Building a Weather-Ready Nation

IDP Deployment Status

NWS Partners Meeting @ Annual AMS

Michelle Mainelli – Office of Dissemination

January 26, 2017 • Seattle, WA

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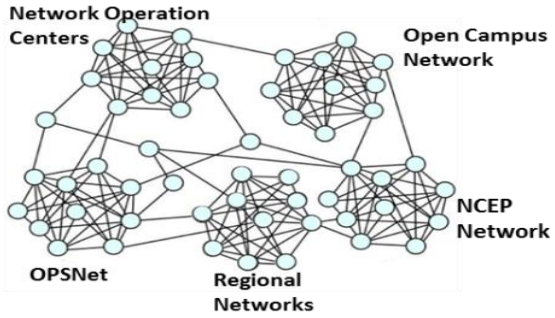
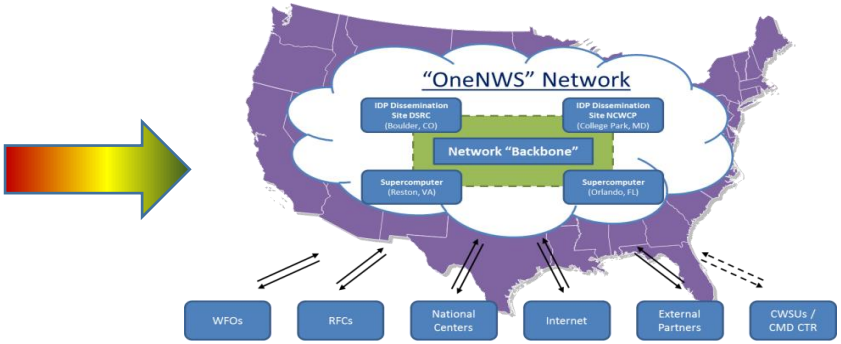
Historical Context

Integrated Dissemination Program (IDP)

- Started in 2013 – Legacy systems were not adequate to meet our mission
- 100% primary & backup dissemination services and geographically diverse
- Improved bandwidth, resilience, redundant, scalable, secure operational networks & systems
- Increased access to environmental data using diverse methods & data formats
- Transforming NWS enterprise dissemination services and infrastructure to enable timely and reliable dissemination of weather, water, and climate data, forecasts and warnings

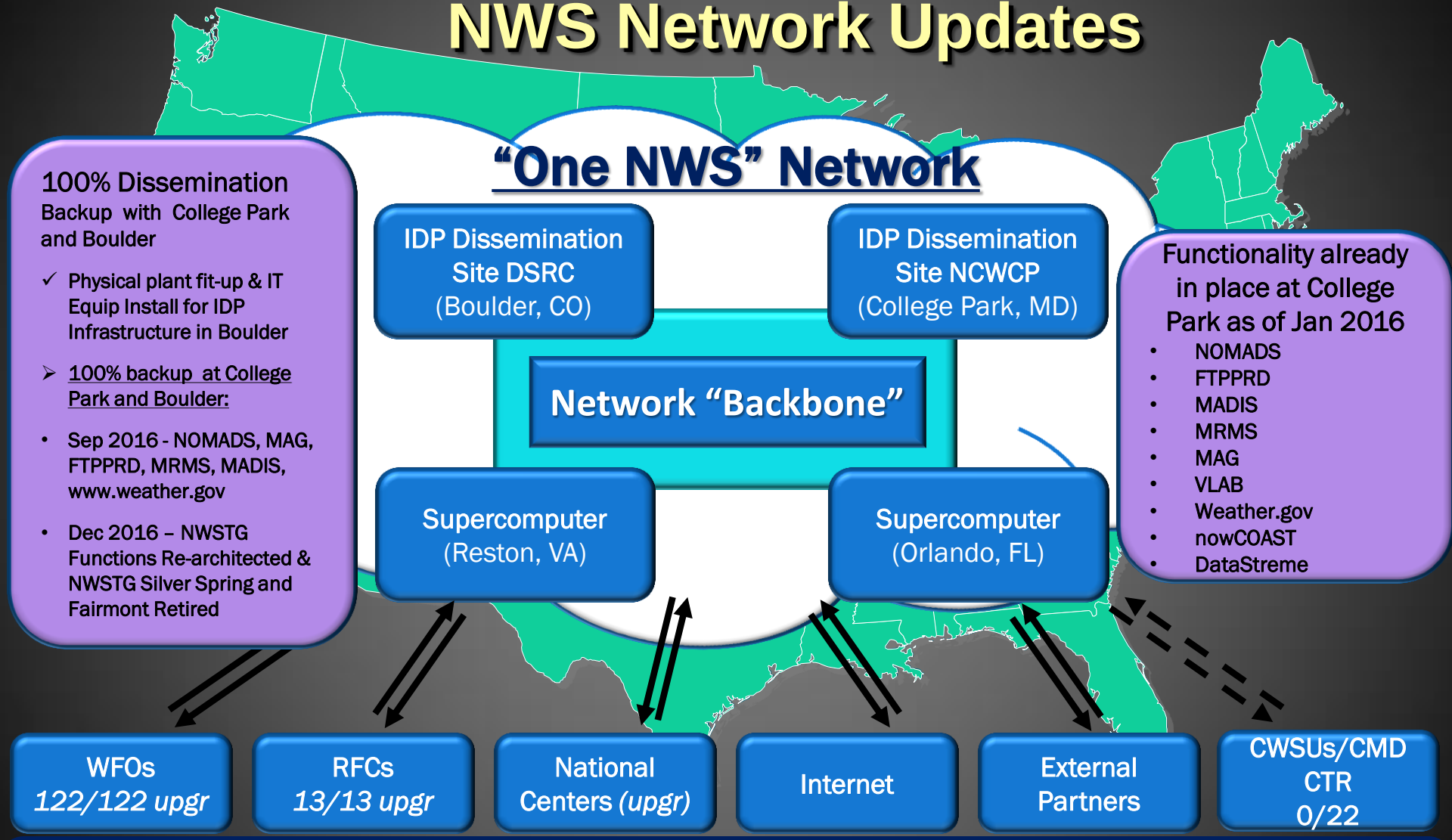




NWS Dissemination Approach

IDP is the multi-year response to ensure reliable and secure information dissemination in support of the NWS mission and build a WRN

