NextGen Weather Programs- CSS-Wx and NWP

Examples of Multi-Agency Collaboration

Presented to: Friends and Partners of Aviation Weather

Presented by: Alfred Moosakhanian, FAA NextGen Weather Systems Program Manager

Date: July 13, 2017

Introduction

- **Collaboration means:**
  - Collective action in producing/creating results which lead to success
  - Working together to reconcile different interests
- **Collaboration is key to achieving NextGen Weather goals:**
    - Providing the best weather support to NAS operations especially information sharing
    - Minimizing adverse weather impacts on NAS operations

NextGen Wx Collaboration Panel

Panel Members	Topics
Wil Brown	FAA Concept to Contract
Ernie Dash (Ryan Solomon)	NOAA NGITWS Support - Q&A
Brandon Smith	NOAA Current NAS Support
Kevin Johnston	NAS Operations
Danny Sims	FAA Wx Requirements
Jud Stailey	Federal Collaboration - Q&A
Matt Fronzak	Challenges and Opportunities
Panel	Discussion - Q&A

NextGen Weather Systems

Common Support Services-Weather (CSS-Wx) and NextGen Weather Processor (NWP)

Presented to: Friends and Partners of Aviation Weather

Presented by: William Brown, FAA NextGen Weather Systems

Date: 13 July 2017

Overview

- **FAA concept to contract**
- **Stakeholder coordination and agency collaboration**
- **NextGen Weather Programs, capabilities, products, and Work Packages**

FAA Concept to Contract

- **NextGen Weather Systems Program Office coordinated with stakeholders to develop requirements during AMS investment analysis**
- **NextGen Weather Systems procured and awarded CSS-Wx to Harris and NWP to Raytheon in 2015**
- **CSS-Wx and NWP are in solution implementation and will be deployed in 2019-2022**
  - CSS-Wx to be deployed at 60 operational sites, and NWP to be deployed at 36 operational facilities in addition to 117 designated facilities for weather displays
  - Weather data and displays will also be available to external users

NextGen Weather Stakeholders (e.g.)

Collaboration with Other Agencies

- **FAA collaborates inside and outside of the agency, in particular with NOAA on implementation of weather requirements**
  - Working on getting concept implemented
  - Collaboration efforts between the FAA's Common Support Services-Weather (CSS-Wx) Program and NOAA's NextGen IT Web Services (NGITWS)
  - Day to Day Collaboration in support of NAS Operations
  - Federal coordination
  - Future requirements

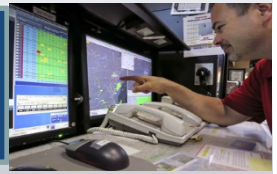
Collaboration Examples

- **NOAA:**
  - Memorandums of Understanding
  - Sample weather data
  - Technical documents including PDDs
- **NASA:**
  - Technology software
- **Environment Canada:**
  - Doppler radar

CSS-Wx Program

Common Support Services – Weather (CSS-Wx)

- Focuses on weather information management, publishing to users, and providing new interface standards and formats
- Enables decommissioning of legacy weather dissemination systems (e.g., WARP WINS, FBWTG, CDDS)

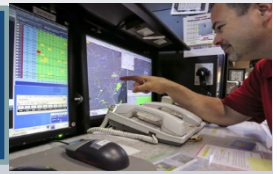


Capabilities	Benefits	Timeline
➢ Single provider of weather data products within the NAS, using standards-based weather dissemination via SWIM ➢ Makes weather products available from NOAA, NWP and other data sources for integration to air traffic systems ➢ Provides weather products via a set of common Web Services for weather, using international data access and data format standards	➢ Facilitates consistent weather information by utilizing standard formats ➢ Increases NAS access to common weather information ➢ Reduces interface development costs by eliminating custom point-to-point interfaces ➢ Reduces infrastructure/bandwidth costs by optimizing weather dissemination	➢ Awarded to Harris in April 2015, executing base contract year 2 ➢ Incremental Agile Software design/development/test in progress ➢ Conducted Critical Design Review (CDR) – June 2016 ➢ Factory Acceptance Testing (FAT) – 2018 ➢ Initial Operational Capability (IOC): 2019

NWP Program

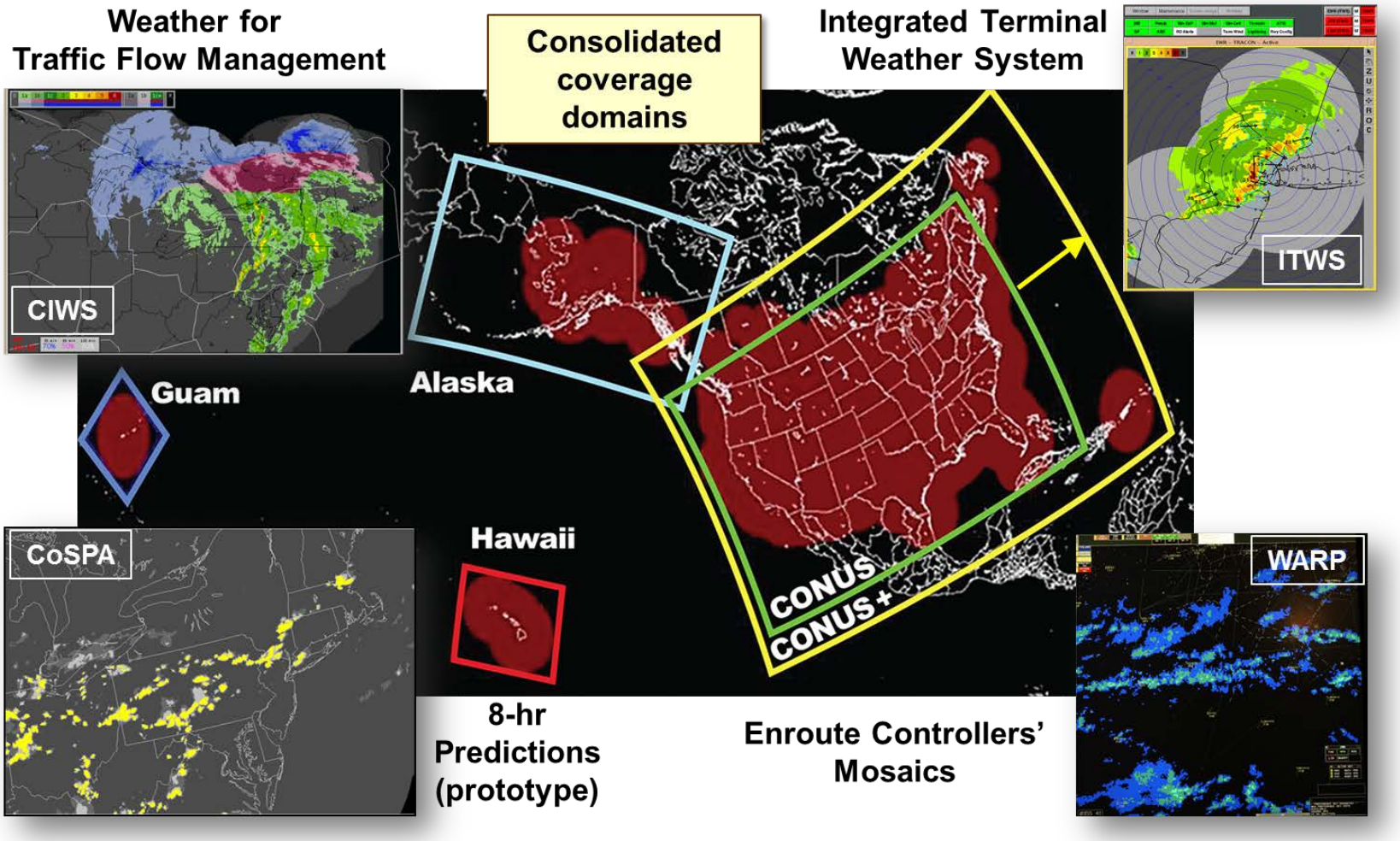
NextGen Weather Processor (NWP)

- Focuses on weather product generation, translation, and display for aviation weather users
- Enables decommissioning of legacy weather processor systems (e.g., WARP, ITWS, CIWS)

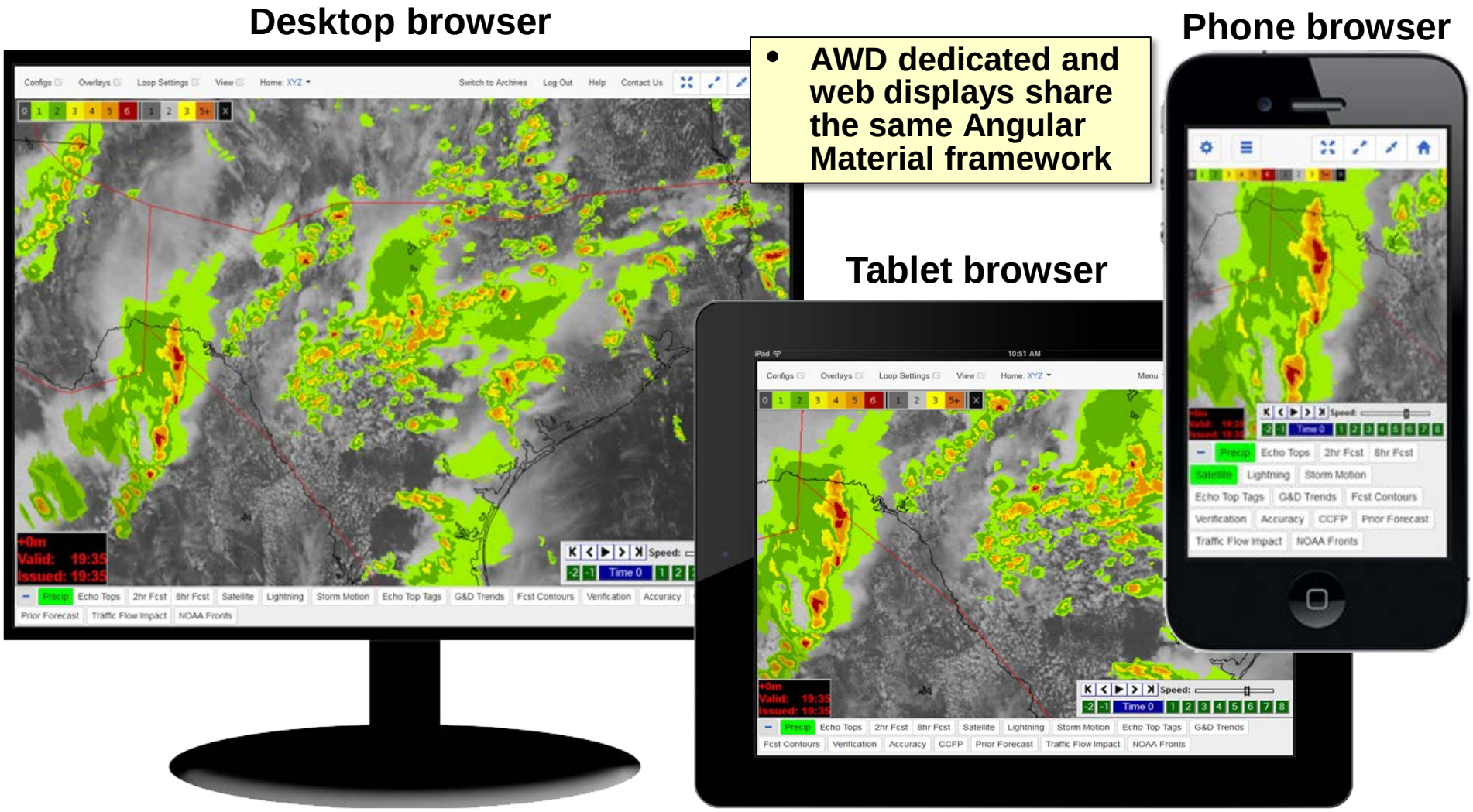


Capabilities	Benefits	Timeline
➢ **Produces advanced aviation specific weather products** • 0 to 8 hour aviation weather products • Real-time weather radar information (e.g., ERAM) • Convective Weather Avoidance Fields • Wind Shear alerts ➢ **Translates weather information into weather avoidance areas for integration into decision support tools (e.g., TFMS, TBFM)** ➢ **Provides Aviation Weather Display (AWD) of NextGen weather information for ATC users**	➢ **Improve accuracy, timeliness and look ahead (0-8 hour) of aviation-specific weather information to air traffic** ➢ **Reduce avoidable air traffic delays and maximize available runway and airspace usage** ➢ **Enhance weather algorithms** ➢ **Establish weather processing platform, reducing operational costs by consolidating legacy processors**	➢ **Awarded to Raytheon in April 2015, executing base contract year 2** ➢ **Incremental Agile Software design/development/test in progress** ➢ **Conducted Critical Design Review (CDR) – November 2016** ➢ **Factory Acceptance Testing (FAT): 2019** ➢ **Initial Operational Capability (IOC): 2020**

