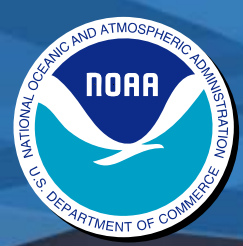


NextGen

14 October 2009

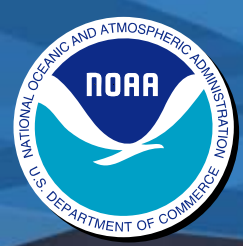
Don Berchoff

Office of Science and Technology



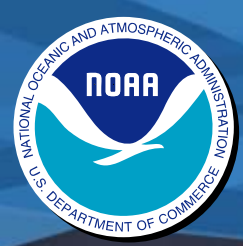
Overview

- **NextGen 101**
- **The Weather Information Database (WIDB)**
- **Launching NextGen**
- **S&T Needed for NextGen; Strategies for Effective R2O/O2R**
- **Broader benefits to NOAA**
- **The Way Ahead**



NextGen 101

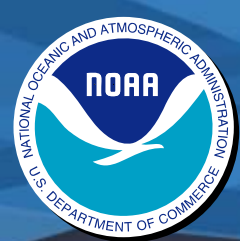
- NextGen is a **Congressionally mandated** initiative to modernize the U.S. Air Transportation System in order to:
 - *Increase **capacity** and **reliability***
 - *Improve **safety** and **security***
 - *Minimize the **environmental impact** of **aviation***



NextGen 101

- Improvements to the air transportation system will be achieved by applying:
 - *Space-based navigation and integrated surveillance*
 - *Digital communications*
 - *Layered adaptive security*
 - *Weather integrated into decision-making*
 - *Advanced automation of Air Traffic Management*
 - *Net-centric information access for operations*

DOC has a role in all of these activities!



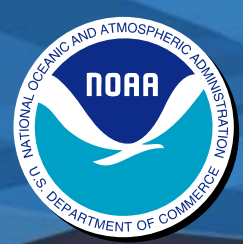
NextGen 101

Next Generation Air Transportation System (NextGen)



Flight Planning	Flight Data	Aeronautical Information	Enterprise Services	Geospatial Information	Communication	Performance Metrics
Environment	Layered Adaptive Security	Surveillance		Position, Navigation, and Timing	Safety	Weather
			Net Centric Infrastructure Services	Network-Enabled Information Access		

Questions/Comments:
Jay Merkle
jay.merkle@faa.gov



NextGen 101

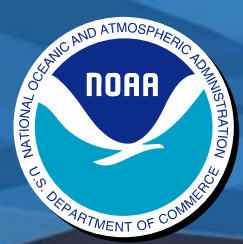
- **Weather accounts for 70% of all air traffic delays within the U.S. National Airspace System (NAS)**

- *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; Oct3, 2007*



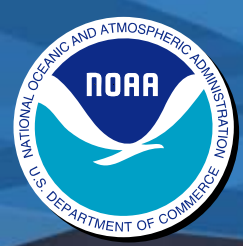


NextGen 101

● **“The total cost of domestic air traffic delays to the U.S. economy was as much as \$41 billion for 2007.”**

- *Air-traffic delays raised airlines' operating costs by \$19 billion.*
- *Delays cost passengers time worth up to \$12 billion.*
- *Indirect costs of delay to other industries added roughly \$10 billion to the total burden.*
- *Your Flight Has Been Delayed Again; Congressional Joint Economic Committee; May 2008*

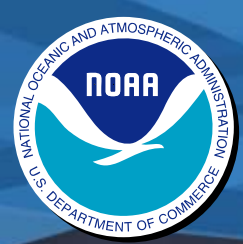
	Flight	Gate	Remarks
	FR3916	42	Canceled
mpino	FR2372	41	Delayed
	FR3002	54	Canceled
	FR232	53	Canceled
ubeck	FR901	58	Canceled
	FR434	45	Delayed
anna	FR034	55	Delayed
	FR2314	48	Canceled
	FR203	44	Canceled
	FR584	56	