Dissemination – Jan 2016
NWS Network Updates



100% Dissemination
Backup with College Park and Boulder

- ✓ Physical plant fit-up & IT Equip Install for IDP Infrastructure in Boulder
- ➢ 100% backup at College Park and Boulder:
- Sep 2016 - NOMADS, MAG, FTPPRD, MRMS, MADIS, www.weather.gov
- Dec 2016 – NWSTG Functions Re-architected & NWSTG Silver Spring and Fairmont Retired

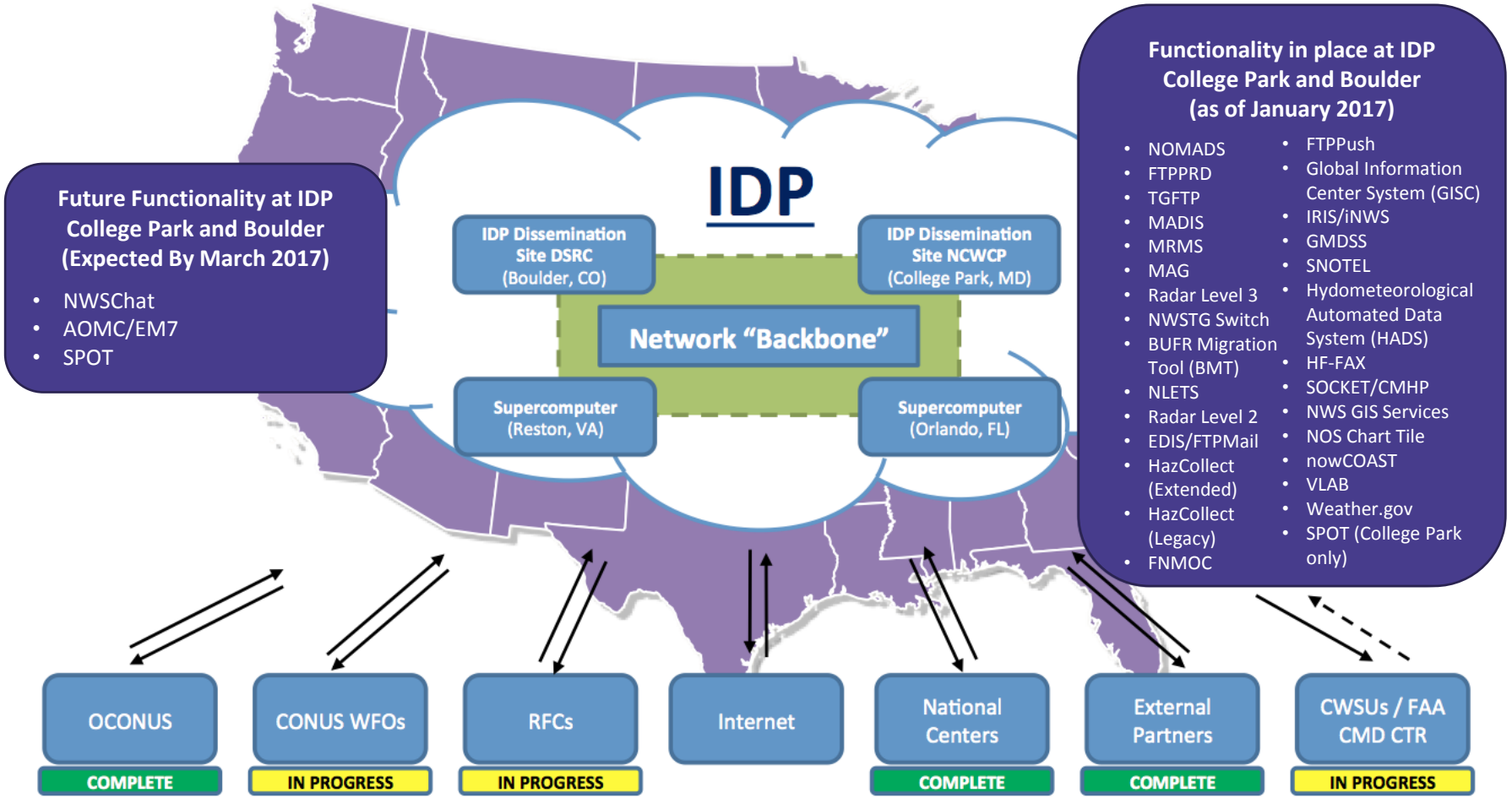
Functionality already in place at College Park as of Jan 2016

- NOMADS
- FTPPRD
- MADIS
- MRMS
- MAG
- VLAB
- Weather.gov
- nowCOAST
- DataStreme

The future One-NWS network will consolidate all operational networks (OPSnet, Regional, etc.) under a single managed network.