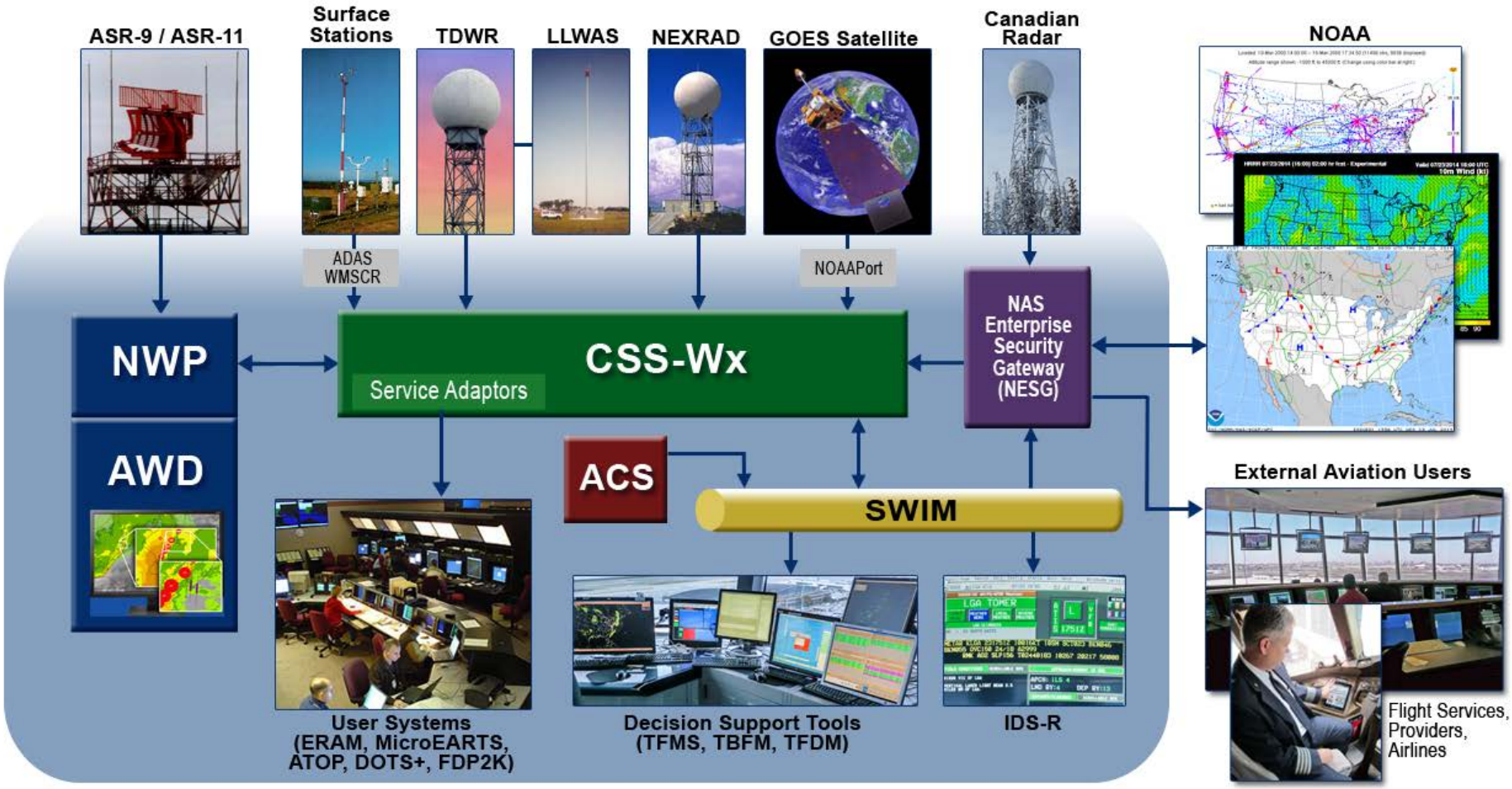
NWP Consolidation and Modernization



NWP Aviation Weather Display (AWD)

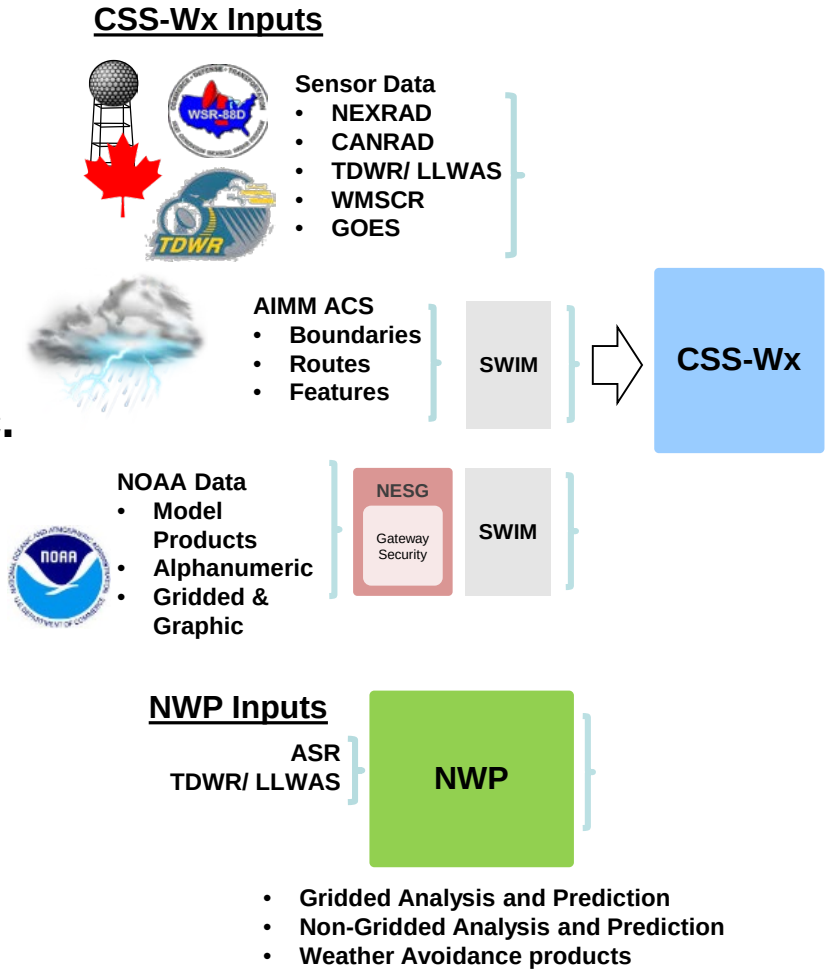


NextGen Wx Providers/Consumers



NextGen Wx Acquisition Services

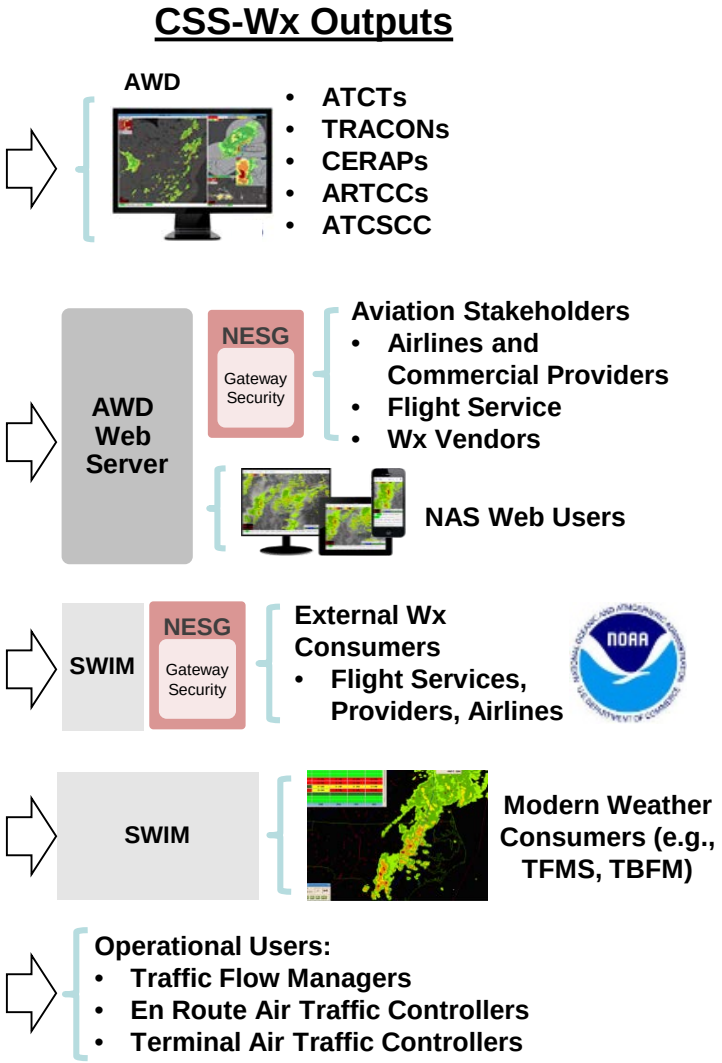
- NOAA gridded model products (RAP, HRRR, GFS, NAM, etc.) and Satellite images
- NOAA non-gridded: AIRMETs, SIGMETs, Advisories, Watches, Warnings, Observations (METAR, Mesonet, etc.), Lightning, CIP, SLD, etc.
- 156 WSR-88D (NEXRADs) across the CONUS, Alaska and selected CERAPs
- 45 Terminal Doppler Weather Radar (TDWR) and 31 Canadian Radar (CANRAD) products
- ASR-9/11 radar weather channels
- NWP Gridded, non-gridded analysis and forecast products