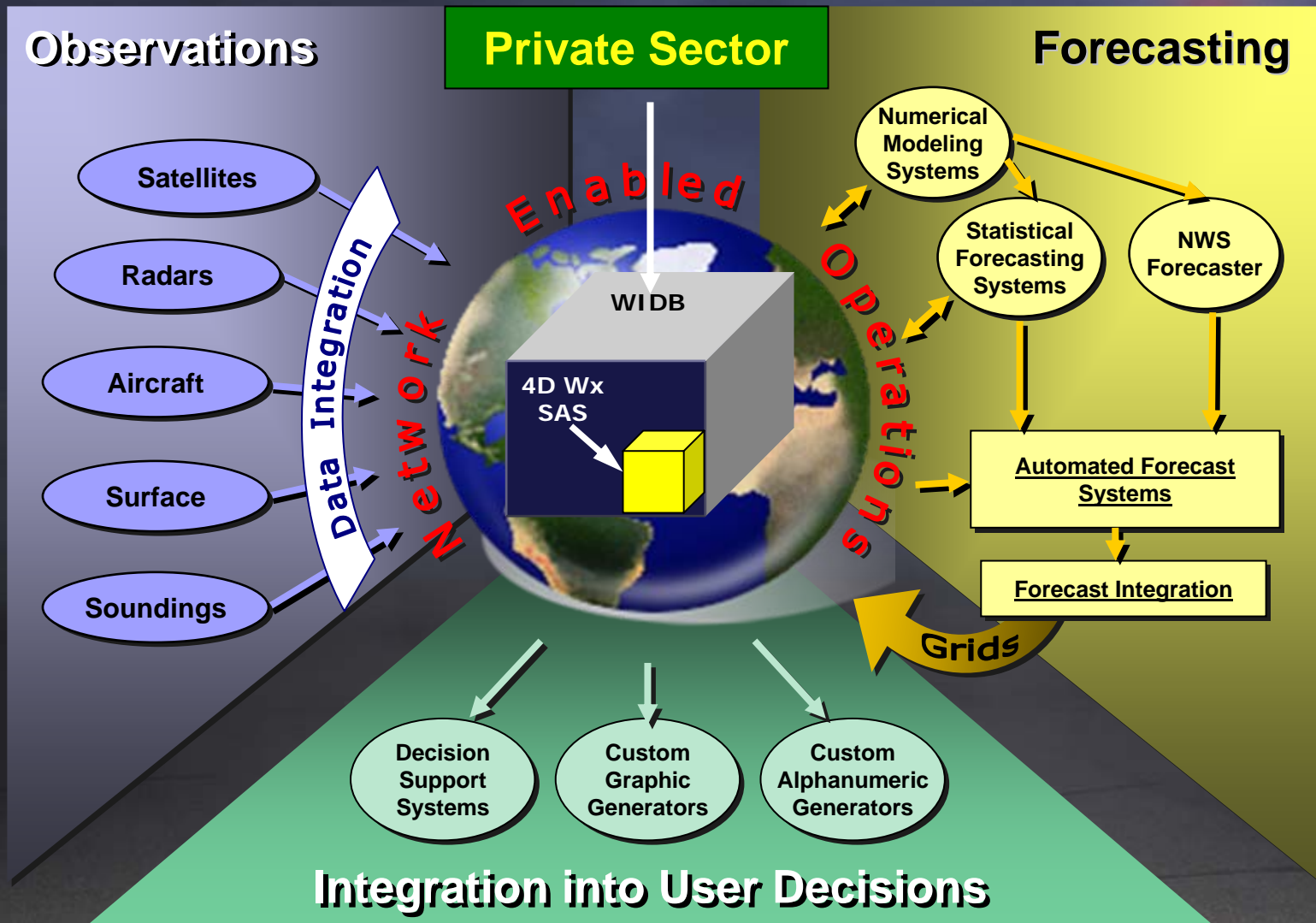
NextGen 101

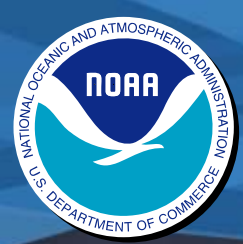
- **NextGen goals are not achievable without improving integration of weather information into **decision support systems****
- **NextGen weather vision (a major paradigm shift) is focused on:**
 - *Providing a multiple user common weather picture*
 - *Consistent and reliable weather information*
 - *An improved weather information data storage approach containing observation and forecast data (i.e., the WIDB or the “4 Dimensional Weather Data Cube”) enabling NextGen dissemination capabilities*