Integrated Dissemination Program (IDP)

Long-Term Sustainable Solution



Future Functionality at IDP College Park and Boulder (Expected By March 2017)

- NWSChat
- AOMC/EM7
- SPOT

Functionality in place at IDP College Park and Boulder (as of January 2017)

- NOMADS
- FTPPRD
- TGFTP
- MADIS
- MRMS
- MAG
- Radar Level 3
- NWSTG Switch
- BUFR Migration Tool (BMT)
- NLETS
- Radar Level 2
- EDIS/FTPMail
- HazCollect (Extended)
- HazCollect (Legacy)
- FNMOC
- FTPPush
- Global Information Center System (GISC)
- IRIS/iNWS
- GMDSS
- SNOTEL
- Hydometeorological Automated Data System (HADS)
- HF-FAX
- SOCKET/CMHP
- NWS GIS Services
- NOS Chart Tile
- nowCOAST
- VLAB
- Weather.gov
- SPOT (College Park only)

"OneNWS" Network

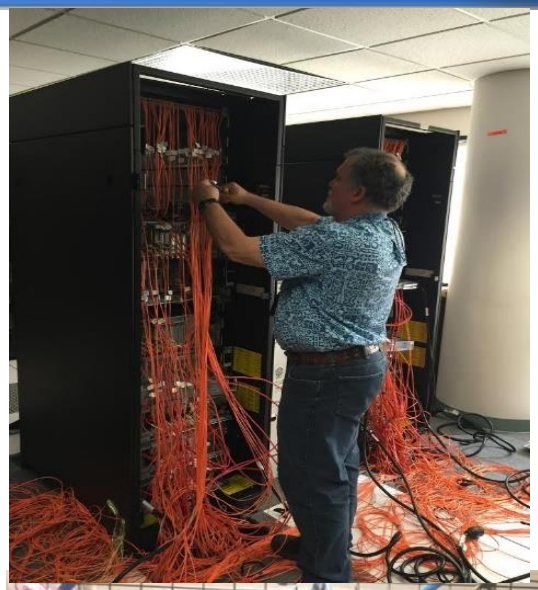
The future OneNWS network will consolidate all operational networks (OPSnet, Regional, etc.) as a single managed network under NCEP Central Operations (NCO).

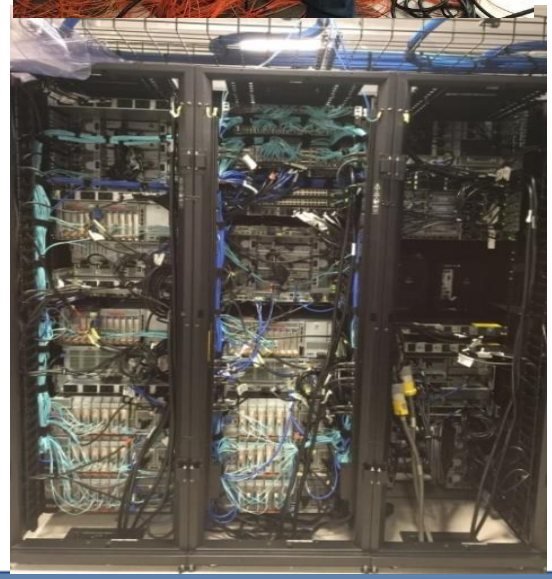
National Weather Service Telecommunications Gateway (NWSTG)

IDP – NWSTG Re-Architecture
Core Switch Transition to Boulder

NWSTG Re-Architecture Project Scope: Migrate functions from the Legacy NWSTG Silver Spring, MD and Fairmont, WV facilities to the IDP operational infrastructure located in College Park, MD and Boulder, CO.

- ✓ **Step 1 – Migrate Core Switch System from Legacy NWSTG facility in Fairmont, WV and operationalize in IDP-College Park**
- ✓ **Step 2 – Migrate Core Switch System from Legacy NWSTG facility in Silver Spring, MD and operationalize in IDP-Boulder**
- ✓ **Step 3 – Retire Legacy NWSTG**





Step 2 – Core Switch Migration to IDP-Boulder Approach

- ✓ **Oct 18 – Oct 20: Shut Down Silver Spring Core Switch**
- ✓ **Oct 21 – Oct 24: Execute move to IDP-Boulder**
- ✓ **Oct 25 – Oct 31: Activate Core Switch at IDP-Boulder**
- ✓ **Oct 26 – Nov 30: Conduct Core Switch System Testing**
- ✓ **Nov 30: Operational Readiness (Originally December 9)**

NWSTG Transition Approach to IDP
Status: January 2017

NWSTG Re-Architecture Project Scope: Migrate functions from the Legacy NWSTG Silver Spring, MD and Fairmont, WV facilities to the IDP operational infrastructure located in College Park, MD and Boulder, CO.

26 of 27 Legacy NWSTG functions decommissioned, integrated with other applications or transitioned to IDP Infrastructure.

IDP Infrastructure

IDP-College Park

TGFTP	☑
Radar3	☑
Radar2	☑
FTPS	☑
SFTP	☑
FTPPush	☑
TGGate	☑
FNMOC	☑
SWPC	☑
SOCKET	☑
FTP-In	☑
BMT	☑
HCE	☑
HCL	☑
NLETS	☑
GMDSS	☑
EDIS	☑
Weather.gov	☑
SPOT	☑
GISC	☑
HF-FAX	☑
AOMC/EM7	88%
HADS	☑
SNOTEL	☑

Core Switch

IDP-Boulder

TGFTP	☑
Radar3	☑
Radar2	☑
FTPS	☑
SFTP	☑
FTPPush	☑
TGGate	☑
FNMOC	☑
SWPC	☑
SOCKET	☑
FTP-In	☑
BMT	☑
HCE	☑
HCL	☑
NLETS	☑
GMDSS	☑
EDIS	☑
Weather.gov	In progress
SPOT	In progress
GISC	☑
HF-FAX	☑
AOMC/EM7	In progress
HADS	☑
SNOTEL	☑

