

Friends and Partners Meeting: Vision for Weather Information Integration

Gene Wilhelm, MITRE/CAASD
Steve Green, NASA
12 September 2005



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**



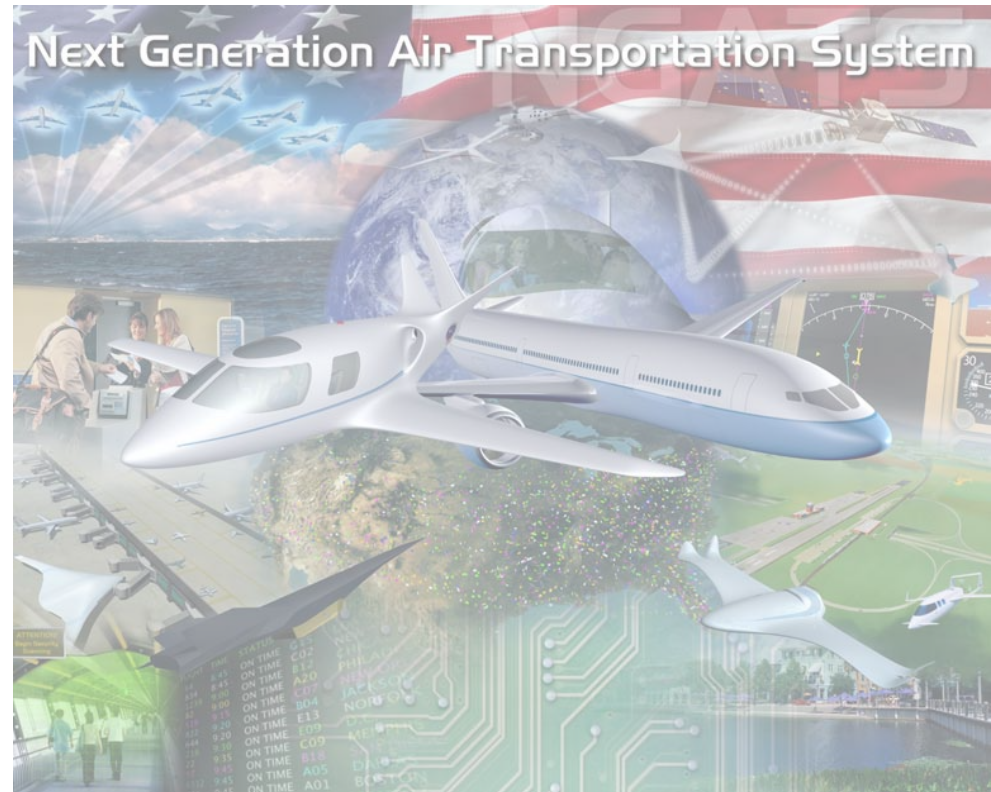
2025 NGATS Concept

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