NextGen Wx Distribution Services

- **CSS-Wx Web and Distribution Services provide aviation weather products to NAS and non-NAS consumers**
- **Distribution services support OGC and legacy consumers**
  - Web Coverage Service
  - Web Feature Service
  - Web Map Service
  - Web Map Tile Service
- **Consumers subscribe to CSS-Wx products through SWIM**
  - Web Service Description Documents (WSDDs)
  - Product Description Documents (PDDs)
  - Sample data
  - Client Library / Software

CSS-Wx



NextGen Weather Products

Gridded Weather Data	
✓ Precipitation (VIL)	✓ Icing Bottoms
✓ Precipitation (VIL) with Mask	✓ Icing Bottoms Forecast
✓ Precipitation (VIL) Forecast	✓ Icing Layer
✓ Precipitation (VIL) Forecast with Mask	✓ Composite Icing
✓ Echo Tops	✓ Icing Layer Forecast
✓ Echo Tops Forecast	✓ Composite Icing Forecast
✓ Precipitation (Base Reflectivity)	✓ Turbulence Layer
✓ Precipitation (Composite Reflectivity)	✓ Turbulence Layer Forecast
✓ Precipitation (Composite Reflectivity) with Mask	✓ Composite Turbulence
✓ Surface Precipitation Phase	✓ Composite Turbulence Forecast
✓ Surface Precipitation Phase Forecast	✓ Convective Weather Avoidance Fields
✓ Precipitation (ASR)	✓ Convective Weather Avoidance Field Forecast
✓ Precipitation (ASR AP Flagged)	✓ Satellite
✓ Icing Tops	✓ Terminal Winds
✓ Icing Tops Forecast	✓ NOAA Model Data (RAP, HRRR, GFS)

NextGen Weather Products (Cont'd)

Non-Gridded Weather Data

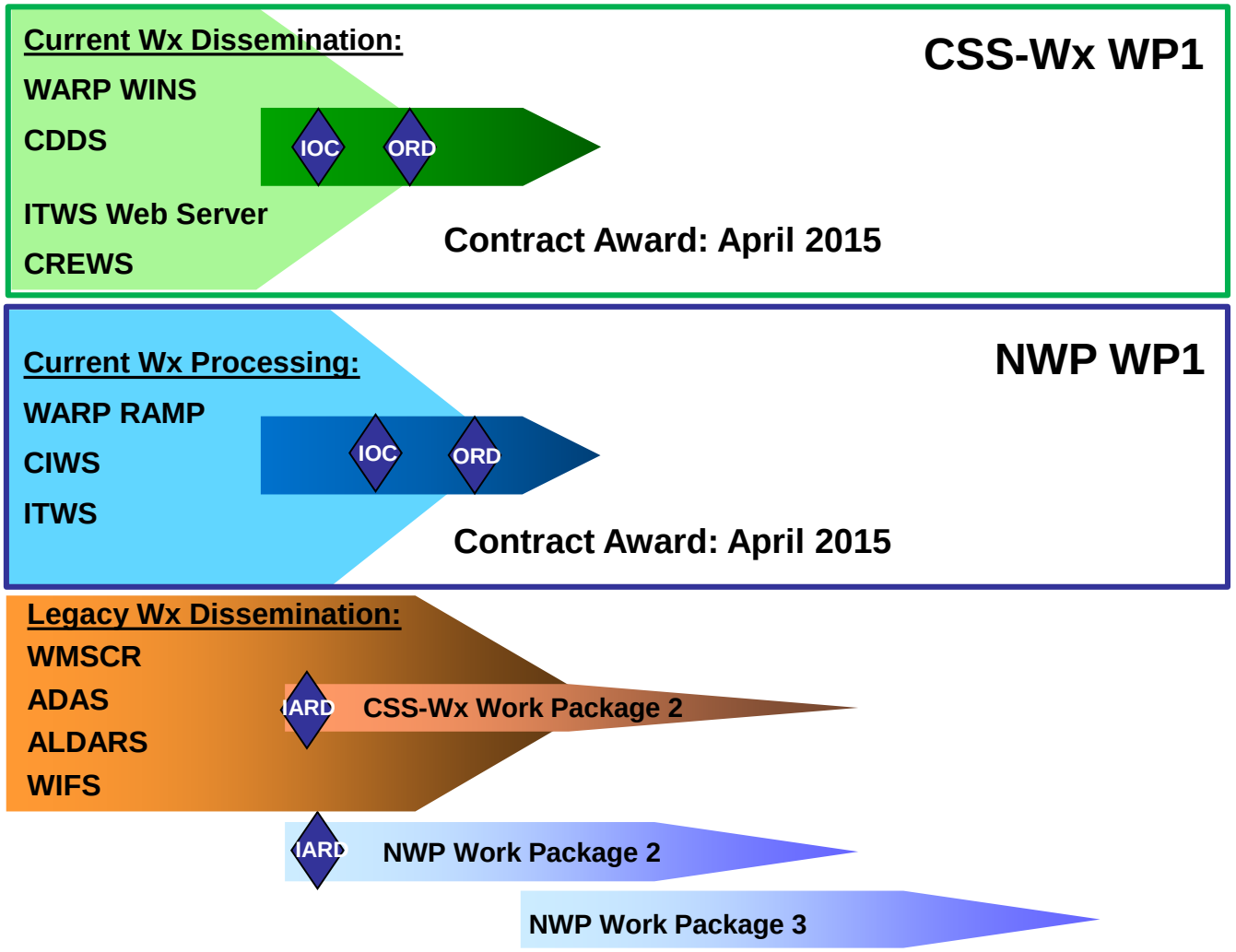
- ✓ Precipitation (VIL) Forecast Accuracy
- ✓ Precipitation (VIL) Forecast Contours
- ✓ Echo Tops Forecast Accuracy
- ✓ Echo Tops Forecast Contours
- ✓ Lightning
- ✓ Storm Information Hazard Text
- ✓ Storm Information Leading Edges
- ✓ Storm Information Motion Vectors
- ✓ Fronts Forecast
- ✓ Growth Trends
- ✓ Decay Trends
- ✓ Forecast Confidence
- ✓ Convective Weather Avoidance Polygons
- ✓ Wind Profiles
- ✓ Tornado Detections
- ✓ Airport Status Summary
- ✓ Microburst
- ✓ Gust Front
- ✓ Gust Front Estimated Time to Impact
- ✓ Tornado Alert
- ✓ Configured Alerts
- ✓ Wind Shear ATIS Timers – Microburst
- ✓ Wind Shear ATIS Timers – Wind Shear
- ✓ Terminal Weather Graphics
- ✓ Terminal Weather Text
- ✓ Airport Lightning Warning
- ✓ Icing Layer Contours
- ✓ Composite Icing Contours
- ✓ Turbulence Layer Contours
- ✓ Composite Turbulence Contours
- ✓ Pilot Report (PIREP)
- ✓ ICAO Aircraft Report
- ✓ Urgent Pilot Report (PIREP)
- ✓ Significant Meteorological Information (SIGMET)
- ✓ Convective Significant Meteorological Information (Convective SIGMET)
- ✓ Airmen's Meteorological Information Advisories (AIRMET)
- ✓ Winds Aloft Forecast
- ✓ Surface Weather Observations
- ✓ Aviation Watch Notification
- ✓ Tornado Warnings
- ✓ Tornado Watches
- ✓ Severe Thunderstorm Warnings
- ✓ Severe Thunderstorm Watches
- ✓ Volcanic Ash Advisory Statement (VAAS)
- ✓ Terminal Area Forecast (TAF)
- ✓ Center Weather Advisories
- ✓ Meteorological Impact Statements
- ✓ Area Forecasts

NextGen Weather Products (Cont'd)

Weather Data Imagery
✓ Himawari Satellite Images
✓ G-AIRMET (graphical)
✓ Volcanic Ash Advisory Graphic
✓ Canadian Graphical Area Forecasts

- Gridded and Non-gridded products can be rendered into an image layer
- Multiple layers can be combined to provide single image output

NextGen Weather Work Packages



NOAA
NextGen IT/Web Services (NGITWS)

Ryan Solomon

NGITWS Project Manager
Aviation Weather Center
NOAA National Weather Service

Topics

- Origins of NGITWS
- NGITWS 101
  - What is NGITWS?
  - Why is NGITWS important?
- NGITWS Architecture
  - Data flow example
- Progress and Timelines
  - What we've accomplished and where we're headed
- Conclusions

Origins of NGITWS

The FAA Next Generation Air Transportation System needs accurate, timely, and reliable weather information

Why does NextGen care about weather?

- ~70% delays in the NAS are due to weather

Through enhanced weather products and services

- ~46% reduction in delays
- ~$19 billion savings annually

That's where NOAA contributes

NGITWS will *"…provide enhanced weather forecast information for integration into an air traffic management system."*

"Capabilities for NextGen will result in a significant increase in weather prediction and dissemination capabilities with wide ranging benefits across NOAA."

- 2014 NOAA Budget Estimate

Origins of NGITWS (cont)

- NOAA **I**ntegrated **D**issemination **P**rogram (IDP)
  - Enhance NOAA's dissemination capabilities
    - Reliability
    - Sustainability
    - Integrated, enterprise-level capabilities
  - Core initiatives
    - NWS Ground Readiness – infrastructure improvements, network consolidation, bandwidth upgrades, etc.
    - NWS Telecommunications Gateway Re-architecture – modernizing the heart of NWS dissemination
    - NextGen IT/Web Services (NGITWS)

Origins of NGITWS (cont)

- The culmination of 5+ years of collaboration between NOAA and FAA

  4-D Data Cube

  FAA Next Generation Network Enabled Weather (NNEW)

  SE2020 prototype

- The fruit of key partnerships

  FAA

  National Center for Atmospheric Research (NCAR)

  MIT Lincoln Laboratory

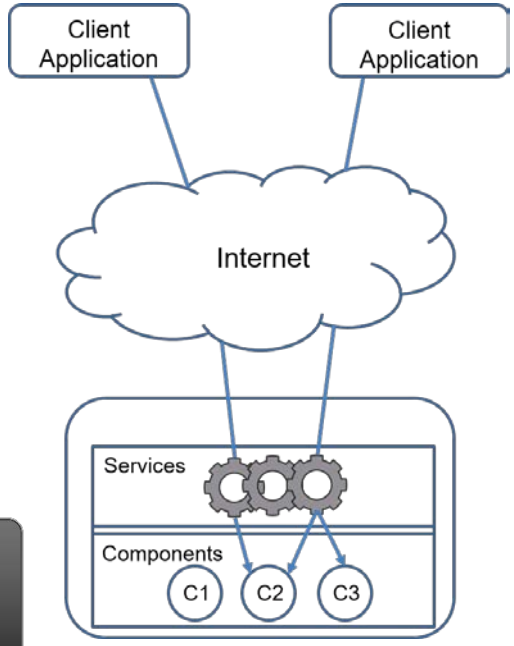
- Leveraging key NOAA resources

  - ➢ Aviation Weather Center (AWC)
  - ➢ Meteorological Development Lab (MDL)
  - ➢ Earth System Research Lab Global Systems Division (GSD)
  - ➢ NCEP Central Operations (NCO)

NGITWS 101

What is NGITWS?