Core Switch

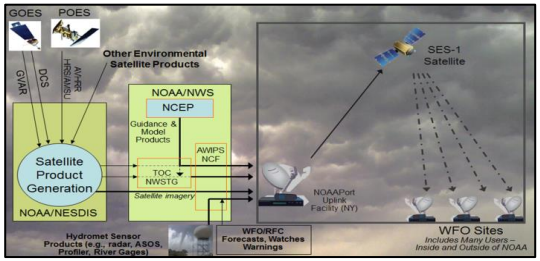
Ground Readiness Project (GRP) OneNWS Network

IDP Ground Readiness Project (GRP)
Background

Part of the NWS Ground Readiness initiative, the objective of the IDP Ground Readiness Project (GRP) is to upgrade NWS dissemination infrastructure to utilize substantially increased environmental satellite, radar, and model data to improve weather warnings and forecasts and assure key performance parameter (KPP) product availability for GOES-16.

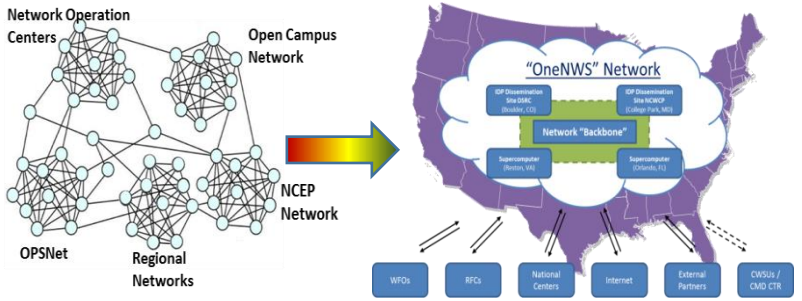
GRP consists of three key subprojects:

- Upgraded and sustaining AWIPS Satellite Broadcast Network (SBN) to one full transponder from 30Mbps to +60Mbps to ensure availability of KPP products

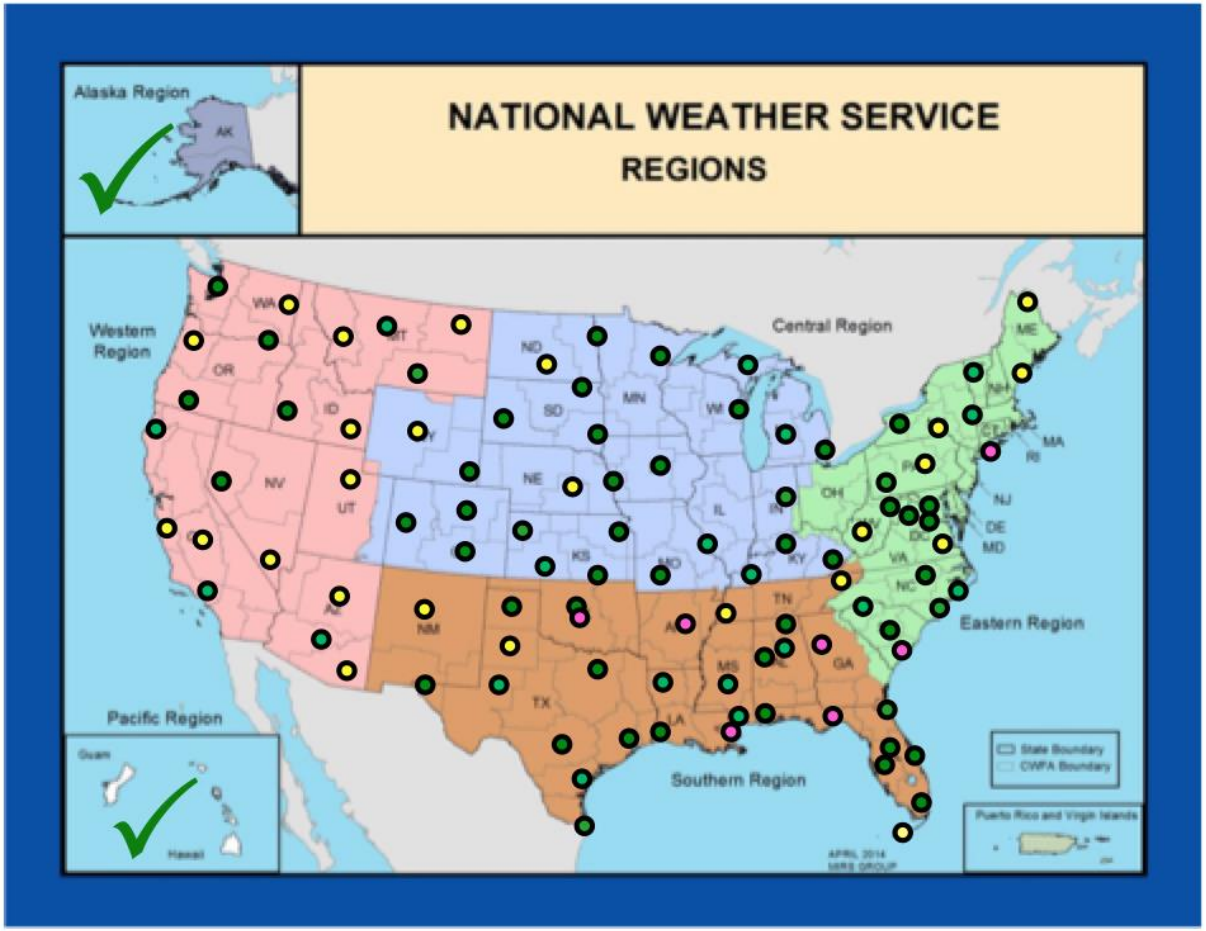


- Installed GOES-R/Himawari-8 Re-Broadcast Antennas at National Hurricane Center, Inouye Research Center, WFO Guam, WFO Anchorage, Aviation Weather Center, Storm Prediction Center, Space Weather Prediction Center, NOAA Center for Weather Climate Prediction

