

Goal

Develop technologies and methods for providing pilots with accurate, timely and intuitive information during the en route phases of flight which, if implemented, will enable a 25 to 50% reduction in aircraft accidents attributable to weather situation awareness

Objectives

Develop Needed
Weather Products and
Sensing Capabilities

Develop Enhanced
Weather Presentations
and Decision Aids

Challenges

Improved Forecasts
Need Better
Input Data

Existing Aircraft
Need Retrofit
Capability

Pilot Workload
Should Not Be
Increased

Diverse Aviation User Groups

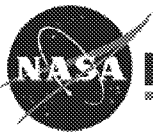
Approach

Use Aircraft as
Airborne Weather
Data Collectors

Develop
Multi-Purpose
Sensor Systems

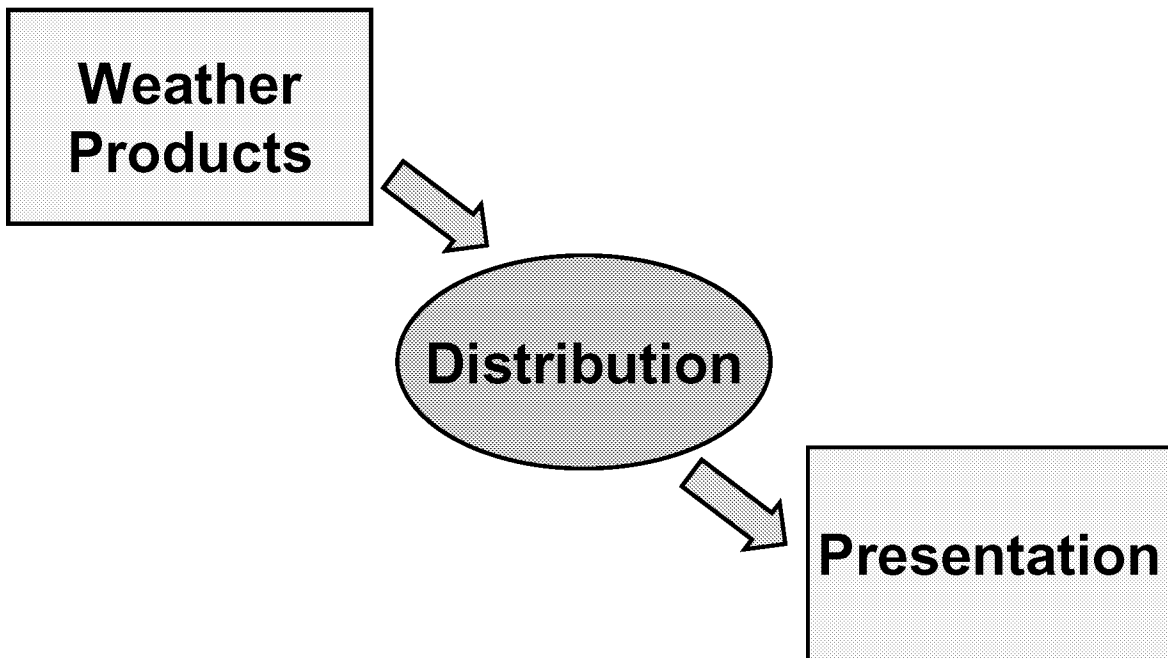
Develop
Installed and
Portable Systems

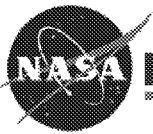
Provide
Decision
Aids



System Elements

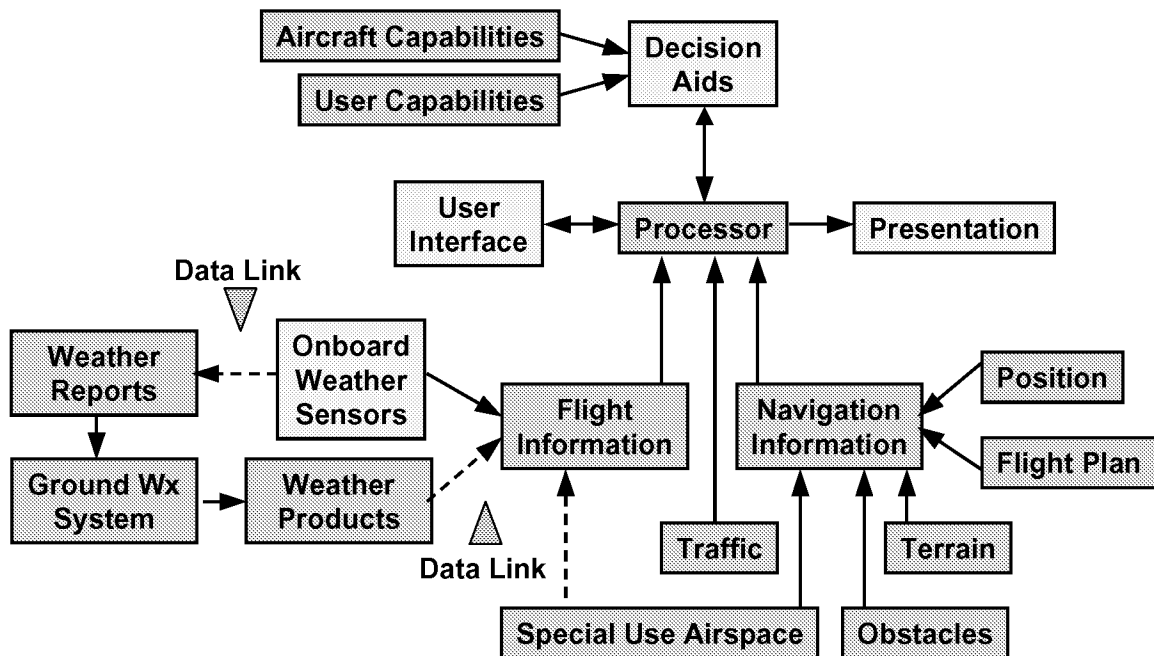
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AWIN System

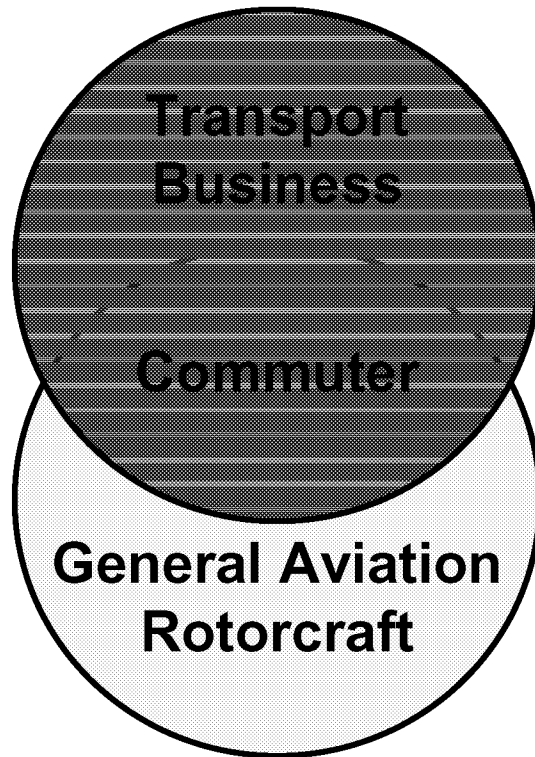
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Market Segments

