

Cockpit Communication of Weather Information

Weather Data Delivery and Display in the Cockpit

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Date: October 21, 2010



Federal Aviation
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Presentation Outline

- **Background**
- **Program Overview**
- **Program Accomplishments**
- **HOTL ITCZ Demonstration**

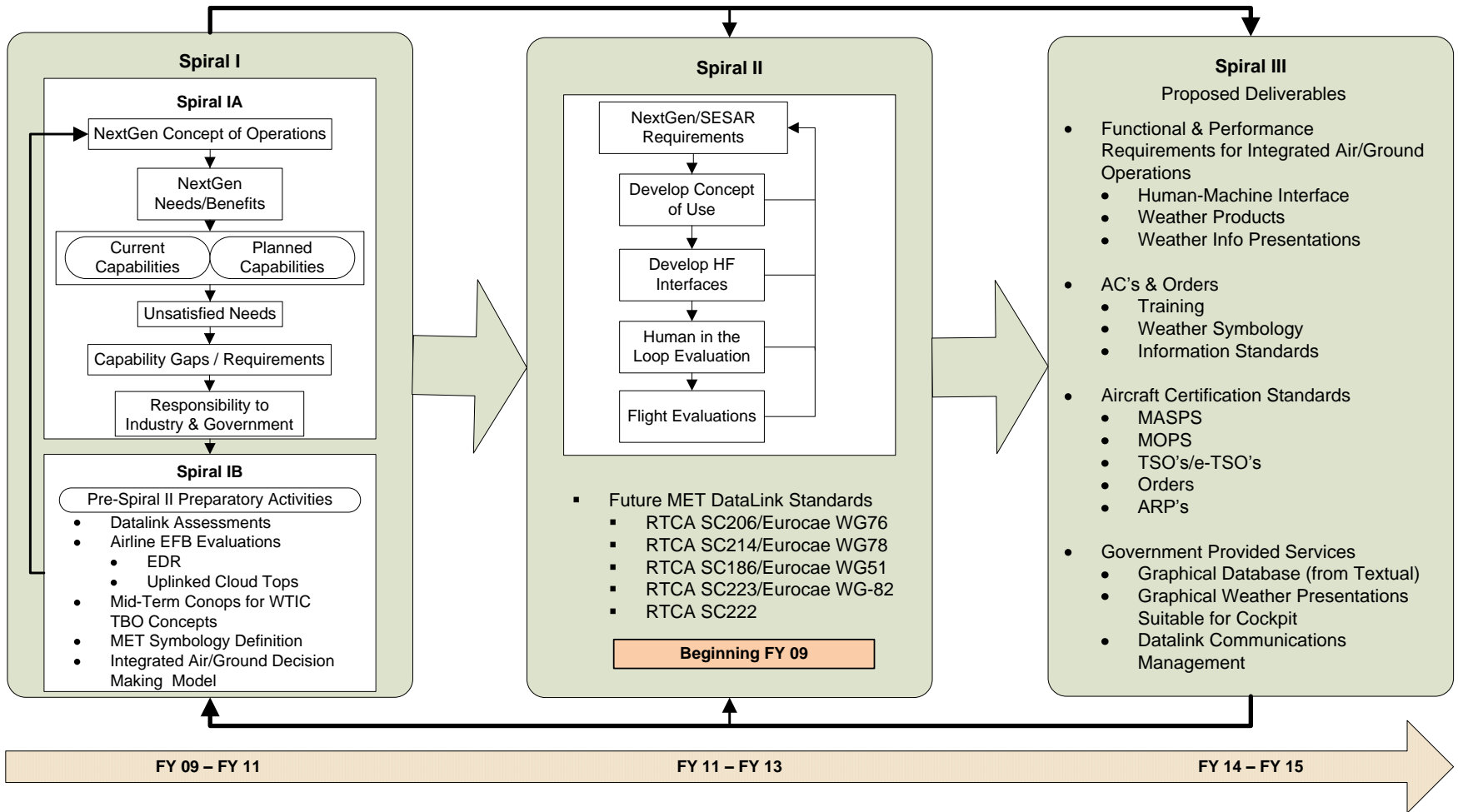


Background

- **1994 to 2003 – While the annual number of weather-related accidents has declined, weather accidents as a proportion of total accidents remains roughly the same**
- **Average of 400 weather-related accidents (general aviation, air taxi, & air carrier) per year, over the 10-year period ending in 2006**
 - \$1.46B (fatalities, injuries, aircraft damages)
 - 42,000 air carrier delay hours in 2008, resulting in \$200M in delay costs.
- **257 weather-related accidents involved Part 135 Commuter/Air Taxi operations**
 - 6.2% of total weather-related accidents
 - Visibility/Ceiling (39.1% of weather-related)
 - Wind (26.6% of weather-related)



WTIC Program Overview



Cross-Cutting Activities

- JPDO NextGen WGs
- SESAR Efforts
- NBAA
- NASA
- RTCA Committees
- SAE Committees

Programmatics

- OTA's
- Interagency Agreements
- University Grants
- MOA's
- Partnership Initiatives
- Contracts



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Information Management Standards

- **Assess needs to sustain MET “Situational Awareness” between the cockpit and ground systems**
- **Aircraft**
 - Display
 - EFB
 - MFD
 - Stand-alone
 - MET Processor
- **Ground**
 - Service adaptor
 - Processor
- **Develop standards for MET information suitable for airborne architectures to support NextGen Concepts for Parts 91, 135, and 121 operators**



Information Exchange and Management Requirements

- **Identify MET downlink requirements**
- **Develop MET data link safety performance requirements**
- **Develop MET data link minimum aviation safety performance standards**
- **Verify and validate MET information bandwidth demand, data latency, quality of service, and coverage requirements for transmission and receipt via data link services**
- **Identify standards to render data linked MET information**



Rendering MET in Cockpit

- **Identify MET to support operational decisions**
 - Replanning, tactical avoidance, and tactical control
 - Broken down by user category (GA vs 121 etc)
 - Environmental Description (ED-1, etc)
- **Develop Standards for MET Presentation**