- Installing OneNWS Network upgrades, including network resilience upgrades at approved budget levels, and decommission OPSNet & Regional networks to provide additional capacity for ad hoc requests and support for radar and high-resolution model data



IDP GRP OneNWS Network
FY16 – FY18 – Status



LEGEND:
- Completed Upgrades (61 CONUS WFOs) as of 1/25/2017
- Upgrades planned in the next 60 days (25 WFOs)
- Upgrades planned in the next 60 – 120 days (7 + WFOs)

Goal:

- Upgrade as many sites as possible with capacity and some with resiliency based on budget and mission priority

Benefits:

- Provide one accountable organization for 7/24 operational support and monitoring
- Provide network capacity for NWS to exploit next generation satellite and model data
- Provide underlying network infrastructure for Forecast Offices to use new dissemination services critical for Impact Decision Support Services
- Replace obsolete technology
- Replace end of life equipment

Common Alert Protocol (CAP)

Common Alerting Protocol (CAP)
Background

The Common Alerting Protocol (CAP) is a digital format for exchanging emergency alerts that allows a consistent alert message to be disseminated simultaneously over many different communications systems.

FEMA has formally adopted CAP v1.2 and the IPAWS Profile to implement IPAWS

Systems that use CAP:

<u>Emergency Alert System (EAS)</u>

- Participants include radio, TV, cable, broadcast, satellite, and wireline providers
- Participants were required to upgrade their equipment to be able to receive CAP alerts under FCC rules

<u>Wireless Emergency Alerts (WEAs)</u>

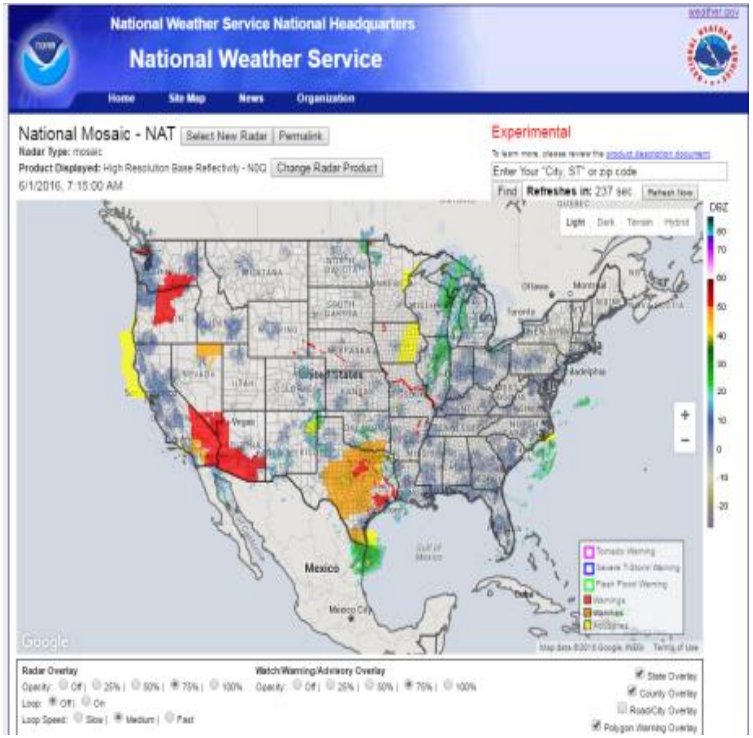
- Transmitted to the IPAWS-Open Platform for Emergency Networks (OPEN) in CAP format

Common Alerting Protocol (CAP)
Phase 1 – Post-Processed CAP

NWS produces "post-processed" CAP watch/warnings and advisories alerts

The current NWS alerts in CAP version 1.2 are produced by parsing WMO/Text products and disseminated via a number of channels:

- Internet file services
- NOAAport
- FEMA IPAWS



This "post-processed" method is a stop gap approach for support of the FEMA/IPAWS Wireless Emergency Alerts channel, a permanent CAP origination capability will be implemented in AWIPS Hazards Services

- There are known data/message defects in some current CAP feeds:
  - Caused by incorrect formatting
  - Caused by non-optimal formatting process
  - Defects do not impact Wireless Emergency Alerts mission

Common Alerting Protocol (CAP) v.1.1 vs v.1.2 – Dissemination Channels

Channel	v.1.1	v.1.2
1. NOAAport/SBN XOUS5x/XOAK5x WMO headers		✓
2. IDP File Systems Seven day archive		✓
3. FEMA IPAWS WEA Channel Public Feed Channel No Non-Weather Emergency Messages		✓
4. alerts.weather.gov / alerts-v2.weather.gov Seven day archive Custom feeds via RESTful service	✓	✓
5. api.weather.gov CAP fields served in JSON format RESTful service		✓

Common Alerting Protocol (CAP) v.1.1 vs v.1.2 – alerts.weather.gov

Feature	v.1.1	v.1.2
1. State/National Atom Feeds	✓	✓
2. County/Zone Atom Feeds	✓	✓
3. Custom Atom Feed by issuing WFO		✓
4. Custom Atom Feed by product type		✓
5. Custom Atom Feed by date		✓
6. Seven Day Archive		✓

alerts.weather.gov / alerts-v2.weather.gov – CAP v1.1 and v1.2 will run in parallel for 90 days beginning on February 1, 2017.