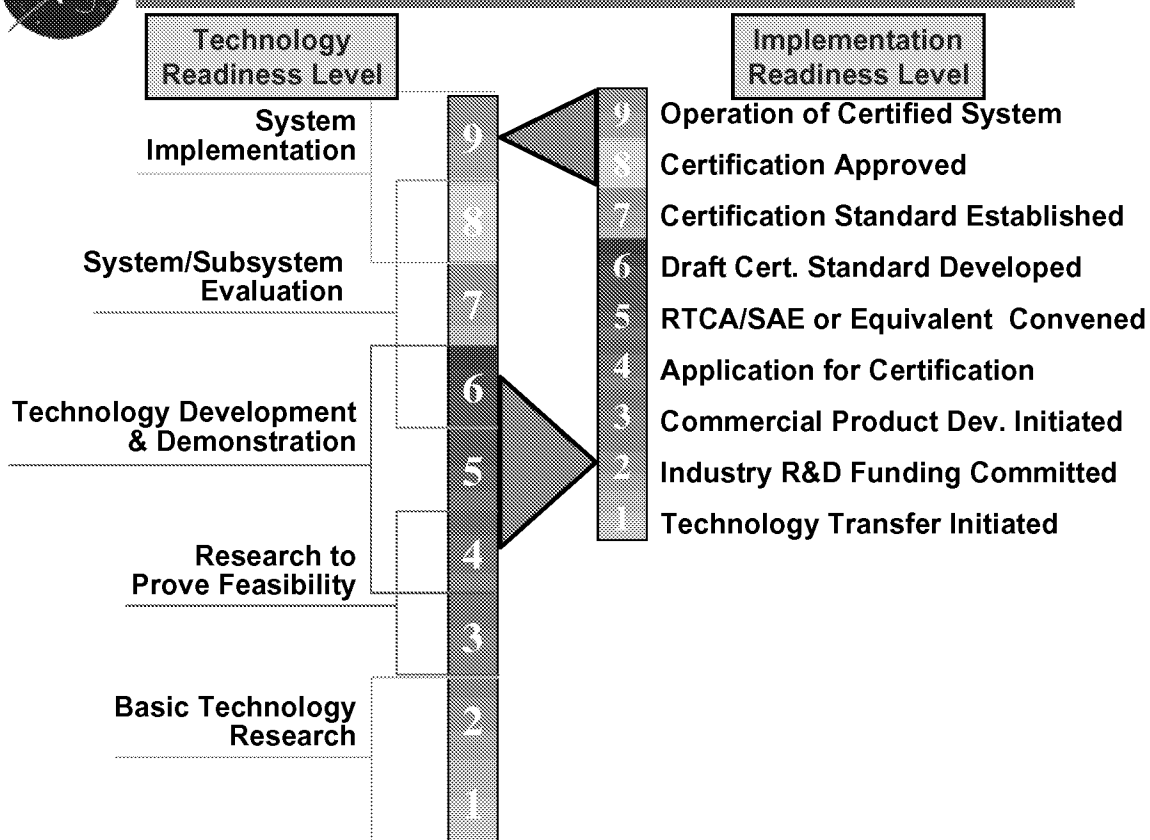
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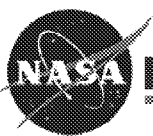




Technology Development Level

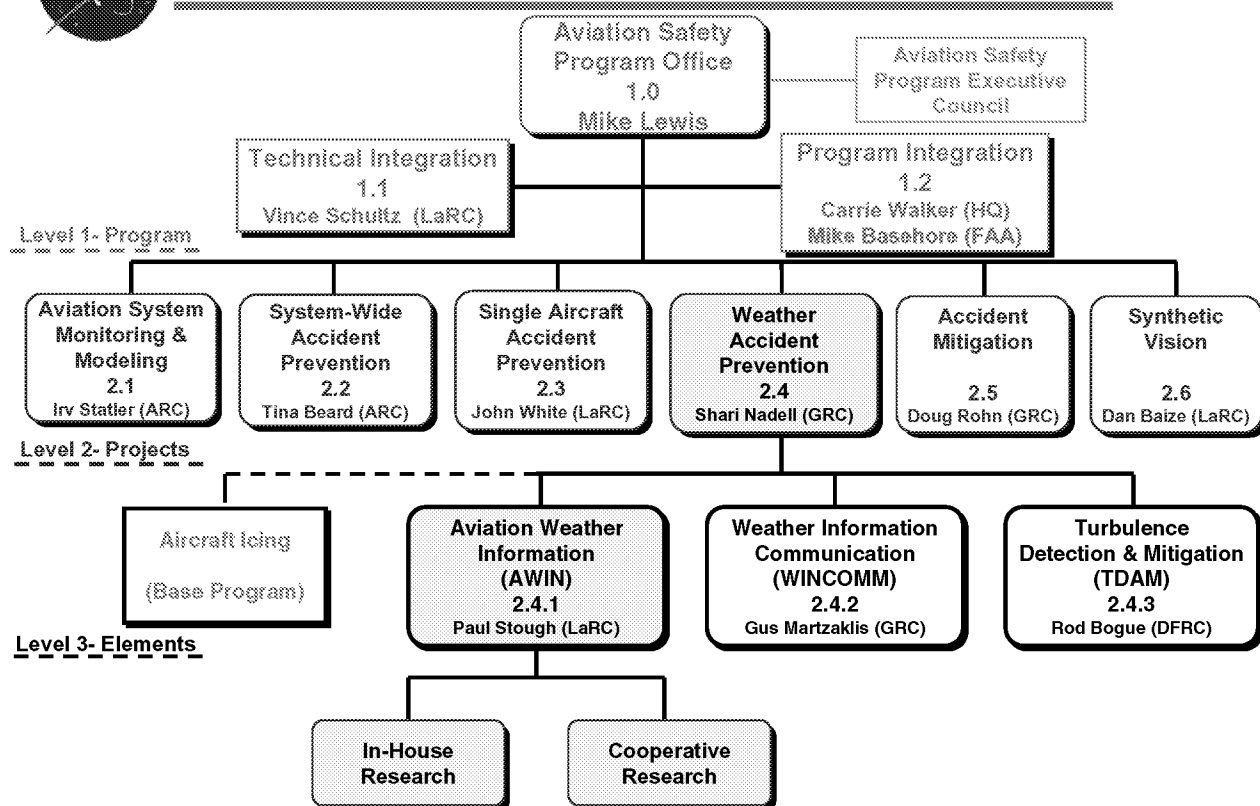
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Aviation Safety Program Organization