 - visual presentation, e.g., color, overlaid on other information, track up
 - information latency, data aging, reliability, accessibility, accuracy in order to be fit for purpose (advisory, safety critical, non-misleading)
 - system latency, data integrity, reliability, data storage



FY10 Accomplishments

- **Based on capabilities described in the NextGen ConOps, developed initial, comprehensive, weather-information user-needs statement for the cockpit environment in different types of operation (e.g., Part 121, Part 135, etc.) for each phase of flight (pre-flight, departure, en route, etc.) in the near-, mid-, and far-term NextGen operating environments.**
- **Assessed currently available onboard weather-information-processing technology.**
- **Identified the specific types of weather information being integrated into cockpit FMS and the decisions supported by the information.**
- **Assessed currently available and emerging ground and cockpit communications interface technologies.**
- **Assessed currently available options for communications systems (air-ground, ground-air, and air-air).**
- **Analyzed the bandwidth requirements to datalink graphical icing and turbulence products to the flight deck using a automated network simulation model.**
- **Supported the development of AIS/MET datalinks Safety Performance Requirements, with commercial industry through RTCA Special Committee and EUROCAE 206/WG-76.**
- **Supported the development of ARP 5740, Cockpit Display of Data Linked Weather Information (Standards for MET Symbology) with industry and government led SAE G10 committee.**



MET in the Cockpit

- **Pilots currently have little information as they fly over remote stretches of the ocean, which is where some of the worst turbulence occurs**
- **Providing pilots with at least an approximate picture of developing storms could help guide them safely around potentially severe weather**



HOTL Research

- **Understand pilot decision-making adverse when presented with MET situational awareness during transoceanic flights**
 - Train flight crews on the capabilities and limitations of uplink weather and representations presented on the flight deck
 - Identify those decisions pilots make in the current environment without weather updates, and propose decisions that can be facilitated with frequent weather hazard updates while en route in oceanic/remote regions.
 - Obtain initial flight crew feedback on weather hazard needs and display presentation concepts.



Questions ???



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