

Overview of NextGen Weather

Mark Andrews
JPDO Assistant Director – Commerce
and
Weather Working Group
Government Co-Chair
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Interagency Governance



Senior Interagency Policy Committee

- Guides and approves the Integrated National Plan
- Chaired by the Secretary of Transportation



Joint Planning and Development Office (JPDO)

- Develops and oversees implementation of the Integrated National Plan



NextGen Executive Weather Panel (NEWP)

- Senior Executive level direction/support

NextGen Weather 101

- Weather accounts for 70% of all air traffic delays within the U.S. National Airspace System (NAS)
 - The Federal Aviation Administration (FAA) has determined two thirds of this is preventable with better weather information



- "A key finding, based on an analysis of several 2005-2006 convective events, is that as much as two-thirds of the weather related delay is potentially avoidable."

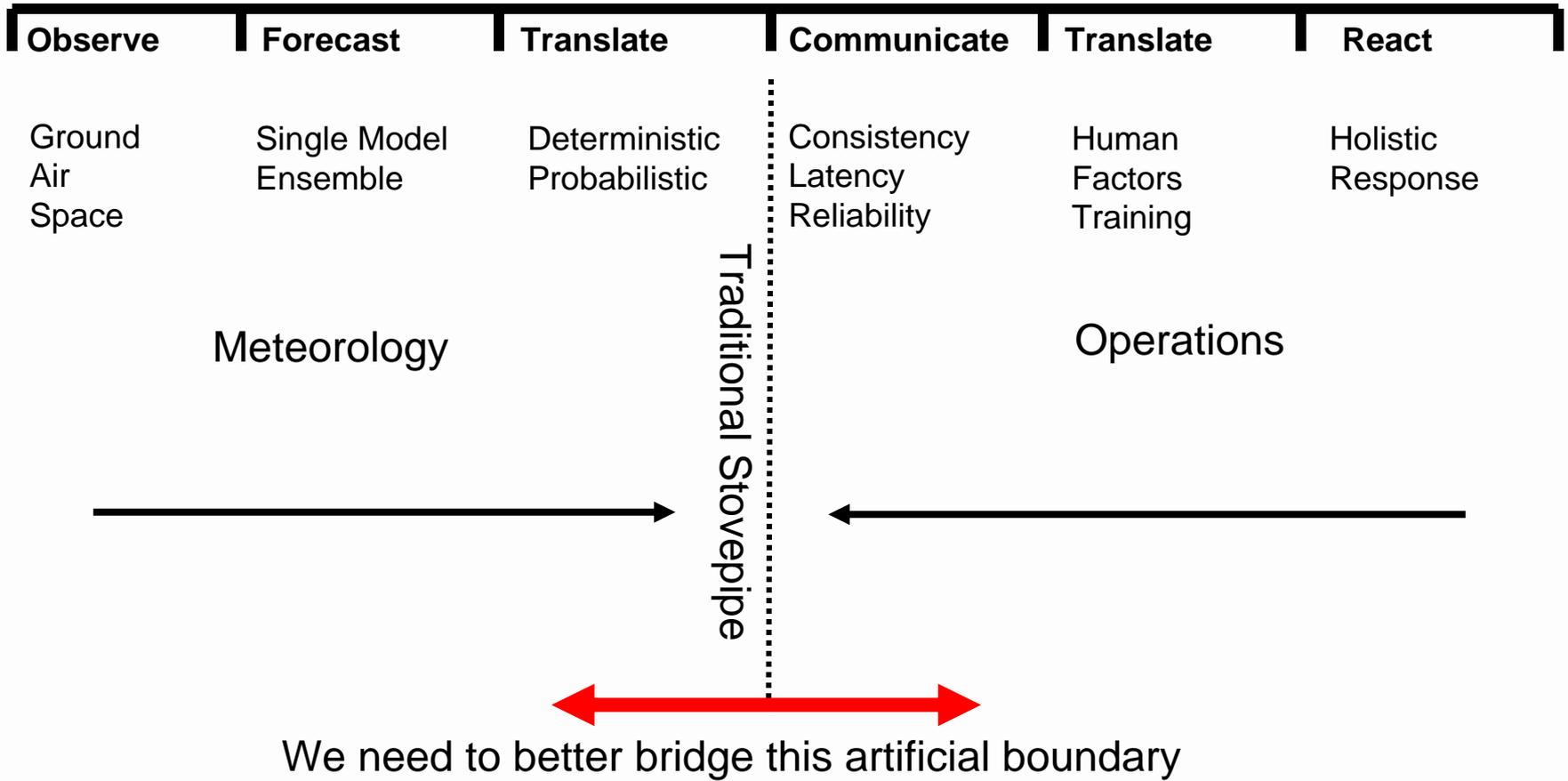
Research, Engineering and Development Advisory Committee;
Report of the Weather-ATM Integration Working Group;
Oct 3, 2007



So What is NextGen Weather?