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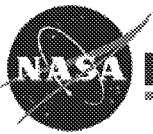


NASA Research Team

Aviation Weather Information

- **Dr. Jennifer Burt** (757) 864-8304
Human Factors/Presentation
- **Mr. Jim Chamberlain** (757) 864-2147
Flight Experiments
- **Mr. Taumi Daniels** (757) 864-4659
Airborne Weather Sensing
- **Mr. Walt Green** (757) 864-3355
Systems Engineering
- **Dr. Ed Johnson** (757) 864-7602
Systems Engineering
- **Mr. Ken Jones** (757) 864-5013
Flight Experiments
- **Dr. Jon Jonsson** (757) 864-2001
Human Factors/Presentation
- **Dr. Kara Latorella** (757) 864-2030
Human Factors/Decision Aiding
- **Dr. Ray McAdaragh** (757) 864-1941
Human Factors/Presentation
- **Mr. John Murray** (757) 864-5883
Meteorology
- **Dr. Robert Neece** (757) 864-1827
Enhanced Weather Radar
- **Mr. Phil Schaffner** (757) 864-1809
Airborne Hazard Processor

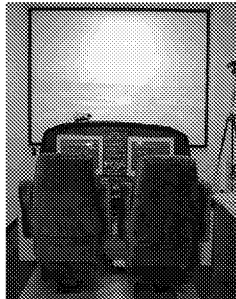
Mr. Paul Stough (757) 864-3860
Project Management



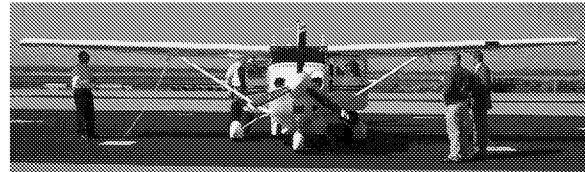
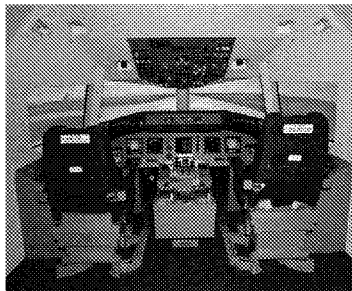
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NASA Facilities

**General Aviation
Work Station**



**Transport
Research
Flight Deck**



NASA C-206

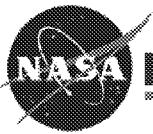


NASA BE-200



NASA B-757

Partnerships



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**Flight Standards
Certification
Weather Policy
Weather Products
Flight Information Services**