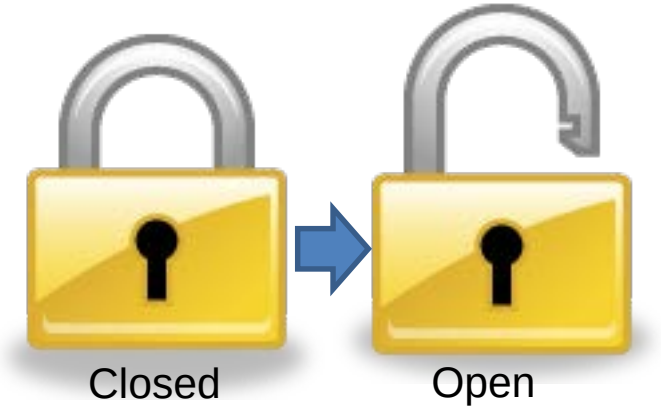
Legacy data silos



Web-based, service-oriented architecture (SOA)

Platform-specific

Platform-agnostic



Closed systems

Open systems

NGITWS 101 (cont)

What is NGITWS?

IWXXM

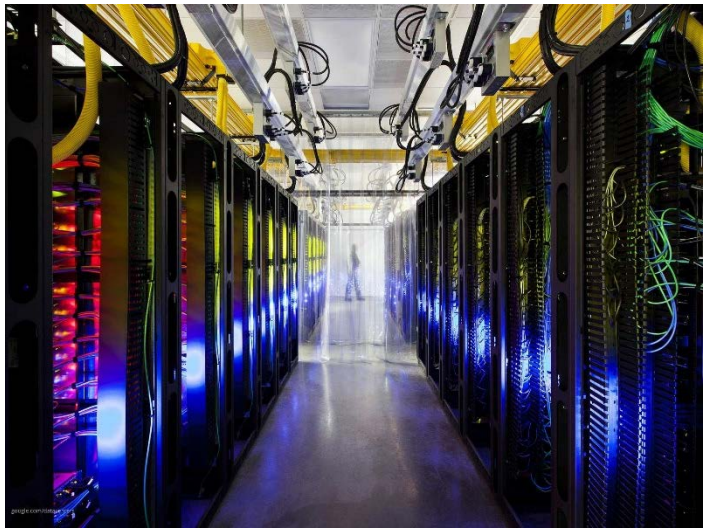
NetCDF

CERTIFIED OGC® COMPLIANT

Standard data formats

OGC compliant services

State of the art data centers



NGITWS 101 (cont)

What is NGITWS?

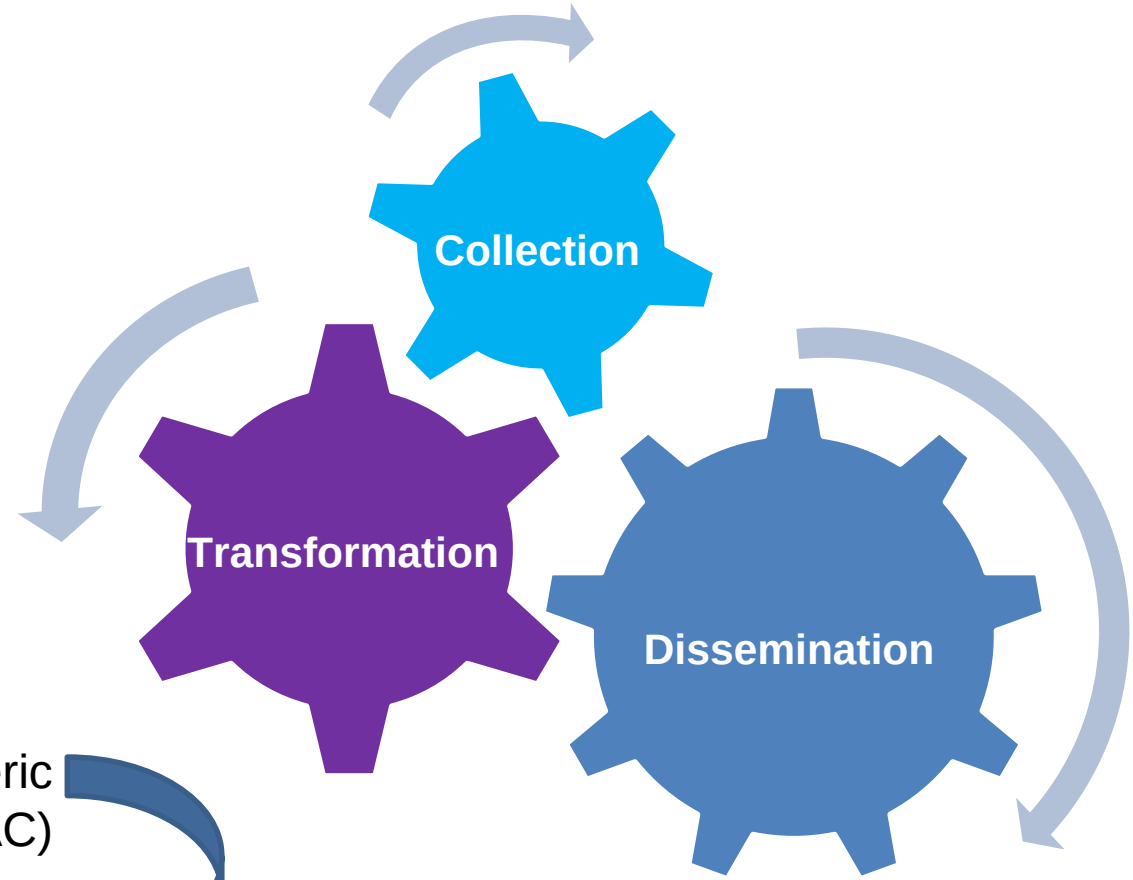
Data
Machine

GRIB2

NetCDF-4

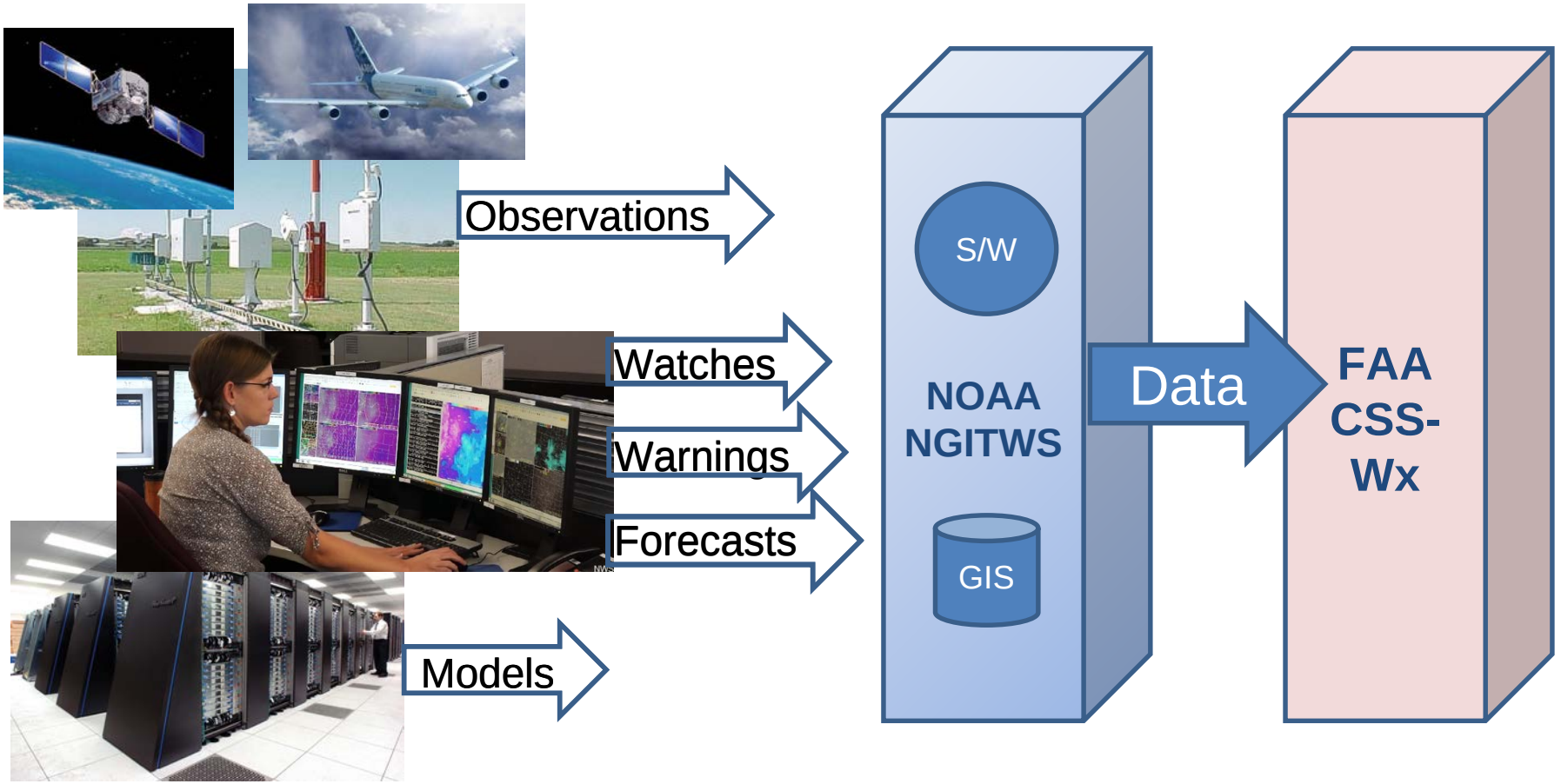
Traditional Alphanumeric Code (TAC)

IWXXM



NGITWS 101 (cont)

What is NGITWS?



Current Data Exchange (in place now)

- Source:
  - NextGen IT/Web Services system, NOAA IDP in College Park, MD, and Boulder, CO
- Destination:
  - FAA SWIM/NEMS Research and Development, FAA William J. Hughes Technical Center, Atlantic City, NJ
- Network:
  - VPN over the Internet
- Message pattern:
  - Publish-Subscribe
- Data:
  - ~230 unique gridded numerical model products in NetCDF-4
  - ~40 unique XML (IWXXM, IWXXM-US, USWX) products
  - ~40 unique image products

Future Data Exchange (FY18/FY19)

- Source:
  - NextGen IT/Web Services system, NOAA IDP in College Park, MD, and Boulder, CO
- Destination:
  - FAA Research and Development Enclave, FAA William J. Hughes Technical Center, Atlantic City, NJ
  - FAA CSS-Wx Operational Centers in Salt Lake City, UT, and Atlanta, GA
- Network:
  - Private high-speed network
- Message pattern:
  - Publish-Subscribe
- Data:
  - ~230 unique gridded numerical model products in NetCDF-4
  - ~40 unique XML (IWXXM, IWXXM-US, USWX) products
  - ~40 unique image products

Conclusion

- This work is extremely important!
- Through healthy partnerships and leadership support we've made tremendous progress

Continue to focus on

- ✓ Reliability
- ✓ Performance
- ✓ Interoperability

NextGen IT/Web Services = the foundational capability for providing the critical aviation weather information necessary for decision making in the National Airspace System.

NWS Support to the FAA Air Traffic Control System Command Center

Brandon Smith

FPAW Summer Workshop
NextGen Weather Program
July 13, 2017

What is “IDSS”?