- An acknowledgement that the existing business model for aviation weather will not support NextGen
- A challenge for relevancy of weather providers
- An opportunity to:
 - Examine, and, if necessary, throw out current/past paradigms
 - Take advantage of current and planned future technology

Perfect Forecast Process: The Neglected Problem



Today/NextGen

Weather Information Attributes

<u>Today</u>	<u>NextGen (new requirements)</u>
<ul style="list-style-type: none"> • Not integrated into aviation decision-support systems (DSS) 	<ul style="list-style-type: none"> • Totally integrated into DSS
<ul style="list-style-type: none"> • Inconsistent/conflicting on a national scale 	<ul style="list-style-type: none"> • Nationally consistent
<ul style="list-style-type: none"> • Low temporal resolution (for aviation decision making purposes) 	<ul style="list-style-type: none"> • High temporal resolution
<ul style="list-style-type: none"> • Disseminated in minutes 	<ul style="list-style-type: none"> • Disseminated in seconds
<ul style="list-style-type: none"> • Updated by schedule 	<ul style="list-style-type: none"> • Updated by events
<ul style="list-style-type: none"> • Fixed product formats (graphic or text) 	<ul style="list-style-type: none"> • Flexible formats
<ul style="list-style-type: none"> • “File and forget” 	

Paradigms We Fought

- It's all about the accuracy
- Local knowledge and local decisions trump national performance (consistency)
- Weather products are a necessary intermediate step (relevance)
- Humans must be in the loop at all phase points
- We are accountable for only those things we control

NextGen Weather Concept

- In the NextGen Concept of Operations (ConOps), weather information will be fully integrated into operations and decision-support tools
 - Data, rather than text and graphics, becomes the “product”
- Weather providers deliver a four-dimensional set of weather information
 - Operators/Managers will have a common weather picture by using a subset of this information called the Single Authoritative Source
- 4-D Weather will facilitate decision-makers by integrating with new tools that will describe the full range of available options to deal with weather issues
 - Identifies risk
 - Suggests strategies
 - Minimizes user disruptions

NextGen Weather Key Themes

- An integrated and nationally consistent weather common operational picture (COP) for observational and forecast data is available to all system users
 - NextGen operational systems are supported by a “single authoritative source”
 - Weather COP fully utilizes envisioned Net-Centric Operations (NCO) capabilities
 - Data Latency (seconds)
 - Data Refresh (seconds)
 - Data Sharing Standards/Protocols
 - Weather information sharing is two-way
 - Unlimited end-user product formats are made possible

NextGen Weather Key Themes

- Direct integration of improved weather information into operational decision-making processes
 - Reduced requirement for government provided weather “products”
 - Weather information sets become the government provided product in most cases
 - Opportunity for tailoring of private-sector-provided products significantly increase
 - Weather information is translated into operational decision options for human/automated systems
 - Standalone Weather “Systems” become obsolete

NextGen Weather Key Themes

- NextGen **proactively** adjusts on multiple strategic and tactical time scales to probabilistic weather information
 - Operational decision making utilizing uncertainty-based information
 - Weather-influenced 4-D trajectory updates “on the fly”
 - New operational weather paradigms (business models) are required
 - Strategic adjustments to departure/arrival planning
 - Areas (volumes) of weather constrained airspace are reduced

Weather Transformation

2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025



- Identify, align, or eliminate duplicative weather research and acquisition programs (FAA, NASA, DOC, DOD)
- Redirect existing research programs towards implementation of a national weather information collection and dissemination capability (FAA, NASA, DOC, DOD)
- Revisit and update decades old weather operational policies (FAA)

