Strengthening the CDM triad:
A view from the cockpit

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Strengthening the CDM Triad: Weather in the Cockpit

Outline:

- RTCA TF5 excerpts on weather
- Graphical weather displayed in the cockpit – a game changer!
  - Beyond the airborne weather radar
- Example of potential convective weather reroute savings
- Weather over the inter-tropical convergence zone
- UA EFB plans
- Conclusions
RTCA Task Force 5 report: Statements on weather

• With the exception of enroute severe weather, high density operations in major metropolitan areas precipitate the majority of flight delays.

• Several airports with high demand suffer throughput reductions when the weather is not good enough for visual approaches to be flown.

• Convective weather and an inability to adapt to rapidly changing conditions are contributing to excess delays, increased flight time and miles flown, increased unpredictability, and increased emissions.
A game changer!

- Graphical updates while airborne via broadband data-link
  - Situational Awareness - no longer limited to the preflight weather briefing
  - Beyond the range of the airborne weather radar
  - Much more effective than voice or textual updates via Flight Watch or Dispatch

- Having the cockpit updated to the same level as ATC and dispatch will allow for more efficient use of airspace, while improving safety
Use of graphical weather in the cockpit:

- Better tactical decisions when deviating around convective weather (efficiency):
  - EFB displays with long range convective weather
  - Allows for strategic decisions in coordination with dispatchers and ATC
  - Gives pilots a better tool to advocate for a more efficient solution

- Potential turbulence products for uplink (safety):
  - Updated Graphical Turbulence Guidance (GTG)
  - Turbulence Remote Sensing
    - NCAR’s NEXRAD Turbulence Detection Algorithm
  - Oceanic convection and cloud top uplinks
Beyond the airborne weather radar
An example of convective weather reroute savings

- Normal flight plan time = 3:00
- Playbook routing flight plan time = 3:45
- Actual flight time = 3:20
Operating through the inter-tropical convergence zone

- Convection in remote areas, especially over the inter-tropical convergence zone, can be difficult to paint with weather radar
  - Low moisture content in the upper stratosphere
  - Current pilot technique:
    - Turn off all cockpit lights, and look out the window! (doesn’t work all that well without moon illumination)
  - Graphical weather updates critical to improving crew situational awareness that there is convective weather ahead
United Airlines EFB programs

- IPad – Class 1 EFB for every pilot
  - Flight Manuals, Charts, Graphical Weather
- Class 2 or 3 EFB for every aircraft
  - Surface Moving Map, In-Trail Procedures, other ADS-B In applications
Conclusions

- Increasing the “real time” graphical weather information in the cockpit will improve capacity, efficiency, and safety during convective weather events
  - Especially important over the inter tropical convergence zone
- NextGen conops needs to acknowledge the pivotal role of updated graphical weather information in the cockpit to achieve expected NextGen efficiencies involving convective weather events
Thank you!
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