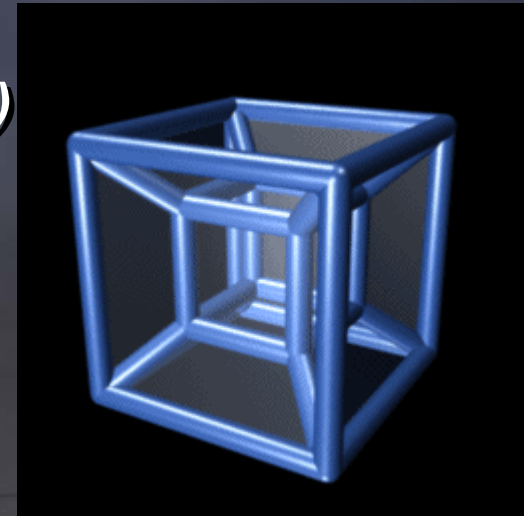
The WIDB: A Conceptual Model

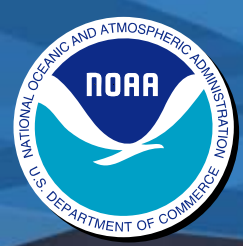




What's in the WIDB?

- **The WIDB (aka the 4-Dimensional Weather Data Cube) will contain:**
 - ***Continuously updated weather observations (surface to low earth orbit, including space weather and ocean parameters)***
 - ***High resolution (space and time) analysis and forecast information (conventional weather parameters from numerical models)***
 - ***Aviation impact parameters for IOC (2013)***
 - Turbulence
 - Icing
 - Convection
 - Ceiling and visibility
 - Winds (surface and aloft)
 - ***The WIDB of the future will contain “all” weather data, not just aviation parameters.***





Launching NextGen

Task Name	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	
NextGen Weather IOC (2013)	█															
NextGen Weather Intermediate (2016)		█														
NextGen Weather FOC (2022)						█										

- **Initial Operational Capability (2013)**

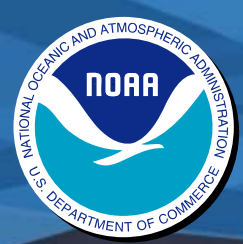
- ▬ *Integrated environmental information sources*
- ▬ *Common data standards and protocols*
- ▬ *Initial integration of diverse weather elements into decision support tools*

- **Intermediate Capability (2016)**

- ▬ *Improved modeling and science enables higher resolution more accurate information*
- ▬ *Full Network compatibility of environmental information*
- ▬ *Direct integration of weather into Air Traffic Management Systems*

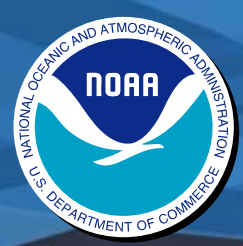
- **Full Operational Capability (2022)**

- ▬ *All NextGen requirements met and benefits achieved*
- ▬ *High resolution, nested scale forecasts available for all elements*
- ▬ *Full network connectivity ensures consistent information use across service areas and user groups*



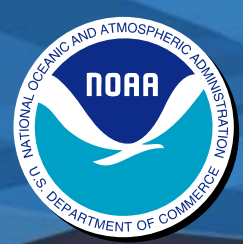
Launching NextGen

- **OST aligning organizational resources and science investments around NextGen**
 - *MOBI branch to handle obs – model – post-processing end-to-end planning*
 - *SEC – NextGen IT infrastructure*
 - *MDL – Transition of new forecast tools to operations*
- **NextGen Program Office**
 - *More refined implementation strategy and plans*
 - *New Program Manager as of September, 2009*
 - *Chief Engineer and 3 support staff FTEs in FY10*
- **Outreach – Regions/Center must help define future**
 - *NextGen web site*
 - *NextGen Roadshows*
 - *Corporate Board updates*
- **OCWWS to exploit NextGen investments for broader applications across other service areas**



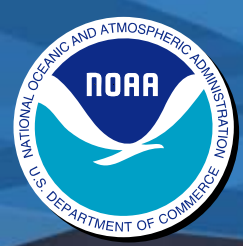
S&T Needed for NextGen

- **Today's forecast operations not tuned to the resolution, refresh and latency requirements of NextGen**
- **Temporal and Spatial resolution requirements will require advanced modeling, post-processing algorithms and forecaster tools**
- **NextGen funding initial NOAA R&D to address these challenges**