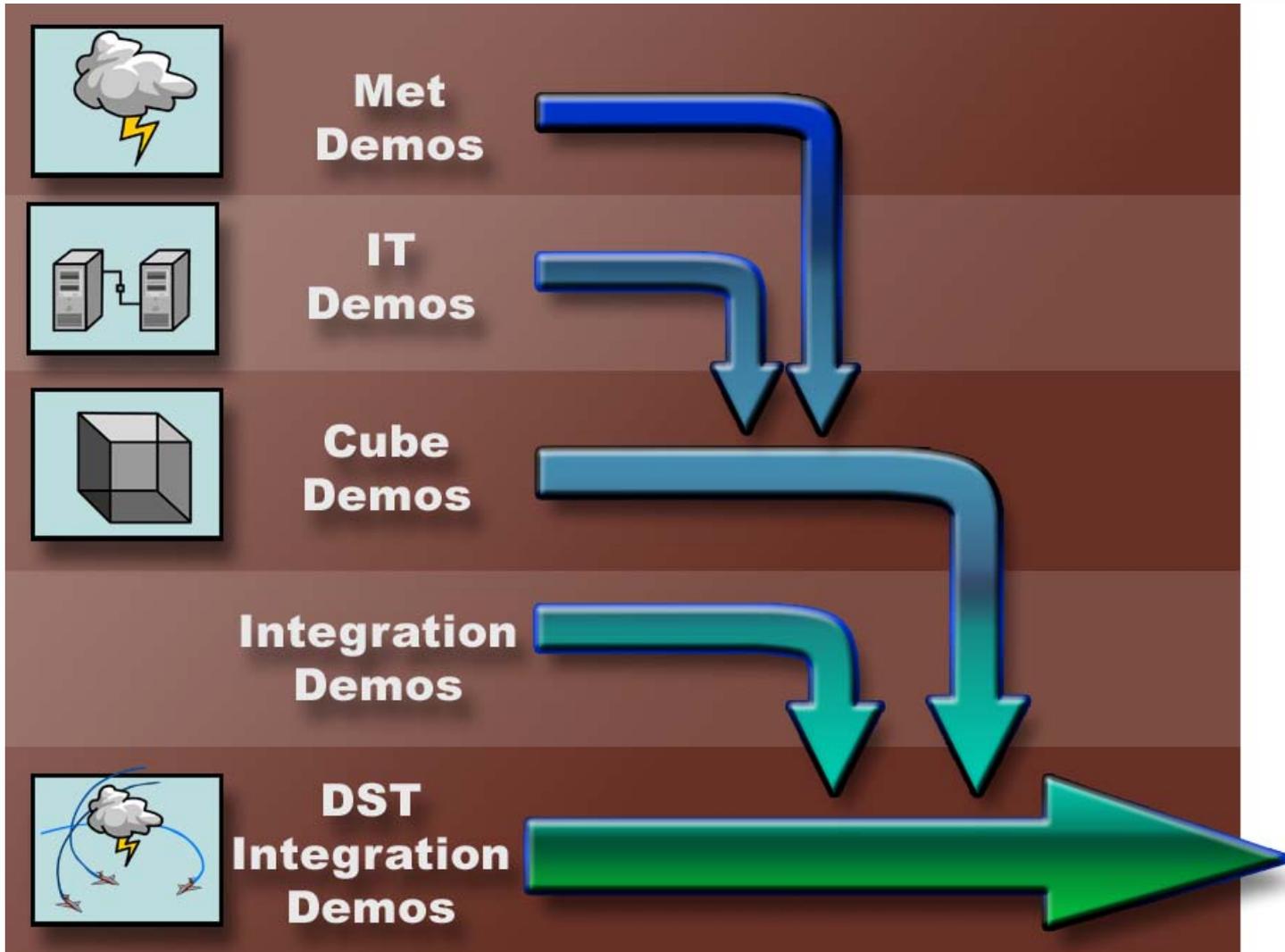
- Develop and implement weather information protocols and standards (FAA, DOC, DOD)
- Design and acquire 4D weather infrastructure (FAA, DOC, DOD)
- Migrate legacy weather systems towards 4D ConOps (FAA)
- Develop and implement technologies to populate weather information system under Single Authoritative Source concept (FAA, DCO, DOD)

- Integrate common weather information with decision support tools to enable a layered, risk-based operations approach (FAA, NASA)
- Ensure weather event information is well characterized and consistently passed across organizational and agency boundaries (FAA, NASA, DOC, DOD)
- Enable 4D trajectories that are routinely updated to incorporate the latest weather information (FAA, NASA)

