Friends and Partners Meeting: Vision for Weather Information Integration

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Agenda

• Objectives and Scope of “Integration”
• Recent focus areas/progress
  – Identification of key research and early analysis needs
  – Development of NGATS weather concept of operations/scenarios
    • Driven by an initial look at NGATS Curb-to-Curb Concept weather implications
• 2025 NGATS Concept & Weather Implications
• Discuss high level plans for Integration:
  – Present to 2008
  – 2008-15
  – 2015+
Objectives and Scope

• The objectives of the Integration Team of the JPDO Weather IPT are to provide the leadership and proactive advocacy for the:
  - Timely identification, development and integration of:
    • NGATS-relevant weather information, and
    • Weather savvy decision making (and supporting automation)
  - Utilization of weather information to enhance air transportation decision making, including:
    • Development of operational concepts that define appropriate utilization of weather information in making operational decisions for all phases of flight
    • Utilizing these proposed concepts to drive discussions with the other JPDO IPTs on the utilization of enhanced weather information in evolving NGATS concepts
    • Also utilizing these concepts to coordinate with stakeholders outside of the JPDO in developing a consensus on the way forward
    • Working within the Weather IPT to accomplish key weather objectives for advancing NGATS (e.g. net-centric weather capability)
Objectives and Scope
(Concluded)

• Integration scope includes the operational uses of weather information:
  – In applicable air transportation decision making situations
  – By all service providers
  – By all customers
  – Display and direct automation integration
  – Ground systems and in aircraft
  – Etc.
Key Focus Areas/Progress (Cont’d)

• Identification of recommended, priority “integration” research and trade studies, e.g.
  - Studies to determine NGATS-relevant weather information
  - Concept development for weather-ATM automation integration (including laboratory prototyping)
    • Nearer-term concepts for weather integration with today’s
      - TFM, En route and Terminal capabilities
      - NGATS user capabilities (air and ground)
    • Longer-term automation concepts such as TFM decision support enabled by probabilistic weather information
      - Interface standards for 4-D, net-centric weather capability, including product generation responsibility
Key Focus Areas/Progress (Cont’d)

- **Recommended studies (cont):**
  - New weather information requirements posed by future vehicles, including UASs and Very Light Jets
  - Assess transportation security needs for weather information, e.g. bio-hazard dispersion
  - Metrics/Business case-
    - How do identify what “NGATS–relevant” weather information is the most critical?
    - What is the benefits pool?
    - Where do we spend the money?
  - Definition of terms such as “shared situational awareness” from a weather standpoint
- **Studies documented, with first order costs, for consideration in JPDO future (next 3 year) planning**
Key Focus Areas/Progress
(Concluded)

• Development of NGATS Weather Concept of Operations
  – Emphasis on operational uses of weather information
  – Goals:
    • Seek to define a flexible weather system that could support “multiple futures”
    • Set stage for planned transition capability roadmap
    • Drive development of functional and system requirements
  – Status:
    • Annotated outline in review, and sections being drafted
    • Target of December 2005 for initial version
    • Assessment of NGATS 2025 Concept of Operations in progress to:
      – Understand possible weather system implications
      – Drive development of the Weather concept of operations
2025 NGATS Concept

**Design Principles**
- “It’s about the users...”
- System-wide transformation
- Prognostic approach to safety management
- Globally harmonized
- Environmentally compatible to foster continued growth

**Key Capabilities**
- Net-Enabled Information Access
- Performance-Based Services
- Weather-Assimilated Decision Making
- Layered, Adaptive Security
- Broad-Area Precision Navigation
- Trajectory-Based Aircraft Operations
- “Equivalent Visual” Operations
- “Super Density” Operations
Example NGATS Concept

Weather Implications

- ATC separates aircraft from weather, especially for limited or non-equipped aircraft
- Role of UASs from the weather observation gathering and weather user perspectives
- 4-D weather information system is primary source
  - Vendors can provide tailored support to meet user needs or missions based on this source
- Weather assimilated into NGATS “decision loops”
  - “Learning Automation” Accounts for Uncertainties in Weather and Managing Aircraft Trajectories
- Weather Data for Chemical/Biological/Nuclear (Radiation) Security Incidents
Example Implications (Concluded)

- Providing wake vortex impact information critical to greater throughput at airports ("super density operations")
- Observation/forecast for non-towered airports, and dissemination to pilots and other users
Integration Plans: Present to 2008