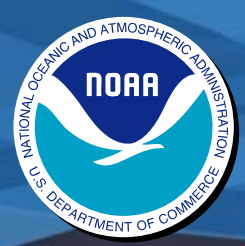
S&T Needed for NextGen

- **NextGen S&T needs collected in NextGen S&T Roadmap, linked to NWS S&T Roadmap**
- **OAR addressing NextGen S&T needs**
 - ▣ *Science-service focus: aviation weather research*
 - ▣ *Enabling Capabilities foci: obs, models, post-processing, forecaster applications research*
- **NWS and OAR increasing coordination in DSS**
 - ▣ *OAR research (ESRL, NSSL) increasing: e.g. technologies for meteorologist-over-the-loop, Single Authoritative Source, communicating forecast uncertainty*
 - ▣ *Other Research Partners: FAA*
 - ▣ *FY 12 \$ for enhanced DSS in LFW, AWX, STI*
 - ▣ *Challenge: Managing interagency research targeted for NOAA operations*

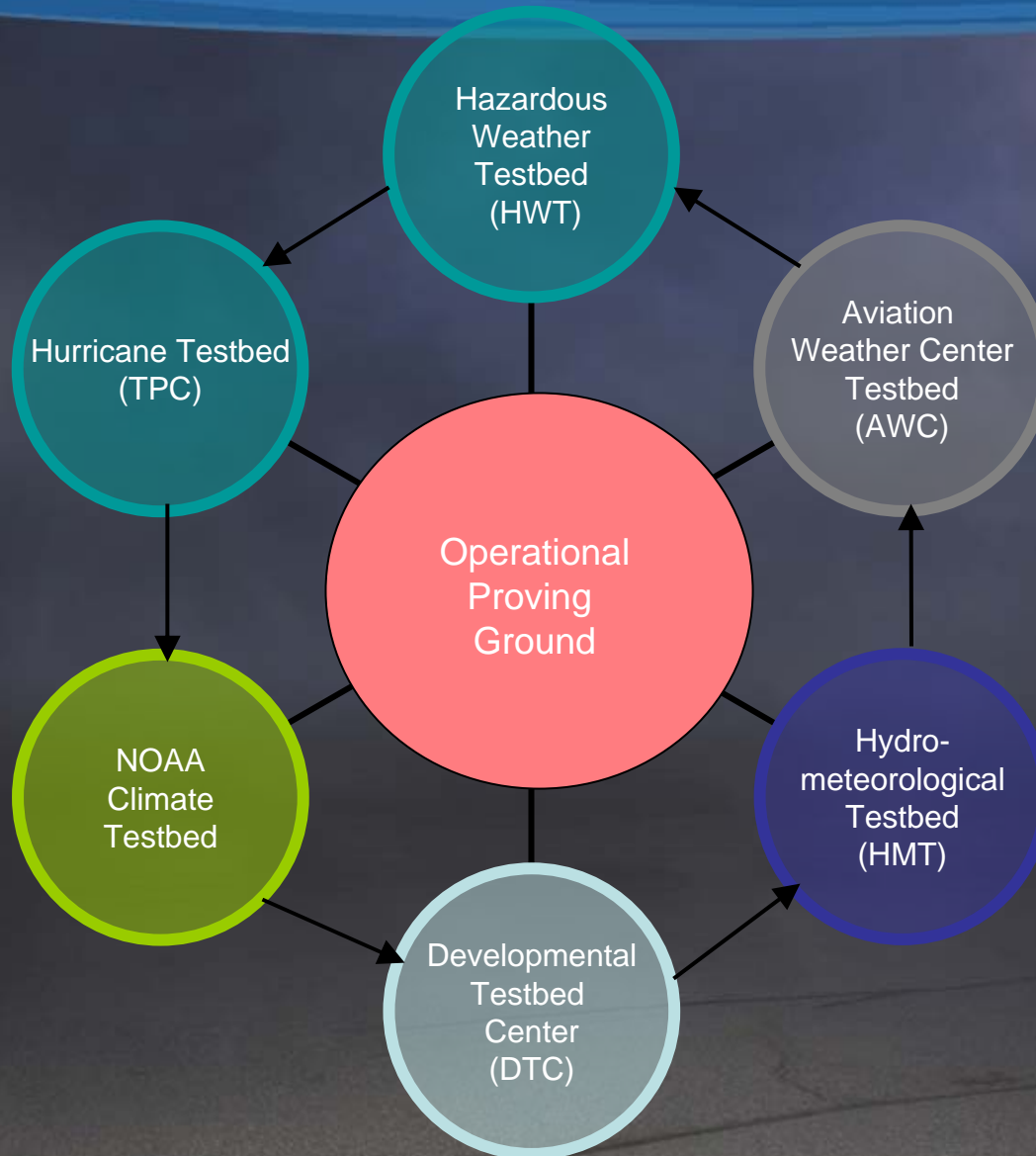


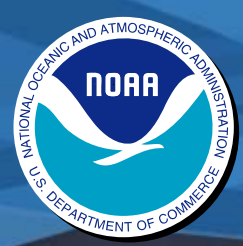
Strategies for Effective R20/O2O

- **Build a little, test a little by field forecasters in a simulated operational environment**
 - ▣ *Holistic, end-to-end approach that includes modeling improvements, user tool improvements and the interaction between national centers and forecast offices*
- **Test beds and Operational Proving Ground will be built on the AWIPS II and NextGen architecture**
 - ▣ *Common software development platforms (R20 and O2R)*
 - ▣ *Collaboration*
 - ▣ *Data Sharing*



Operational Proving Ground





Science-Service Improvements: Broader Benefits to NOAA

- **Aviation driven consistency and accuracy requirements will improve all NWS services**