- Ensure common weather situation awareness for all users of the NextGen System, promoting improved system capacity and safety (FAA, DOC, DOD)
- Streamline weather information architecture to reduce operations and maintenance cost for government and users (FAA, DOC, DOD)
- Ensure direct integration of weather information into NextGen decision support tools to enable “weather savvy” decision support automation (FAA, NASA, DOD)
- Inform decision makers of options, assist in the automated identification of potential decision risks, and pose suggested operational solutions along with projections of NextGen impacts (FAA, NASA, DOD)

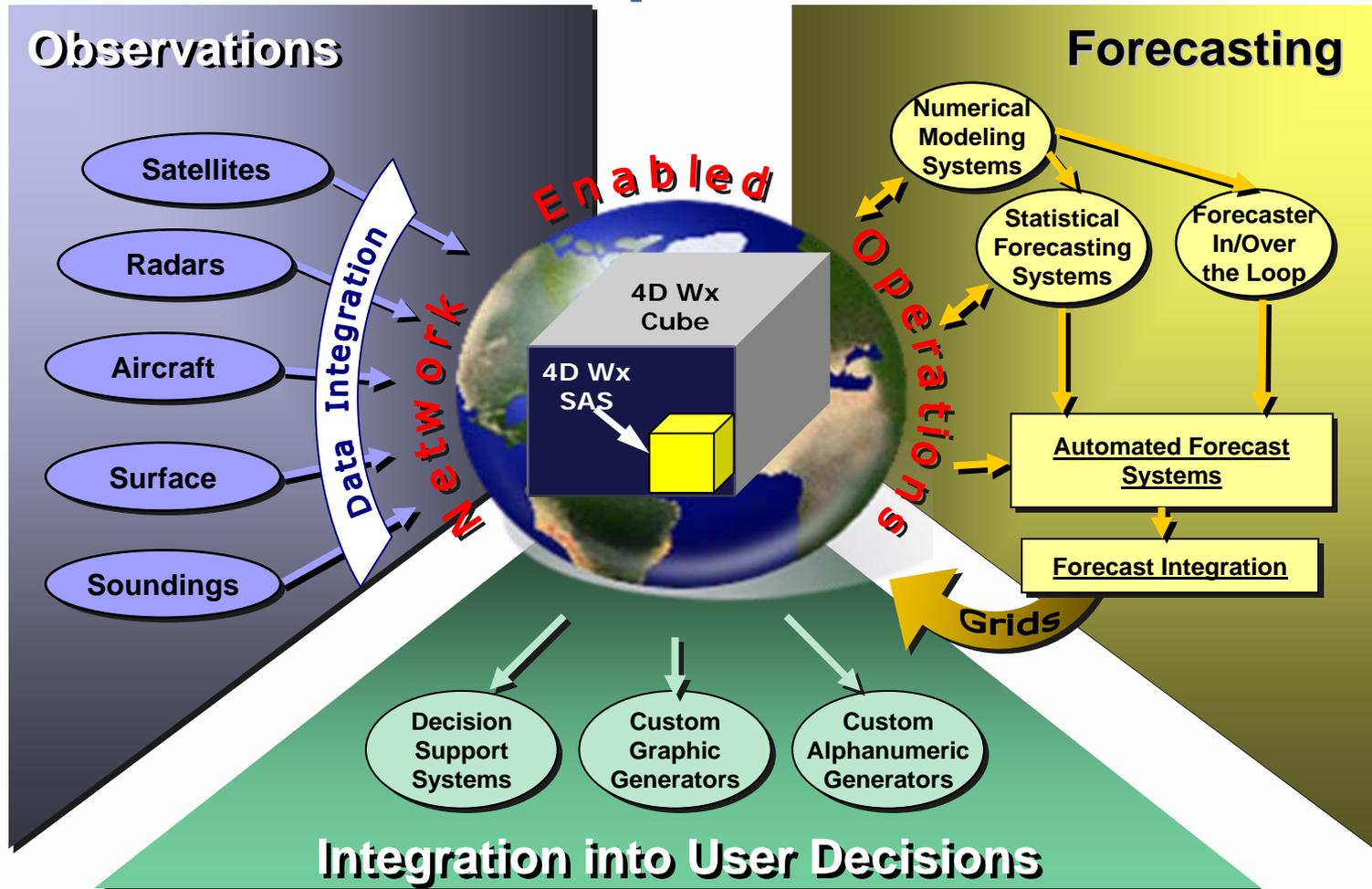


Multiple Path Approach



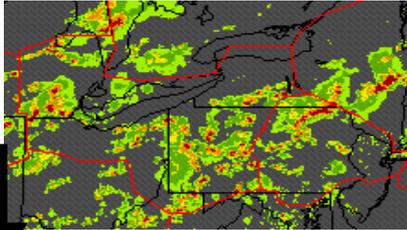
Back-Up

The 4-D Weather Cube: A Conceptual Model

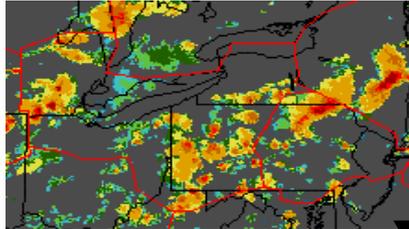


Example: Translate Weather to Impacts

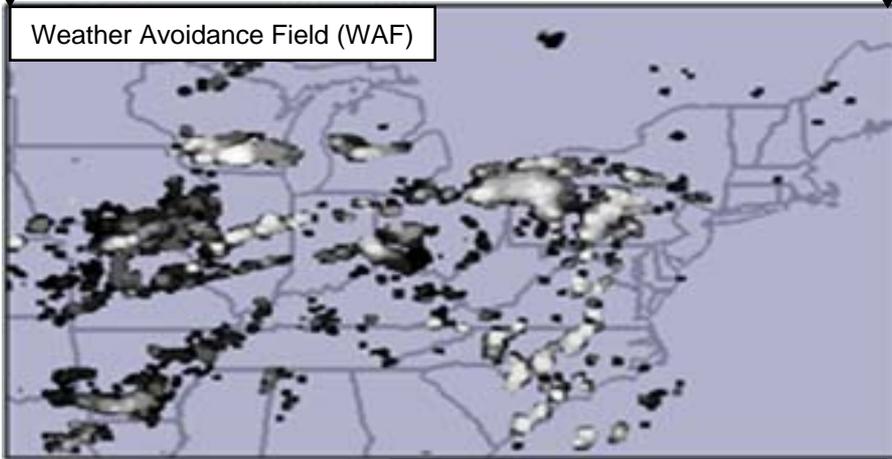
Precipitation



Echo Tops



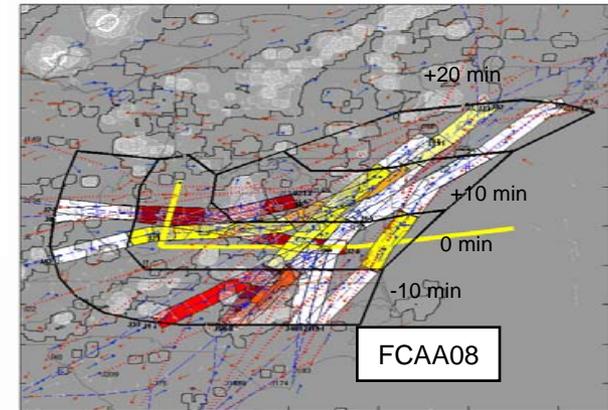
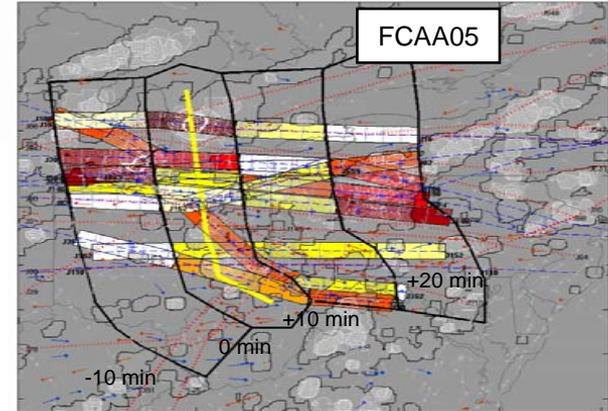
Weather Avoidance Field (WAF)



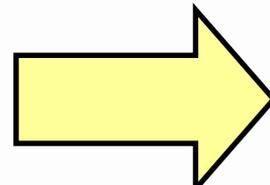
Pilot Deviation Prob



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Weather



Estimated Airspace Availability

Probabilistic Information (Reliability vs. Accuracy)