On May 1, 2017, NWS plans to decommission the v1.1. feed.

http://www.nws.noaa.gov/om/notification/pns16-38cap1_2.htm

Common Alerting Protocol (CAP) v.1.2

Issues / Bugs – Status Report

Issue	Impact	Level of Effort	Status
1. WMO Products and headlines are not parsed correctly and/or data is missing in output	Results in over warning for some Flash Floods and fails to align the header to the watch / warning / advisory information in the body of the product (IBM/TWC issue)	80 hours / IRIS & HCE	**Fixed (8/22/16)**
2. CAP message does not properly display precautionary / preparedness information that is listed in the WMO message	CAP has missing or incorrectly placed product content (IBM/TWC issue)	40 hours / IRIS decoder and HCE	**Fixed (9/19/16)**
3. Duplication of messages on EAS if warning is received at EAS broadcast station via both NWR and IPAWS CAP Message	Multiple messages are sent for the same watch, warning, advisory (FEMA issue)	Test first to determine LOE	**In Progress (long term) (FEMA+NWR+CAP)**
4. Alerts are not distributed or are inadequately distributed for some watch, warning, advisories that have multi-line VTEC codes	Affects mostly hydro products but has occurred with dust storms, winter weather, tropical, and heat-related products	40 hours/ IRIS decoder	**Testing started 12/16 – on going**

Common Alerting Protocol (CAP) v.1.2

Issues / Bugs – Status Report

Issue	Impact	Level of Effort	Status
5. CAP output is not generated for some OCONUS and NCEP products. Not all information is contained in the product as expected by the IRIS Decoder	Affects tsunami products, hurricane local statements, Alaska Region WFO products. Note: hard-coded fix implemented for NTWC and PTWC	40 hours/ IRIS	**HLS fixed (9/19/16) TSU Fixed (12/06/16)**
6. During the process to add WMO headers to the CAP messages, the processing fails resulting in messages failing to be disseminated	When the process to add WMO headers fails, the CAP messages are not written to TGFTP and are not sent to NOAAport. This does not impact IPAWS.	40 hours / HCE	**Fixed (9/19/16)**
7. CAP messages for Tsunami Warnings may have missing fields due to non-standard formatting of the original WMO message	Tsunami watch/warning CAP messages affect WEA users only. CAP does not include description and instruction elements for other users.	16-40 hours / IRIS	**Fixed (12/06/16)**
8. The CAP messages do not contain all the WMO-formatted parameter elements	Customers are not able to always reproduce headlines and other data currently in the WMO products from CAP v1.2	120 hours / IRIS & HCE	**Fixed 12/06/16)**

Common Alerting Protocol (CAP) Update

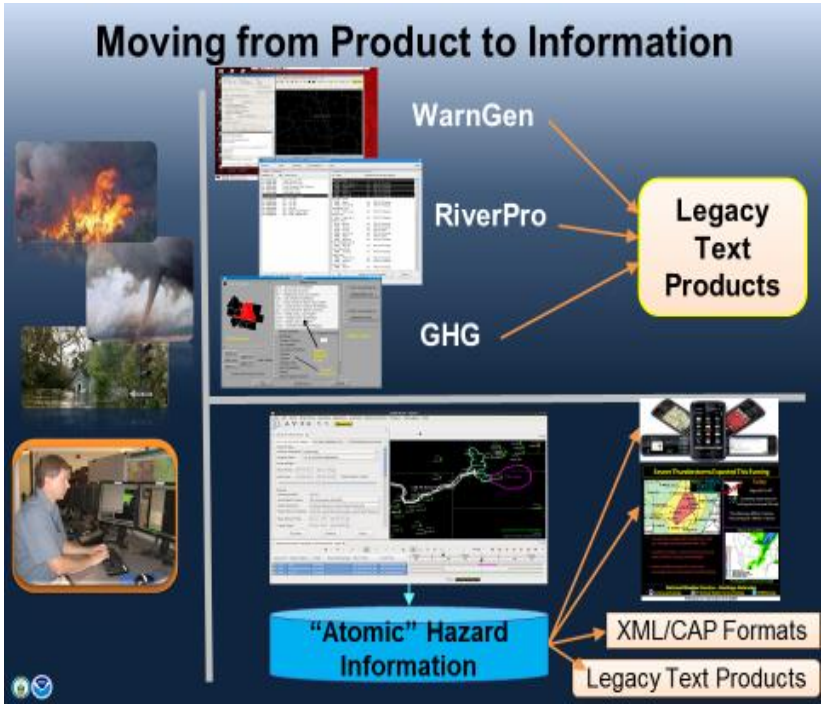
Phase 2 – Hazards Services Generated CAP

Hazard Services

- Produce Hydrologic related hazards using a new framework that replaces the capabilities that reside in WarnGen , GHG, and RiverPro
- Implement new capabilities to better generate hazards (e.g., recommenders)

Benefits/Highlights:

- Streamlines the hydro warning process w/in the forecast office
- Enables modern communications protocol (e.g., CAP, XML, etc.), and future capabilities (e.g., Probabilistic Hazards, Hazard simplification)
- Reduces the cost of O&M for the watch, warning and advisory applications



Hazard Services Tentative Schedule

- Framework and Hydrologic Products deployment in 2019
- Remaining Products between 2019 and 2020

Potential Transition to Hazard Services CAP messages

- Hydrologic products in 2019
- Remaining watches and warnings in 2020
- Decommissioning of the “post processing” method in 2021