Triad of Concepts Embodies “Impact-based Decision Support Services (IDSS)”

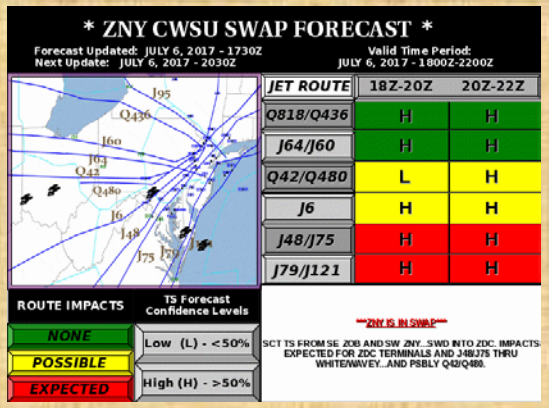
Impact-based Services **Decision Assistance to Core Partners** **Decision-relevant Information**

NWS IDSS has many faces:

Deployable Meteorologists →

- Wildfire support (since the 1920’s)
- High profile incidents (Deepwater Horizon, NYC/DC Fireworks, Super Bowl)
- Center Weather Service Units at ARTCCs (since the 1970’s)
- Spaceflight Meteorology Group at NASA/JSC in Houston (since 1960s)
- NWS Liaison to FEMA National Incident Management Action Teams

- Tailored Forecast Products
- Customer-driven thresholds



AWC/NAM Weather Unit

Back Row (L → R) Brandon Smith, Brian Waranauskas, Dan Kremnitzer
Front Row (L →R) Frank Brody (MIC), Michael Eckert, (Bucky the Ground Hog), Kyle Struckmann, Joe Carr

- Pre 1995:
  - NWS Meteorologists in ATCSCC
- Post 1995:
  - FAA Weather Specialists in ATCSCC
- May 2012: NWS returned to ATCSCC with 2 meteorologists
- August 2014: Added 1 Meteorologist & a MIC
- July 2016: Selected 2 Meteorologists
- *Current Staffing: 1 MIC, 5 Mets, 1 FAA Wx Specialist*

NWS SUPPORT TO ATCSCC

- NWS dedicated weather IDSS to the ATCSCC
- Six NWS meteorologists (**N**ational **A**viation **M**eteorologists)
- One FAA weather specialist
- Organizationally: NWS / NCEP Aviation Weather Center (AWC)
- NOT a traditional forecasting role (we do not issue TAFs or standard products, but we collaborate on them)

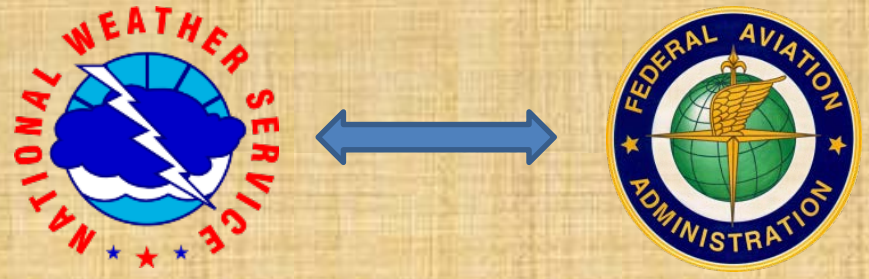
The Critical 8 C's:

Coordination
Collaboration
Consistency
Customization
Confidence
Consultation
Clarity
Creativity

Goal: Paint a *cohesive, timely national weather picture to the Command Center* to improve safety, efficiency, and decision making

“Weather is intertwined with nearly every decision we make.”

- ***Bryan Beck, FAA / ATCSCC National Operations Manager (NOM)***



“We bet our entire house on a weather forecast!”

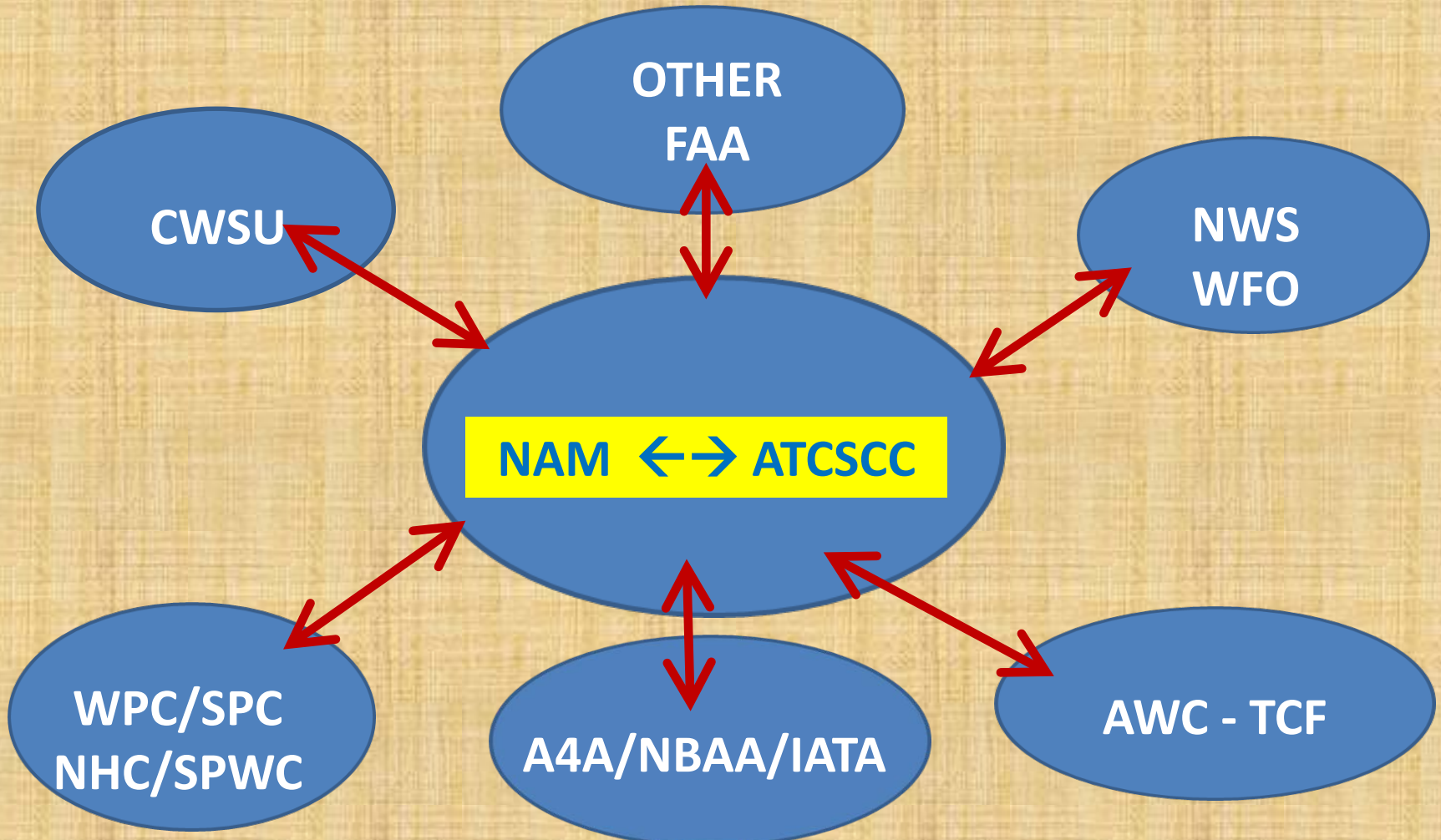
- **Mike Murphy, ATCSCC NTMO and PERTI Supervisor**

“Forecasts possess no intrinsic value. They acquire value through their ability to influence the decisions made by users of the forecasts.”

