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FPAW
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Weather Technology in the Cockpit – WTIC CONOPS

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CONOPS Overview

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- Iterative process based on operational scenarios, Nextgen OIs, and stakeholder input/feedback
- Scenarios developed and downselected based on relevance and illustration of key considerations
  - Balance between number / type of scenarios and document size
- Addresses CFR Parts 121, 135, and 91
- Stakeholders from many industry communities including:
  - Air Transport (Flight Operations, Pilots, and Dispatch)
  - CDM
  - General Aviation
  - Charter / Part 135 operators
  - Business Aviation
  - Alaska-specific operators
- Approximately 18-month effort included stakeholder TIM and broad-based stakeholder review

WTIC and DLW

- WTIC denotes a specific FAA Program: Weather Technology In the Cockpit
- For CONOPS clarity, WTIC is only used in reference to that program
- DLW – Data Link Weather – is used to reference other capabilities, products, etc.
  - Commercial information services
  - Operational capabilities
  - Avionics
  - Information sources

FAR Part 121

- Part 121 operations are dependent on continuous collaboration with FAA and other ANSPs
- Optimized graphical weather depictions can enable flight crews to be better-informed participants in the CDM process – increases efficiency
- Improved wind information coupled with improved FMS algorithms:
  - Can help NextGen applications such as Interval Management (IM) and 4-D Trajectory Management meet goals
  - Also allow flight crews to make operational decisions that could minimize fuel consumption
- DLW information provides opportunity for crews to participate more effectively in devising and executing new collaborative strategies for operations around hazardous weather

FAR Part 121 Example Scenario:

The crew is monitoring a line of convection along the route, about 400 miles ahead. The crew has DLW information indicating that the most efficient routing clear of the weather is an immediate 5-degree right turn.

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Extended CACR:

- Airlines participating in the CTOP, Collaborative Airspace Constraint Resolution (CACR) program
- File multiple prioritized routings for each flight
  - Allows ATC to perform systemic optimization, giving airlines their preferred routing for their highest priority flight
- Currently CACR is envisioned to end with the final assignment of a route before the aircraft takes off
- DLW capability enables CACR options to be requested by pilots and assigned by ATC once the aircraft is airborne
- Allows ATC to adjust to the actual convection and traffic flow management constraints closer to when they actually occur
- DLW capability is used to minimize the additional mileage flown when deviating
- Also allows pilots to be engaged in coordination with their dispatcher and ATC to advocate for the most efficient reroute
- Aircraft with DLW capability are able to find shorter deviations around convective weather along their route that also satisfy ATC traffic flow management constraints.
- DLW capability allows extension of CACR into the en route environment
  - Allows pilots to advocate for routing in the priority as determined by their dispatcher prior to departure
- Can increase safety (fewer passenger and flight attendant injuries) and result in fewer emissions, and reduced fuel burn.

FAR Part 135, Jet Aircraft Example Scenario

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- *VLJ up to Boeing BBJ; Charter operations, no dispatch capability*
- Intense schedule pressure from the passengers to complete the flight as planned
- Passenger comfort and convenience are key considerations
- **Cruise:** crew uses DLW information to avoid areas of reported turbulence without having to ask ATC for information
  - Receive updated Graphical Turbulence Guidance NowCast (GTGN) forecast via DLW
  - Along with real-time cross-link data from aircraft ahead on a similar route
- Operator realizes a marketable benefit by avoiding uncomfortable turbulence, as well as a safety benefit if severe turbulence is avoided
- Frequency congestion is reduced by avoiding ATC calls
- **Landing:** Wind conditions are gusty and variable due to approaching front
  - Crews flying aircraft without cross-link are frequently requesting wind checks, but controller workload sometimes precludes a response
  - DLW information provides crews with landing wind information and RVR from ground AWOS/ASOS/RVR sensors with one minute updates via uplink
  - Weather information may be available from other proximate aircraft via cross-link
- Landing information, currently provided by voice communication, is provided via uplink and/or cross-link, reducing frequency congestion – a major goal of NextGen