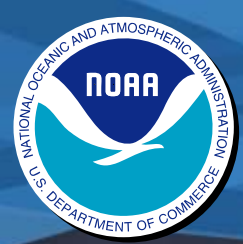
- *Consistency challenges not unique to aviation*

- **More accurate public forecasts because of aviation driven high resolution modeling requirements**

- **Improved severe weather lead times because of aviation driven convective forecasts**

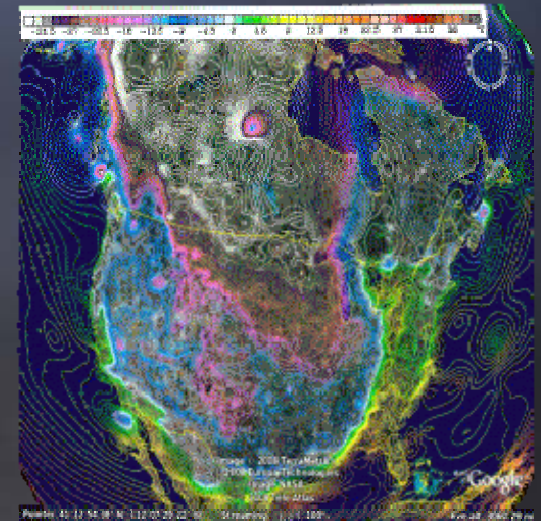
- *Implements "Warn on Forecast" technologies*

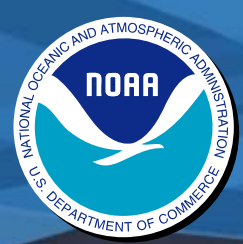




NextGen Enabling Capabilities: Broader Benefits to NOAA

- **Improved access to all NWS products and services via the cube**
 - *Supports automated decision assistance tools for other agencies and entities beyond FAA*
- **IT and Data Management enhancements**
 - *Establish a central repository and access for critical NWS products and services beyond aviation*
 - Support GEOSS requirements
 - Enhances continuity of operations
- **Extends the AWIPS enterprise services into a 'system of systems' linking AWIPS, MADIS, NDFD, CCS and NEXRAD**





The Way Ahead

- **NOAA is building the S&T advances and infrastructure needed for Next Gen**
 - ▣ ***NWS relying on OAR research to for S&T needs***
 - ▣ ***Transitioning research to operations***
 - **Testbeds & proving ground to assure the most effective S&T implemented: maximizes benefit to users of NWS information and forecast services**
 - ▣ ***NWS and OAR planning for additional coordination in DSS***
- **NexGen Benefits Apply to a Wide Spectrum of NOAA products and service**