**Aviation Weather Center
Forecast Systems Lab**



Honeywell

**Rockwell
Collins**



Cooperative Research Agreements



Research Triangle Institute 

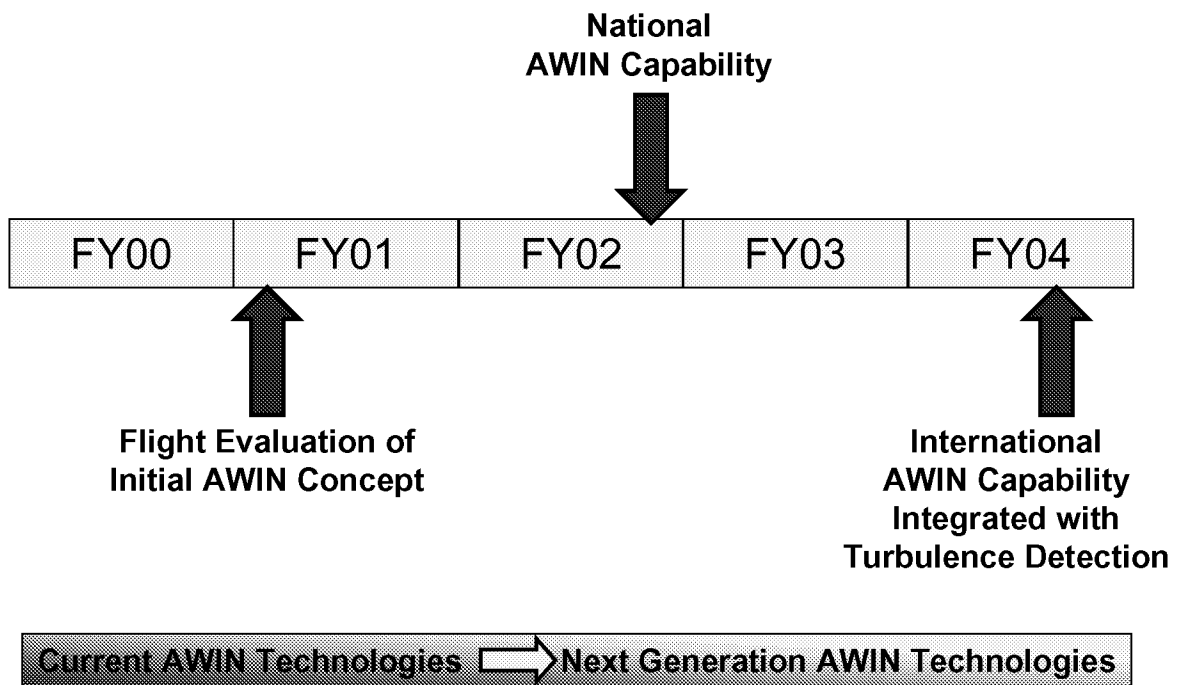


Academia



Timeline

Aviation Weather Information





AWIN Research Areas

Aviation Weather Information

- **Enhanced Weather Radar**
- **Airborne Weather Reporting**
- **Airborne Hazard Awareness System**
- **Display Guidelines**
- **Decision Aids**
- **Automatic Speech Recognition**
- **Cooperative Research Agreements**



Cooperative Research with FAA

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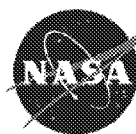
- **Human factors researcher assigned to the AWIN Team**
- **Joint funding of research**
- **Data-link Weather Information Systems Enhancements**
 - Investigate effects of data-linked in-flight weather displays on pilot decision making and flight operations
 - Investigate the benefits and limitations of using cockpit presentations of time-delayed data-linked weather information with real-time airborne weather radar for Part 121 operations
 - Investigate feasibility of using cockpit access to data-linked weather information in place of in-situ destination weather reporting for Part 135 operations
 - Define the cost considerations and incentives for aircraft owners to equip their aircraft and provide airborne weather reporting as part of a national implementation



Cooperative Research

Aviation Weather Information

- **Worldwide Transport Weather Information Systems**
 - Honeywell Weather Information Network (WINN)
- **Nationwide General Aviation Weather Information Systems**
 - ARNAV
 - Honeywell
- **Elements of Weather Information Systems**
 - Honeywell Weather Avoidance Using Route Optimization as a Decision Aid
 - Rockwell Aviation Weather Awareness and Reporting Enhancements (AWARE)
 - Rockwell Enhanced On-Board Weather Radar (EWxR)
 - Rockwell Airborne Hazard Awareness System (AHAS)
 - NCAR Oceanic Convective Nowcasting Demonstration (OCND)
 - NRL Ceiling and Visibility Forecasting Improvements



Honeywell Weather Information Network

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Technology Development

Honeywell Citation Jet
Honeywell simulator
UAL B-777 simulator
NASA B-757

Avionitek display in NASA B-757



In-Service Evaluation

United Airlines Spring 2001

Electronic Flight Bag in UAL Airbus