Determining FAA Mid-Term Aviation Weather Requirements for Traffic Flow Management – the Transition to NextGen

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FAA Mid-Term Operational Capability (MOC) 2015-2018 NAS-Level Requirements

- Core Team: NWPRT led by Cheryl Souders; includes Stewart Stepney, Frances Bayne, Bob Showalter, Jack May, James Tauss, Lorraine Leonard & Ernie Dash
- Facilitates Transition from IOC to the Far-Term (FOC) of NextGen in accordance with NextGen CONOPS & NextGen Wx CONOPS
- Describes NAS-Level MOC Functional & Performance Requirements not allocated to particular Agencies or solutions
- Outlines Requirements in 4-D Wx Data Cube
  - 4-D Wx Single Authoritative Source (4-D Wx SAS) minimally implemented by MOC with 25% of Required Wx Elements (to include Convections, Winds & Temps)
- 4-D Wx Data Cube contains meteorological data sets (Obs & Forecasts) from which Wx processors (NWS & NWP WP1) create information, but
  - Wx Integration into Automation systems possibly limited during MOC (2015-2018)
  - Service Gaps may remain in MOC (subject to future benefit/cost prioritization)
Why the Mid-Term?

Traffic Flow Mgmt (TFM) requires Improved Mid-Term Wx Support for four TFM goals:

- Flight Planning & Collaboration
- Integrated Capacity Management & Flow Contingency Planning
- Integrated Arrival/Departure Management
- Performance Management
Mid-Term Wx Actions Needed

• **Improve Wx Forecast Accuracy & Resolution (time & space) enabling TFM to make better decisions for**
  - Routing/Re-routing
  - Aircraft Arrival Rate
  - Airspace Flow Program initiation
  - Ground Stop/Delay
  - SWAP Implementation
  - Metering/Spacing

• **Better Assessment of Airspace Constraints from Wx**
  - NWPRT working with TFM Requirement Working Group (TRWG) to facilitate:
    o Determining Wx Elements TFM Needs & Associated Performance Requirements
    o Translation of Wx State Data to Constraint Fields & Threshold Events
    o Integration of constraint/threshold fields into TFM Automation (DSTs) enabling them to route/re-route around Impact Fields
FAA MOC Wx Requirements’ Assumptions

• MOC Weather Performance values will be less than those of FOC
  – Accuracy and Resolution will Support TFM Decision Making but not fully meet NextGen needs (more ‘coarse’ than at FOC)

• Improved update frequency of Wx information during Mid-Term supports TFM & User need to respond to rapidly changing circumstances

• Wx information will be formatted for Integration into automation (DSTs) in the Mid-Term
  – However, it is not known if TFM & User DSTs will be sufficiently widespread to enable full collaboration
  – The Translation of potential NAS constraints (from Weather) into the Impact on Operations is performed by TFM and User DST, not Weather

• The availability of consistent, reliable, probabilistic forecasts, covering 3-D location, timing, intensity (and probability of all possible outcomes) is not likely in the Mid-Term
Approach for TFM Wx Requirements

TRWG & NWPRT identified TFM Wx Needs to include Observations & Forecasts of:

- Convection**#
- Ceiling/Visibility*
  - Marginal VFR*
  - IFR/VFR*
- Icing**
  - In-Flight Icing
  - Surface
- Turbulence#
- Winds Surface & Aloft
- Volcanic Ash**#
- Microbursts/Low-level Wind Shear*
- Compression due to Winds*
- Liquid/Frozen Precipitation**#

Notes: * = Core 30 airports, # = en route; in most instances TFM wants Event Onset & Cessation
Approach for TFM Wx Requirements

- **NWPRT Methodology**
  - Reviewed Mid-Term ConOps
  - Developed Mid-Term Functional Requirements
  - Used TFM-adjusted Functional Requirements to Develop TFM Mid-Term Performance Requirements
    - Developed Mid-Term Performance Value Tables by determining if current performance requirements are sufficient, or if “in between” performance values (between now and FOC) are needed
  - Provided TFM with examples of how to read/interpret the N-Tables so they could validate performance values
  - Developed performance requirements using validated performance values from MOC N-Tables
NAS-Level MOC Spatial Accuracy Requirements for Wx Hazards Observations caused by Convection

MOC values; FOC values

<table>
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<th>Resolution</th>
<th>High Density Terminal</th>
<th>Designated Terminals</th>
<th>Global Terminals</th>
<th>En Route</th>
<th>Global</th>
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<td>250 feet 500 feet</td>
<td>250 feet</td>
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<td>250 feet 500 feet</td>
</tr>
</tbody>
</table>
FAA TFM MOC Wx Requirements Status Update

TRWG & NWPRT

- NWPRT
  - Provided TRWG with set of Functional & Performance Requirements for Operational Wx elements
  - Briefed TRWG on Functional/Performance Requirements, fielded questions and provided explanation of accuracy values and/or rationale

- TRWG
  - Presently working Near-Term Reqm’ts w/NWS
  - NWPRT to assist TRWG in transition from Near-Term to MOC
  - Late August 2011 TRWG group meets with expanded TFM users to finalize review and formulate adjudication responses
  - TFM Specialists to review MOC Performance Requirements to validate as TFM Wx Needs

- Based on TRWG review, TFM Wx requirements will be updated or removed if not needed
FAA TFM Wx Requirements for MOC - Summary

Pending Validation by TFM Requirements Working Group:
• Envisioned Wx Performance Requirements values for TFM between those of today and FOC
• Wx Community can provide Translation of State of Atmosphere into at least Convective constraints by MOC
• ANSP & User Automation (DST) likely in place to Assess Impact from Translated Weather
• Post-validation efforts entail:
  – Performing Gap Analysis
  – Addressing how to mitigate gaps via Alternatives Analysis employing system engineering process, Cost Benefit Analysis & Risk Mitigation to examine Wx Architecture before allocating TFM MOC Requirements to various ‘systems’
  – Unmet Requirements assigned to Weather R&D