- Allan Murphy, NCAR, 1993

Coordination / Collaboration

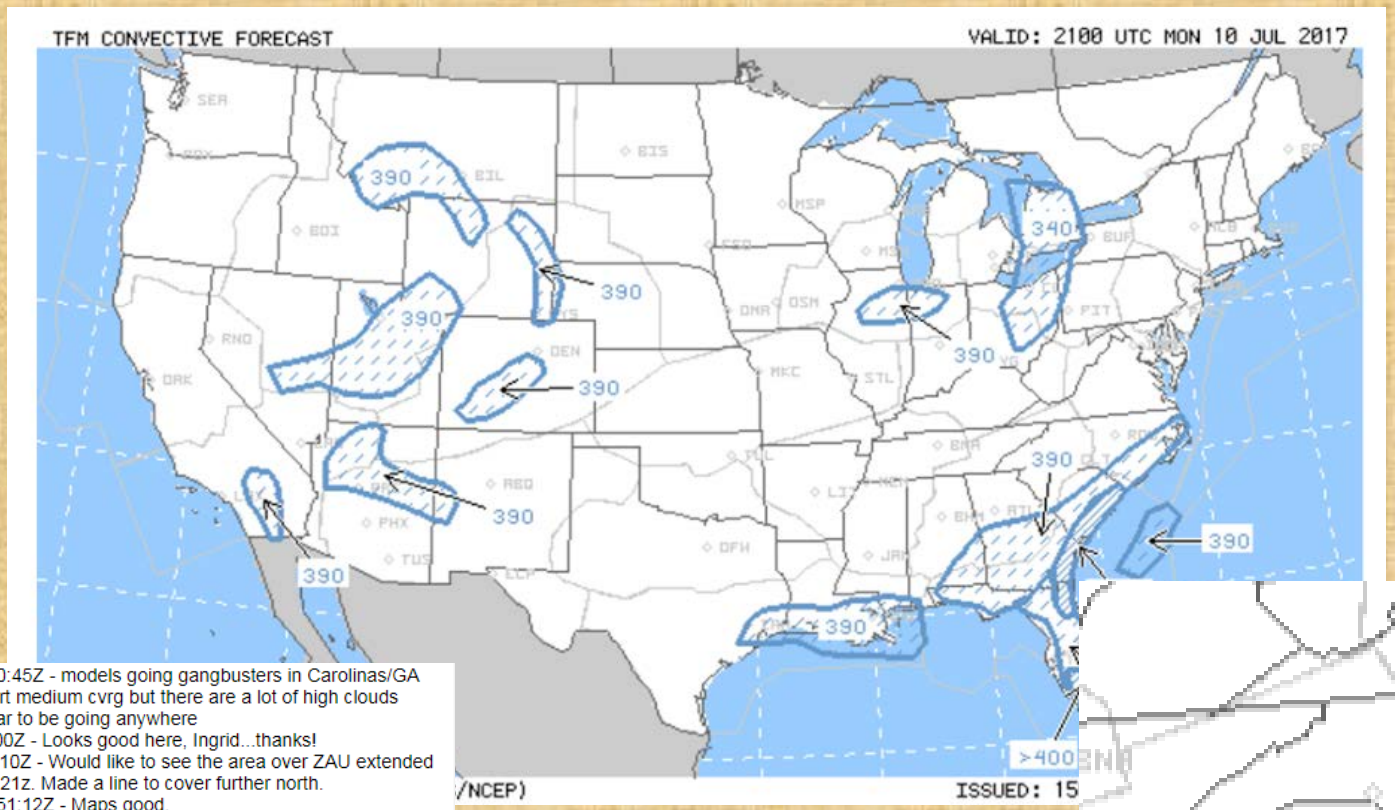
NWSChat is the primary tool

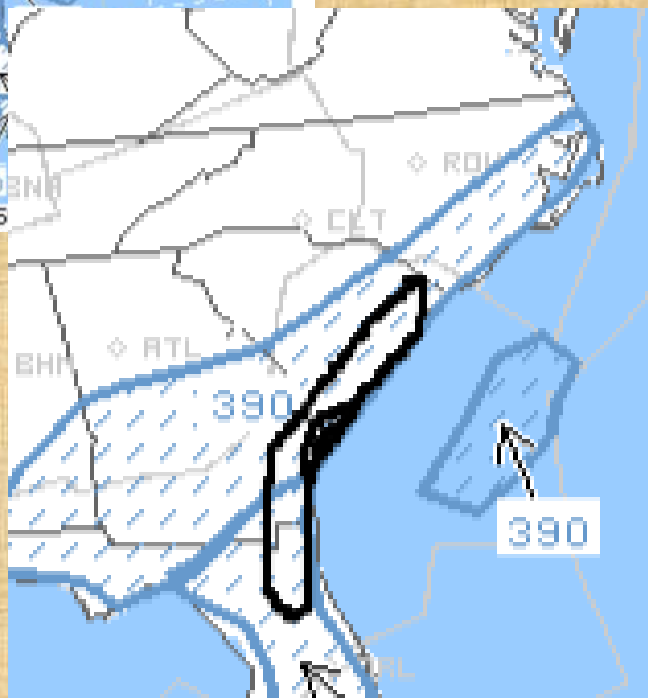


NAM Daily Products & Briefings

- **Customized TAF Briefings:** 09Z through 03Z next day
- **TCF Collaboration** – 11Z through 03Z next day
- **NWS HQ Standup Briefing** – 0745 local
- **ATCSCC Standup Briefing** – 0800 and 1600 Local
- ***Ad-hoc ATCSCC briefings: 15 to 20 times per day***
- **NAS Day-1 Convective Outlook** - 0830 *(started in 2015)*
- **FAA NAS NSR (Day 2-4+ Outlook)** – 1000 Local
- **FAA HQ (High Impacts only)** –1030 Local
- NWS WFO/CWSU NY Metro/PHL Coordination – twice per day
- Space Weather (SWPC) & Volcanic Ash -- as needed
- Ad-hoc Telcons/NWS Chat for coordination/collaboration

TCF Collaboration





<JBLU-ASnyder> 13:50:45Z - models going gangbusters in Carolinas/GA this afternoon to support medium cvrg but there are a lot of high clouds around that don't appear to be going anywhere
<ZDC-TBaker> 13:51:00Z - Looks good here, Ingrid...thanks!
<AAL-RCollins> 13:51:10Z - Would like to see the area over ZAU extended to cover ORD/MDW at 21z. Made a line to cover further north.
<ZJX-THendricks> 13:51:12Z - Maps good.
<ZMA-ADowning> 13:51:25Z - Maps good for ZMA. Agree with adjustment ovr w cntrl FL at 19z to extd area a bit closer to TPA.
<AWC-IGreenwall> 13:51:42Z - ZJX, any thoughts on a medium in your area. JBLU suggested it.
<ZAU-MMosteiko> 13:54:56Z - Thanks for the add, Ryan. I was going to mention at least in the vicinity of ORD at 21z. Maps good for ZAU
<AWC-IGreenwall> 13:56:10Z - AAL/ZAU, will edit 21Z as depicted on whiteboard at 21Z for the final.
<ZDV-GRobbins> 13:57:34Z - Concur
<ZJX-THendricks> 13:57:40Z - Poss med coverage at 21Z drawn. JAX/CHS 12z soundings the best of the bunch and with southwest steering flow, cells to pile up along East Coast. Not sure if we will reach criteria at 19Z or 23Z however.
<AWC-IGreenwall> 13:57:56Z - ZJX, i will add your medium to the final.
<AWC-IGreenwall> 13:57:59Z - thanks
<JBLU-ASnyder> 13:58:13Z - I think that makes sense ZJX - soundings more impressive than yesterday and 2" PWATs so may not take full sun to get that
<ZJX-THendricks> 13:58:16Z - My best guess. Med coverage always a tough sell down here with frontal systems and upper support.
<ZJX-THendricks> 13:58:34Z - without that is

TAF Impact Board

NWS Generated TAFs/Customer-Driven Thresholds

- NWS TAFs displayed as hourly forecasts
- Colors represent impact level

Impacts TAF Board

TAF Home | Plot | Data | Board

IDs: @TOPE,@TOPC,@T Submit

Potential Impact: None | Slight | Moderate | High

Updated at: 1800 UTC 29 Dec 2016

Time	OBS	29/18Z	29/19Z	29/20Z	29/21Z	29/22Z	29/23Z	30/00Z	30/01Z	30/02Z	30/03Z	30/04Z	30/05Z	30/06Z
@TOPE														
KBOS	WX	WX	WX	WX	WX	WX	WX	CIG	CIG			WGst	WGst	WGst
KCLE								WX	[WX]	[WX]	[WX]	WX	WX	WX
KLGA	WSpd	[VIS]	[VIS]	[VIS]	[VIS]	WGst	WGst							
KEWR	WGst	WX	WX	WX	WGst	WGst	WGst	WSpd	WSpd	WSpd	WSpd	WSpd	WSpd	WSpd
KJFK	CIG	[VIS]	[VIS]	[VIS]	[VIS]	WGst	WGst	WSpd	WSpd	WSpd	WSpd	WSpd	WSpd	WSpd
KPIT		WX	WX	WX	WX	WX	WX	WX	WX	WX	WX	WX	WX	WX
KPHL	VIS	VIS	CIG	CIG			WGst	WGst	WGst	WGst	WGst			
KBWI				WGst	WGst	WGst	WGst							
KIAD	CIG	CIG	CIG	WGst	WGst	WGst	WGst	WGst	WGst	WGst	WGst			
KDCA				WGst	WGst	WGst	WGst	WGst	WGst					
KCLT														
KATL		WSpd	WSpd	WSpd	WSpd	WSpd	WSpd							
KMCO														
KTPA														
KFLL														
KMIA														

- Wind thresholds (for LGA)

KLGA	290	340	11	17	17	23	1	04/22 X-WIND
KLGA	290	340	17	20	23	30	2	04/22 X-WIND
KLGA	290	340	20	999	30	999	3	04/22 NOT USED; AAR=28-30
KLGA	110	160	11	17	17	23	1	04/22 X-WIND;
KLGA	110	160	17	20	23	30	2	04/22 X-WIND;
KLGA	110	160	20	999	30	999	3	04/22 NOT USED;AAR=28-30
KLGA	170	270	6	999	10	999	0	
KLGA	170	270	6	999	10	999	0	

- CIG/VIS thresholds

010	032	2		0	999	0
000	999	0		3	4	2
000	999	0		0	3	3
000	003	3	AAR=32	0	999	0
003	005	2	AAR=34	0	999	0
000	999	0		0	999	0

Addressing various observing datasets – ITWS vs. ASOS

- ASOS reports DEG TRUE
- wind is aligned with the TAF
- sighting is consistent

- ITWS reports Deg MAGNETIC
- different from TAF Winds
- sighting is inconsistent

Newark, Newark International Airport, NJ. KEWR (NWS/F
Elev: 16 ft; Latitude: 40.68250; Longitude: -74.16944

Current time: Sun, 25 Jun 4:43 pm EDT
Most Recent Observation: Sun, 25 Jun 4:35 pm
Explanation of Wx and Clouds columns.

Time (EDT)	Temp. (f)	Dew Point (f)	Relative Humidity (%)	Wind Direction	Wind Speed (mph)	Visibility (miles)	WX	Clou
25 Jun 4:35 pm	81	59	48	ENE	9	10.00		BKN065 BKN120
25 Jun 4:30 pm	82	57	42	NNE	5	10.00		BKN065 BKN120
25 Jun 4:25 pm	82	59	45	NNW	3	10.00		BKN065 BKN120
25 Jun 4:20 pm	82	59	45	CALM		10.00		BKN065 BKN120
25 Jun 4:15 pm	81	59	48	E	6	10.00		BKN065 BKN120
25 Jun 4:10 pm	82	59	45	NE	7	10.00		BKN065 BKN120
25 Jun 4:05 pm	82	59	45	NNE	8	10.00		BKN065 BKN120
25 Jun 4:00 pm	82	59	45	NNE	8	10.00		BKN065 BKN120
25 Jun 3:55 pm	82	59	45	NNE	8	10.00		BKN065 BKN120
25 Jun 3:51 pm	82	59	46	N	12	10.00		BKN065 BKN120
25 Jun 3:40 pm	82	55	40	NW	12	10.00		BKN070 BKN110
25 Jun 3:36 pm	83	56	40	NW	12	10.00		BKN070 BKN110
25 Jun 3:35 pm	82	55	40	NW	13	10.00		BKN070 BKN110
25 Jun 3:30 pm	84	55	37	NW	14	10.00		BKN070 BKN110
25 Jun 3:25 pm	82	54	37	W	14	10.00		BKN070 BKN110
25 Jun 3:20 pm	82	52	35	WSW	14	10.00	-RA	BKN070 BKN110
25 Jun 3:15 pm	82	54	37	WSW	16G24	10.00	-RA	BKN070 BKN110
25 Jun 3:10 pm	82	52	35	WSW	13	10.00		BKN070 BKN110
25 Jun 3:05 pm	82	54	37	WSW	14	10.00		BKN070 BKN110
25 Jun 3:00 pm	84	54	35	W	17	10.00		BKN070 BKN110
25 Jun 2:55 pm	82	54	37	WSW	14	10.00		BKN070 BKN110
25 Jun 2:51 pm	83	52	34	WSW	13	10.00		BKN070 BKN110
25 Jun 2:50 pm	84	54	35	WSW	15	10.00		BKN070 BKN110
25 Jun 2:45 pm	84	54	35	W	14	10.00		SCT070 SCT110
25 Jun 2:40 pm	84	54	35	WSW	16	10.00		SCT070 SCT110
25 Jun 2:35 pm	84	55	37	WSW	17G25	10.00		SCT070 SCT110

```
**********************************************
**            ITWS - KEWR - Newark Liberty
**  MAGNETIC DIRECTIONS (subtract 13 deg fo
**********************************************
KEWR 06/25/2017 20:41:42 GMT 110 06 KT
KEWR 06/25/2017 20:39:42 GMT 090 05 KT
KEWR 06/25/2017 20:37:42 GMT 110 08 KT
KEWR 06/25/2017 20:35:42 GMT 110 10 KT
KEWR 06/25/2017 20:33:43 GMT 110 06 KT
KEWR 06/25/2017 20:31:43 GMT 110 06 KT
KEWR 06/25/2017 20:29:43 GMT 100 05 KT
KEWR 06/25/2017 20:27:43 GMT 100 06 KT
KEWR 06/25/2017 20:25:43 GMT 110 05 G14KT
KEWR 06/25/2017 20:23:43 GMT 120 06 G14KT
KEWR 06/25/2017 20:21:43 GMT 100 08 G14KT
KEWR 06/25/2017 20:19:43 GMT 110 09 G14KT
KEWR 06/25/2017 20:17:43 GMT 100 10 G14KT
KEWR 06/25/2017 20:15:44 GMT 100 07 KT
KEWR 06/25/2017 20:13:44 GMT 080 05 KT
KEWR 06/25/2017 20:11:44 GMT 060 06 KT
KEWR 06/25/2017 20:09:44 GMT 070 06 G15KT
KEWR 06/25/2017 20:07:44 GMT 050 07 G15KT
KEWR 06/25/2017 20:05:44 GMT 060 10 G15KT
KEWR 06/25/2017 20:03:45 GMT 070 09 G15KT
KEWR 06/25/2017 20:01:45 GMT 060 11 G15KT
KEWR 06/25/2017 19:59:45 GMT 060 08 KT
KEWR 06/25/2017 19:57:45 GMT 060 09 KT
KEWR 06/25/2017 19:55:45 GMT 040 09 KT
KEWR 06/25/2017 19:53:45 GMT 040 12 KT
KEWR 06/25/2017 19:51:08 GMT 030 09 KT
KEWR 06/25/2017 19:49:43 GMT 020 07 KT
KEWR 06/25/2017 19:47:43 GMT 010 10 KT
KEWR 06/25/2017 19:45:43 GMT 020 08 KT
KEWR 06/25/2017 19:43:43 GMT 010 09 KT
KEWR 06/25/2017 19:41:43 GMT 020 09 KT
KEWR 06/25/2017 19:39:43 GMT 020 10 KT
KEWR 06/25/2017 19:37:43 GMT 020 08 KT
KEWR 06/25/2017 19:35:43 GMT 360 10 G18KT
KEWR 06/25/2017 19:33:43 GMT 350 11 G18KT
KEWR 06/25/2017 19:31:43 GMT 350 13 G18KT
KEWR 06/25/2017 19:29:43 GMT 350 14 G18KT
KEWR 06/25/2017 19:27:43 GMT 340 13 G18KT
```