FAR Part 135, Non-Jet Aircraft Example Scenario

- *Propeller-driven aircraft, charter operation; no dispatch capability*
- Competition from commercial airline options and surface transportation
  - Need for competitive reliability adds equipage motivation
- Pilot/crew uses DLW information to finalize flight plans closer to their time of execution with more current weather information
  - Crew decides that an alternate airport may be required, and loads the appropriate fuel
  - Crew makes contingency hotel and ground transportation arrangements for passengers
  - Using more current weather information provides marketable benefits for FAR Part 135 operators, in this case, better customer service
- Pilot/crew uses NEXRAD display to view an approaching weather system prior to taxiing
  - Crew request a more optimal route for departure and ATC clears the altered requested
  - NEXRAD imagery over FIS-B provides a strategic overview of weather that will affect the departure
- Crew detects a worsening trend in the destination weather using graphically depicted METAR and TAF data
  - Crew selects different alternate airport
  - Crew initiates contingency planning and post-landing support for their passengers
    - Arranging surface transportation from the new alternate airport to intended final destination
    - Revised lodging, meeting rescheduling, and other mitigations of the disruption of deviating
  - Contingency planning and mitigation for passengers is also a marketable benefit of DLW

FAR Part 91, VFR Operations Example Scenario

- Typical GA aircraft; e.g. Cirrus SR20
- Cruise Operations: Relationship between weather and SUA (p. 65)
- MFD or handheld display; FIS-B or commercial DLW
- Departing from an uncontrolled airport with multiple runways, convective activity approaching the airport
- Pilot monitors the location and movement of the convective activity using FIS-B NEXRAD information
- Pilot elects to use the less-preferred runway for takeoff - heading will maintain safer distance from the approaching weather
- DLW capability enables pre-takeoff modifications to standard procedures, allowing the pilot to maintain safer distances from approaching weather

FAR Part 91, IFR Operations Example Scenario

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- Avoidance, exit and safely transiting icing conditions are areas where DLW technology can provide potential benefits to FAR Part 91 operations
- Pilot monitors icing conditions, locations and altitudes during flight
  - Requests a route deviation to avoid encountering icing in clouds during IMC
- Pilot encounters icing unexpectedly in IMC
  - Uses DLW information to determine that a lower altitude is above the freezing level
  - Pilot requests and receives clearance, and descends out of the icing
- Due to changes in conditions, or to a change of planned route of flight enroute, the pilot must descend through probable icing to transition from cruise to landing
  - Using DLW information, the pilot determines the probable icing altitudes, and requests and receives an expedited descent through those altitudes
- DLW information on icing and temperature allows the Part 91 IFR pilot to plan and execute icing avoidance expeditiously and based on actionable information
  - Enhancing safety and probability of completing flights as planned

Related Considerations

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- Icing information can be as important for GA users in some areas as Nexrad is in other areas
  - Has not benefited form the same level of focus as Nexrad to date
- Some weather products exist today that are applicable to DLW but not currently in use
  - Inventory products relative to CONOPS needs
  - Stimulate use of available products
- CDM and DLW will affect each other & must be interlinked
- DLW proliferation affects existing FAA guidance
  - Consider updates to FAA 7110.5 related to DLW operations & ATC
  - Consider updates to FAA AC – 0045 defining aviation weather products
- NAC Report (11/13) has no Tier A or B weather elements
  - But multiple Tier A/B elements require weather to succeed
  - Limited weather community representation on NAC
  - Need to identify / bring visibility to these gaps
- Implementing Part 121 DLW on a widespread basis can be facilitated by POI Handbook updates
  - Recommended Practices for implementation
  - Guidelines for DLW application

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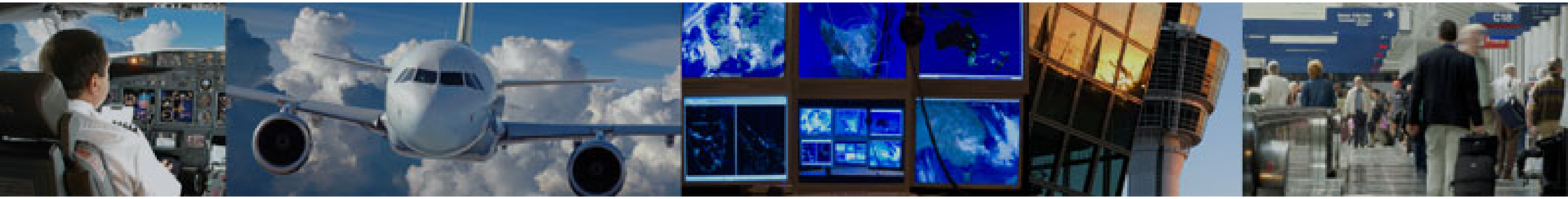

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