IDP Web/GIS Dissemination Services

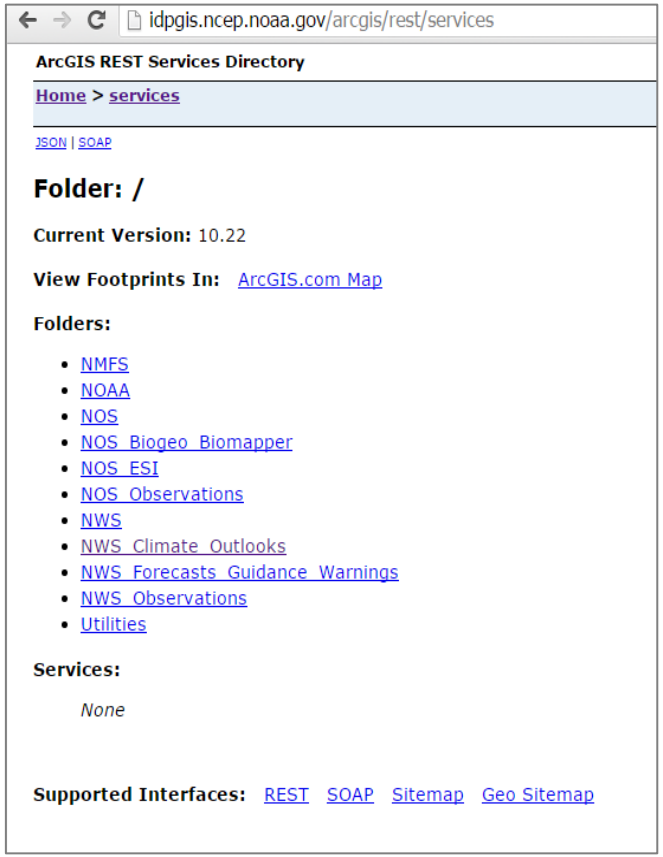
Available IDP Dissemination Services
IDP Web and Geospatial Services (GIS)

- **Standup and Maintain an Enterprise GIS Infrastructure**
  - Leveraging web services and GIS to disseminate NOAA and NWS critical data to forecasters, NOAA users, Federal partners (Federal Aviation Administration (FAA) and Federal Emergency Management Agency (FEMA)), International community and public
  - Implementing net-centric weather information dissemination capability to fulfill NWS' role for the Next Generation Air Traffic System (NextGen)
  - Onboarding current GIS capabilities onto operational dissemination infrastructure
  - Establishing common format framework for providing GIS data sets

- **Establishing consistent metadata and a consolidated catalog for discovery and access of NOAA and NWS geospatial content**

Available IDP Dissemination Services

IDPGIS.ncep.noaa.gov



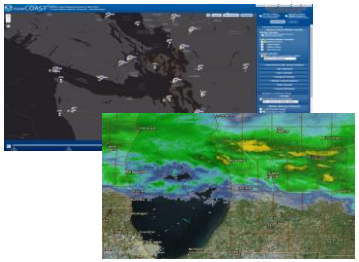
idpgis.ncep.noaa.gov

Provides the ability to gather the information you need and add the data to your own map.

IDP GIS – nowcoast.noaa.gov
Web Mapping Portal

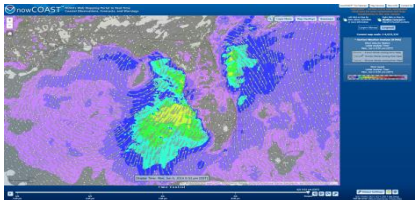
- Integrating observations, imagery, warnings, forecasts, & model forecast guidance from NOS, NWS, NESDIS, & other federal agencies
- Creating a web-based data display using the latest GIS web mapping software