Summary

- National Weather Service NAMs provide key weather decision support to ATCSCC and the National Air Space

- Meteorological expertise is fully integrated with ATFM decision makers

Collaboration with NWS in Support of NAS Operations

Date:
07/13/17

SYSTEM OPERATIONS DIRECTORATE

Presented to:
FPAW

Presented by:
Kevin Johnston, Chief Meteorologist

FAA
Air Traffic Organization

Collaboration with NWS in Support of NAS Operations

- Contract Officer Representative of Inter-Agency Agreement for Decision Support Services
  - 90 Meteorologists at 22 Air Traffic Facilities
  - Implementing significant change/responsibilities of the Agencies
    - NWS now will provide Met workstations (i.e. AWIPS Thin Client) and communications for their operations

Collaboration with NWS in Support of NAS Operations

- Collaborative Decision Making Weather Evaluation Team with FAA and Aviation Industry
  - NWS key to development of the Traffic Flow Management (T) Convective Forecast (TCF)
  - NWS involved with new Plan, Execute, Review, Train and Improve (PERTI) initiative

Collaboration with NWS in Support of NAS Operations

- CONUS Area Forecast (previous session)
- Additional NWS Product Review being planned and led by FAA/ANG-C6

Collaboration with NWS in Support of NAS Operations

- Thoughts for the future
  - Air Traffic Management and the use of data linked forecast and current wind information
    - RTCA guidance—how should NWS be involved?
  - Improvements needed on how NWS tracks performance in support of the NAS
    - Additional motivation is potential for FAA Air Traffic Services to move to private sector

NextGen Weather Systems

FAA Aviation Weather Requirements

Presented to: Friends and Partners of Aviation Weather

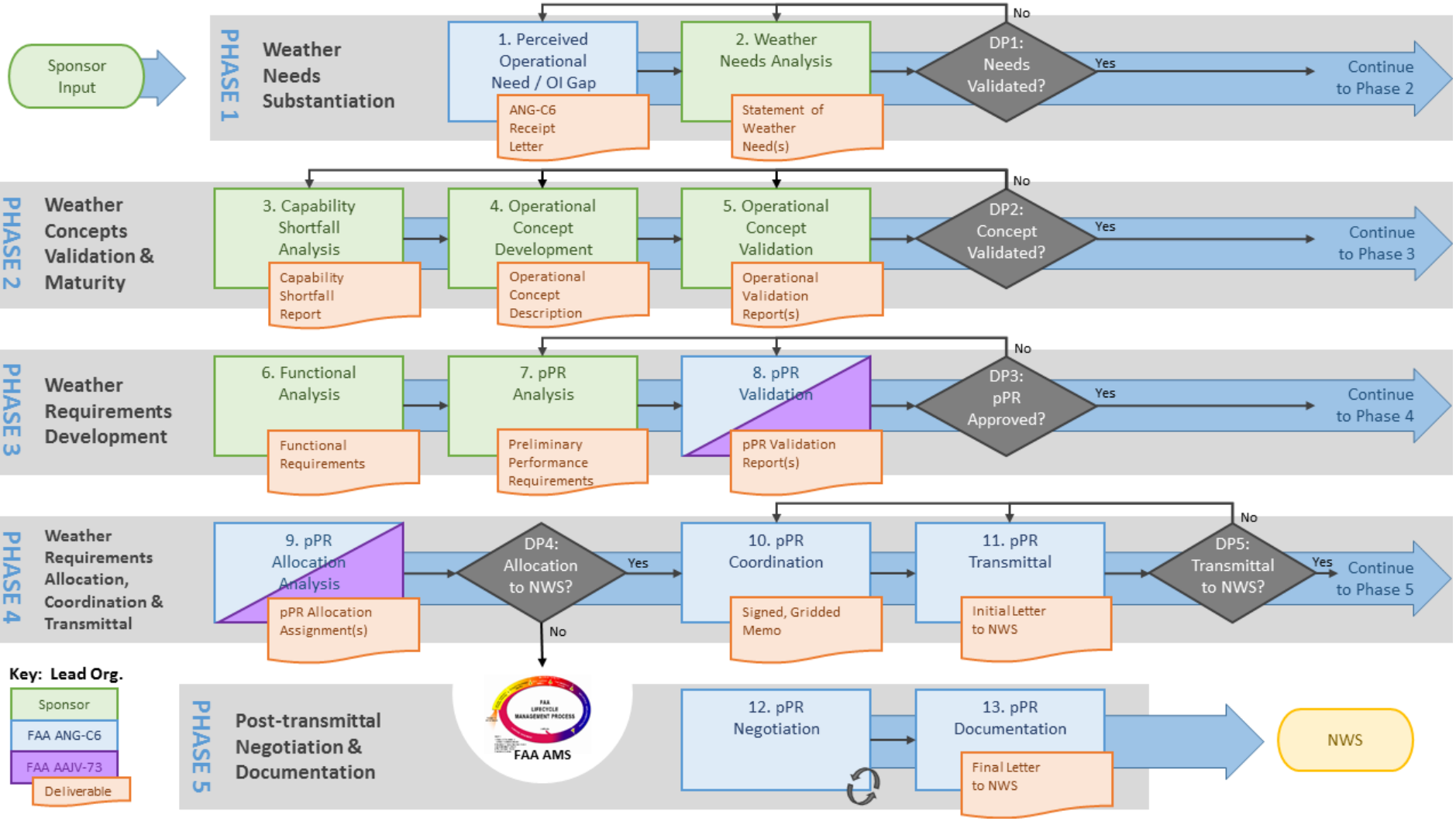
Presented by: Danny Sims, NextGen Weather, ANG-C61

Date: 13 July 2017

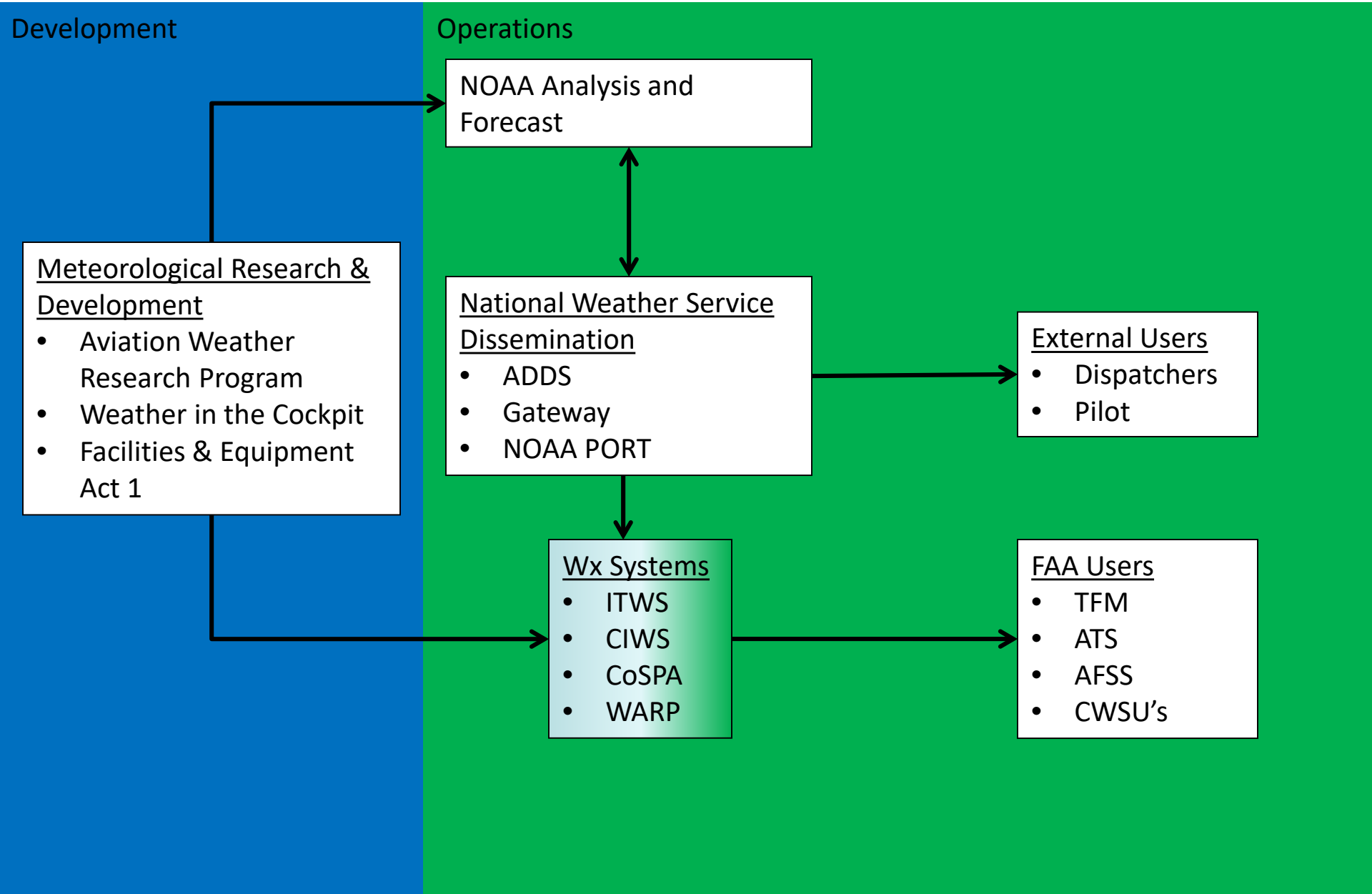
Overview

- **FAA Weather Requirements Process**
- **Work Package 2 (WP2) Status**
  - A set of enhancements and additions to an existing capability

