Strengthening the CDM triad: A view from the cockpit

Captain Rocky Stone
Chief Technical Pilot
United Airlines

Friends and Partners in Aviation Weather
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NextGen weather concept

- Current NextGen weather conops emphasizes ground based decision support tools
  - Integrating the cockpit into the Collaborative Decision Management (CDM) process is critical to achieving improved system performance during convective weather events
    - Pilots still have the ultimate authority for if they will fly in a certain area
    - Updated graphical weather displayed in the cockpit increases the probability that aircraft will be able to fly where it is predicted that they will fly
Graphical weather in the cockpit

A game changer!

- Updates while airborne via data-link
  - Situational Awareness - no longer limited to the preflight weather briefing
  - Graphical updates while airborne, 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 allows for more efficiency while improving safety
Potential uses 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):
  - Graphical Turbulence Guidance
  - Turbulence Remote Sensing
    - NCAR’s NEXRAD Turbulence Detection Algorithm
  - Oceanic Cloud top uplinks
 Longer range weather – 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
Turbulence remote sensing: in-cloud turbulence
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
Oceanic cloud top uplinks:

Both Display formats available with EFB

Current ACARS display
Weather Data Link Standards – RTCA SC206

- Concept of Use document
  - What will graphical weather information transmitted to the cockpit via data link be used for?
  - What will environmental data from the aircraft transmitted to the ground be used for?
    - Capacity increases with wake vortex mitigation

- Data link architecture recommendations
  - What are the options for transmitting weather data to the cockpit
  - What are the options for transmitting environmental data from the aircraft
    - 1090 MHz ADS-B (but bandwidth limitations)
    - Other data link options for Meteorological Data Collection and Reporting System (MDCRS) services

- Next meeting at RTCA Headquarters in Washington, DC, December 14-16, 2010
Conclusions

- Increasing the “real time” graphical weather information in the cockpit will improve capacity, efficiency, and safety during convective weather events, and is especially important for operations in remote areas.

- NextGen conops needs to acknowledge the necessary role of graphical weather information in the cockpit to achieve expected NextGen efficiencies during convective weather events.
Thank you!
Captain Rocky Stone
Chief Technical Pilot
United Airlines
Flight Standards and Technology
1200 E. Algonquin Rd.
Elk Grove Village, IL 60007 USA
1 (847) 700-6463
rocky.stone@united.com