- Concept of Operations/Scenarios for NGATS Weather
  - Work with JPDO IPTs to develop NGATS concept to lower level of detail
  - Coordination with IPTs and external stakeholders
  - Define “NGATS-relevant information” to support decision making, and facilitate “weather-savvy” decision making and supporting automation
  - Consideration of non-ATM needs (e.g. homeland security)
  - Identify unique weather information needs related to new and evolving air vehicles, e.g. commercial space, UASs, very light jets

- Functional and operational weather system requirements development

- Transition plan to transform today’s NAS into NGATS
  - Including emphasis on implementing near-term weather product improvements in ATM automation systems
Integration Plans: Present to 2008 (Concluded)

• Research and analyses to further define priority NGATS weather capabilities
  – Alternative concept evaluation, e.g. integration of probabilistic weather information with ATM decision support tools
  – Determine metrics for measuring operational impact of weather information
  – Business Case analyses- where is the best bang for the buck

• Standards development for weather information access by all users

• Integration-related policy issue analysis, in concert with IPT’s Policy Team, e.g.
  – Roles of government and private sector in access to and utilization of net-centric weather capability
Integration Plans: 2008 to 2015

- Support initial implementation of net-centric weather capability
  - Enable access by current government systems (e.g. ERAM, TFM Modernization) to ensure utilization in a timely fashion
  - Companion integration into user systems (e.g., flight planning)
- Continue to ensure alignment of the weather concept of operations with evolving NGATS concept elements
- Execute, and adjust as necessary, the NGATS weather transformation strategy
  - As new/improved information is added, define and implement concepts/capabilities to utilize it
  - Emphasis on direct integration of probabilistic weather information with decision support algorithms
  - Emphasis on phasing out/modernizing legacy products, where appropriate (e.g. textual representations)
  - Data link of information to the cockpit will be a major priority, including low-cost display options (e.g., EFB)
- Evaluation/approval process streamlined to expedite new weather information into operational use
Integration Plans: 2015+

• Complete the transition to the envisioned NGATS Weather Concept
  – Full implementation of transformational improvements based on overall NGATS roadmap and the availability of NGATS-relevant weather information availability
  – Highly “weather-capable” aircraft fleet in place to support:
    • Full utilization of airport resources
    • Near-VFR operations at all times
  – Weather information:
    • Fully integrated into government and user decision support capabilities and procedures, and
    • Roles/responsibilities refined to make optimal use possible
Panel Discussion

• Comments?
• Issues?
• Recommendations?
Backup Charts
### Agile Air Traffic System IPT Capability Roadmap - DRAFT 26-May-05

#### C2C Capabilities - Weather
- Enhanced weather observations and forecasts to meet user needs
- Dissemination of Common Weather Picture to All Users
- Integration/interoperability to Improve Transportation Decision Making Based on Utilization of Common Weather Picture

<table>
<thead>
<tr>
<th>Year</th>
<th>2006</th>
<th>2008</th>
<th>2015</th>
<th>2025</th>
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<tbody>
<tr>
<td>1.</td>
<td>Continuously Improved Usefulness of Aviation-Critical Weather Forecasts (Convection, Turbulence, Icing, C&amp;V, etc.) for Decision Making (phases 1, 2, ..., N)</td>
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<td>2.</td>
<td>Probabilistic Forecasts for Decision Making</td>
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<td>3.</td>
<td>Improved Usefulness of Aviation-Critical Weather Observations for Decision Making (phases 1, 2, N)</td>
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<td>4.</td>
<td>Weather information for Enhanced Ops: new vehicle classes and phenomena of interest</td>
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<td>5.</td>
<td>Initial Net-centric Weather Information for All users</td>
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<td>6.</td>
<td>Enhanced Common Weather Picture Based on Obs/Forecast Improvements and net-centric information</td>
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<td>7.</td>
<td>Initial Weather Capable Automation Support for TFM Decisions by Service Providers and Users</td>
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<td>8.</td>
<td>Initial Weather Capable Automation for Tactical Decisions: Arrival/Departure And Weather Avoidance</td>
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<td>9.</td>
<td>Initial, Pre-flight 4-D Filing, Reflecting Weather</td>
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<td>10.</td>
<td>4-D Trajectory Management Enabled by Common Weather Picture</td>
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<td>12.</td>
<td>User-relevant Net-Centric Information (accurate, rapidly updated) directly to/from Cockpit for Efficiency/Safety Decisions</td>
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<td>13.</td>
<td>Improved utilization of Small and Medium Sized Airports Based on Weather Services Availability</td>
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