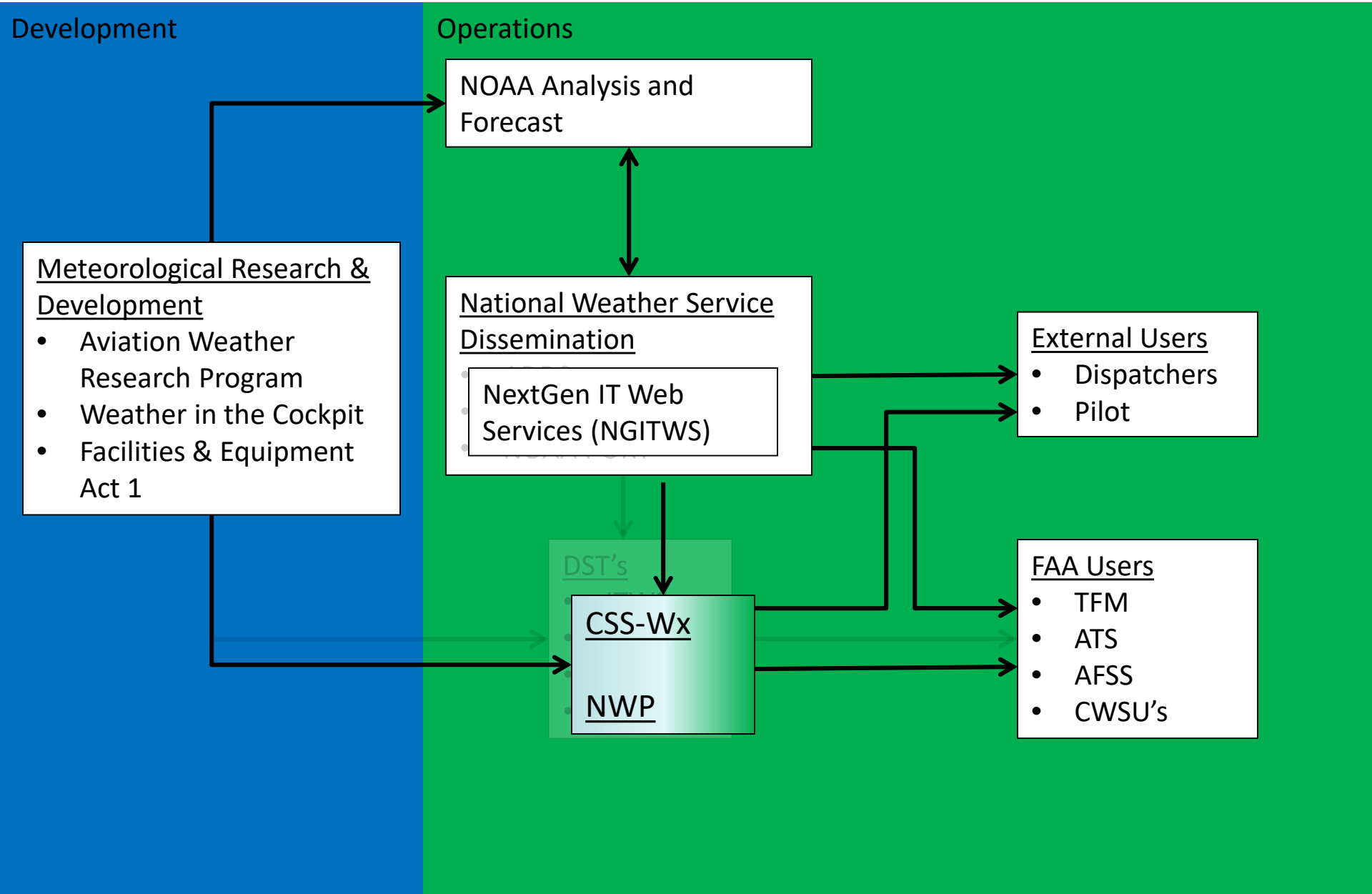
Weather Requirements Process



Recent Dissemination



NextGen Dissemination

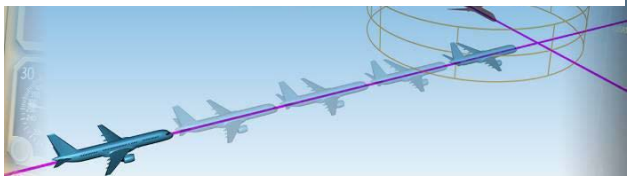


Air Traffic Management Evolution

Trajectory Based Operations is a concept to operate the NAS based on the aircraft's ability to fly precise paths in time and space and ANSP's ability to strategically manage and optimize trajectories through the operation.

Trajectory computed by automation (ground and or flight deck) that defines the flight path of an aircraft from one point to another in four dimensions (lat/long/alt/time)

Covers all phases of flight from gate to gate



WP2 Broad Shortfalls

- Lack of objective **translations** of **weather** forecast into predictions of air traffic **constraints** and airspace **impacts**
- Lack of easily **interpreted** measures of forecast **uncertainty**
- Insufficient shared **situational awareness** for all participants in the strategic planning and collaborative decision making process
- Insufficient **training** and team development for all participants in strategic Traffic Flow Management

WP2 Status

- **In process of looking at candidate capabilities, e.g.**
  - Along with pre-planned capabilities
  - Offshore Precipitation Capability (OPC)
  - Support for Trajectory Based Operations

OFCM

Interagency Coordination for Aviation Weather at OFCM

Jud Stailey

Lead Meteorologist

Office of the Federal Coordinator for Meteorology

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OFCM

Aviation Weather at OFCM

OFCM Mission

Foster the effective use of Federal meteorological resources by encouraging and facilitating the systematic coordination of meteorological services and supporting research across the Federal Weather Enterprise.

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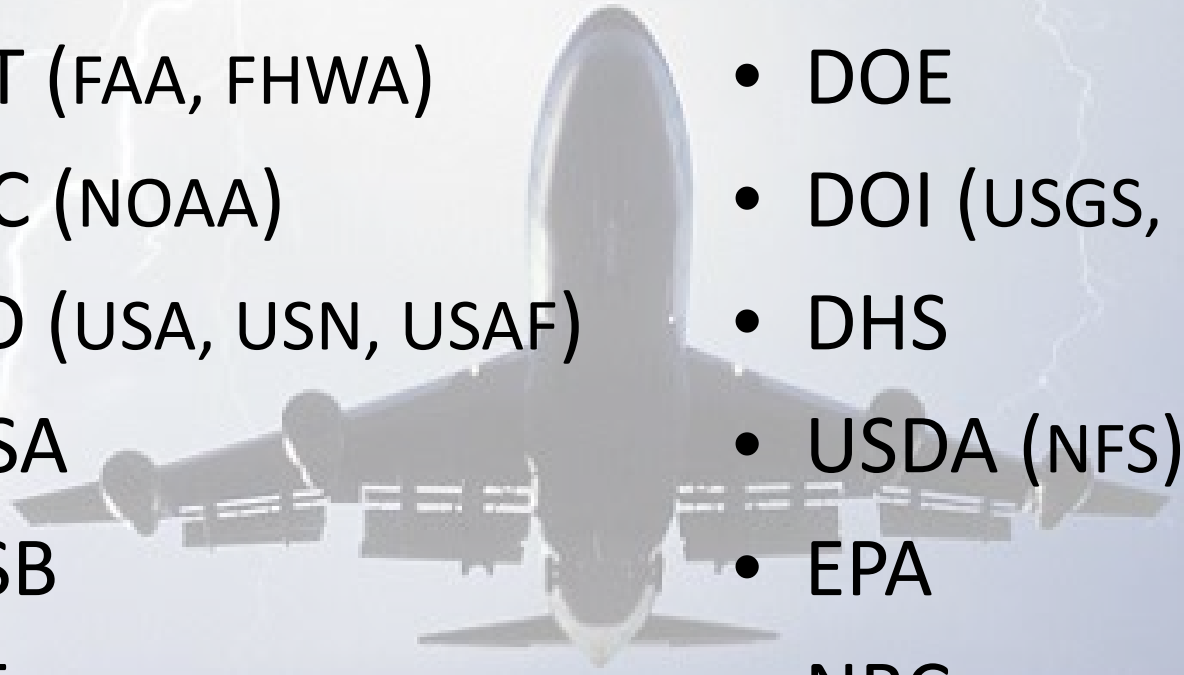
Participating Agencies

- DOT (FAA, FHWA)
- DOC (NOAA)
- DoD (USA, USN, USAF)
- NASA
- NTSB
- NSF
- DOS
- DOE
- DOI (USGS, NPS)
- DHS
- USDA (NFS)
- EPA
- NRC
- EOP (OMB, OSTP)



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Evolving Coordination

Pre-NextGen

- National Aviation Weather Program Council
  - FAA, NOAA, USAF, NASA, NTSB, USDA
  - Strategic Plan
- Committee for Aviation Services and Research
  - Implementation Initiatives
  - Tracked progress
  - Tracked Weather-Related Accident Trends

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Evolving Coordination

NextGen

- Federal Meteorological Handbooks
  - FMH-1: Surface Weather Observations and Reports
  - FMH-11: WSR-88D Meteorological Observations
  - FMH-12: Meteorological Codes and Coding Practices
- Multifunction Phased Array Radar (MPAR)
- Aviation Weather Code Transition (IWXXM)
  - TAC to xml code formats
- Space Weather

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Strategic Goals for Weather Coordination

- **Improve** the resolution, frequency, information content, and sustainability of global **observing** capabilities.
- Make Federal **forecasting** processes more resilient for all relevant time and spatial scales.
- Ensure availability of effective and consistent **decision-support** products, information, and services.
- Conduct productive, synergistic interagency **research** efforts.
- Develop, recruit, and sustain a **professional and diverse** Federal weather **workforce**.
- Coordinate **messaging** about FWE priorities and needs.

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Inter-Agency Aviation Weather: Opportunities and Challenges

Matt Fronzak

Summer FPAW

July 13, 2017

MITRE

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Inter-Agency Opportunities and Challenges – General

- **Opportunities**
  - Collaboration
  - Information sharing
  - Economies of scale
  - Improved efficiencies
  - Agile acquisition/development
  - High level oversight along with working level coordination

- **Challenges**
  - Budget uncertainties and timeliness
  - Competing priorities
  - Lengthy processes
  - Miscoordination
  - Duplication
  - Restricted sharing
  - Interdisciplinary [ATM and Weather] training

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Inter-Agency Aviation Weather Opportunities (O) and Challenges (C)

- **People**
  - (O) Leverage expertise of NWS and industry forecasters in ATM decision-making
  - (C) Train forecasters and ATM decision-makers on the proper use of current (e.g., probabilistic) and future (e.g., translated) weather products
- **Products**
  - (O) Incorporate improved weather observation and forecast products
  - (C) Achieve consistent, appropriate use of weather information from varying sources and among related weather products
- **Infrastructure**
  - (O) Use new weather information sources, e.g., Spectrum Efficient National Surveillance Radar (SENSR), Aircraft-based Observations (ABO) across agencies
  - (C) Introduce procedures and industry aviation weather systems technologies which support sharing consistent information among all users, including cockpit/pilot
- **Processes**
  - (O) Include proactive cockpit input in future TBO decision-making
  - (C) Fix identification, notification and resolution of ASOS system problems
  - (C) Provide a flexible and agile means to upgrade weather inputs to NextGen weather systems and decision support tools

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Panel Discussion / Q&A

Panel Members	Topics
Wil Brown	FAA Concept to Contract
Ernie Dash (Ryan Solomon)	NOAA NGITWS Support
Brandon Smith	NOAA Current NAS Support
Kevin Johnston	NAS Operations
Danny Sims	FAA Wx Requirements
Jud Stailey	Federal Collaboration
Matt Fronzak	Challenges and Opportunities