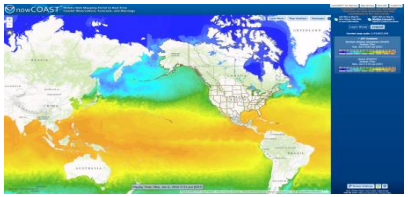
Observations



Wx radar images updated every 4 mins

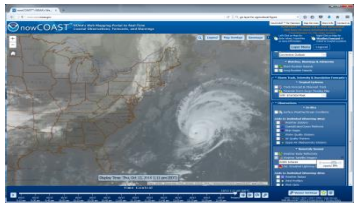
Analyses



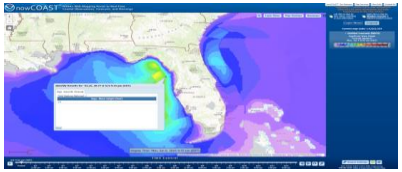


Global SST analysis updated once/day

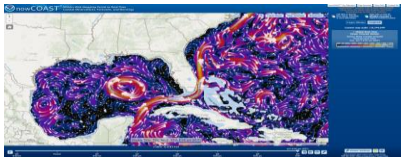
Imagery



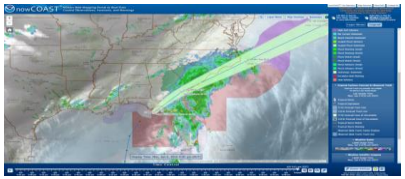
Weather & Marine Forecasts



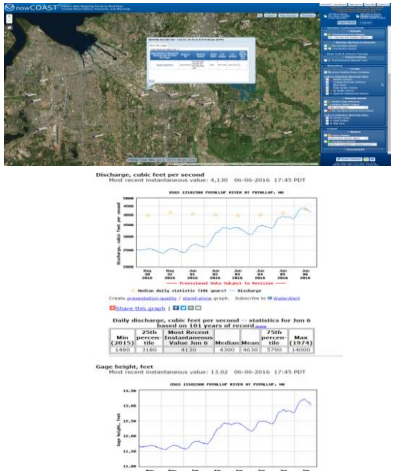
Model Forecast Guidance



Watches/Warnings/Advisories

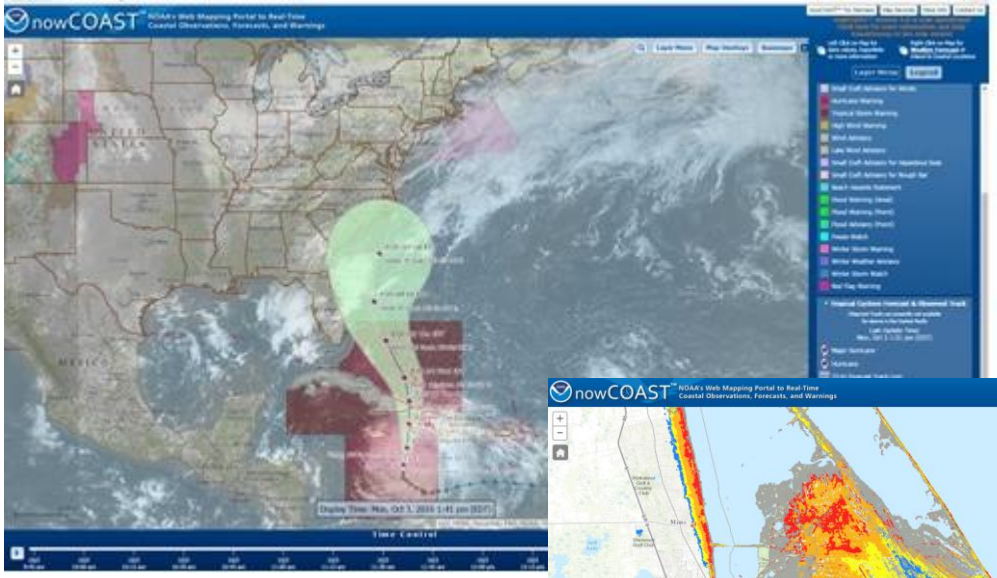


Geo-Referenced Hyperlinks



Hurricane Matthew

IDP GIS – nowcoast.noaa.gov



GOES Weather Satellite Imagery

+

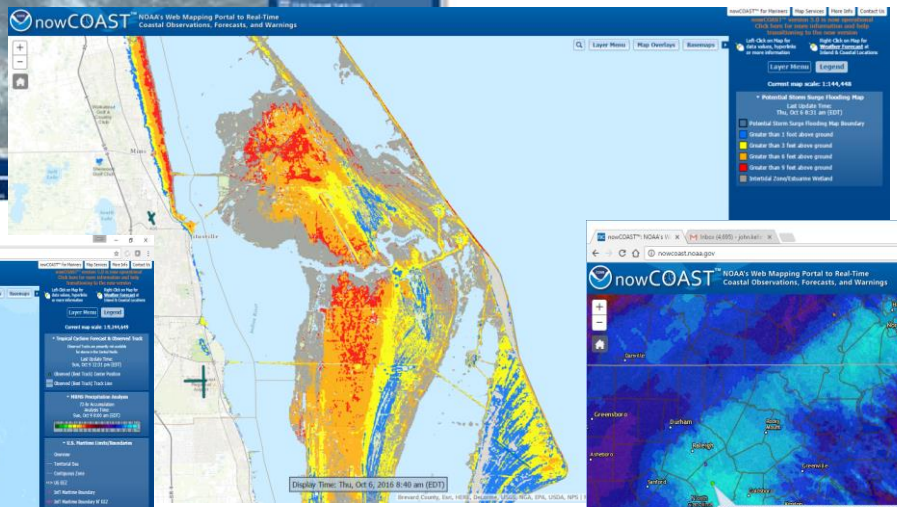
Weather Radar Reflectivity

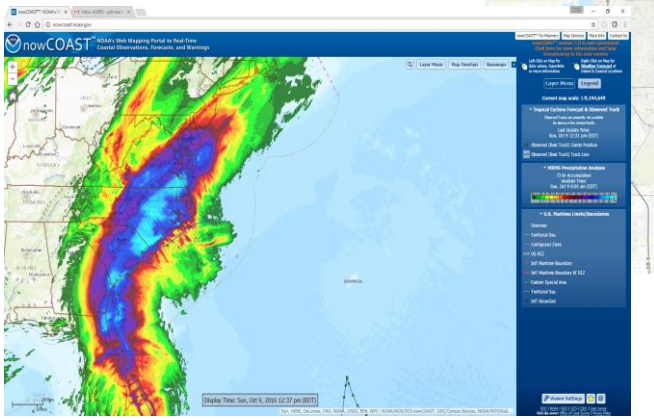
+

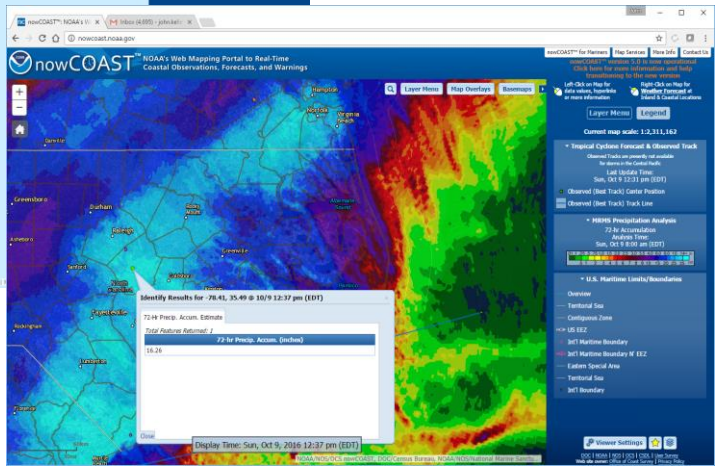
NHC Track/Cone Forecast

+

Watches and Warnings





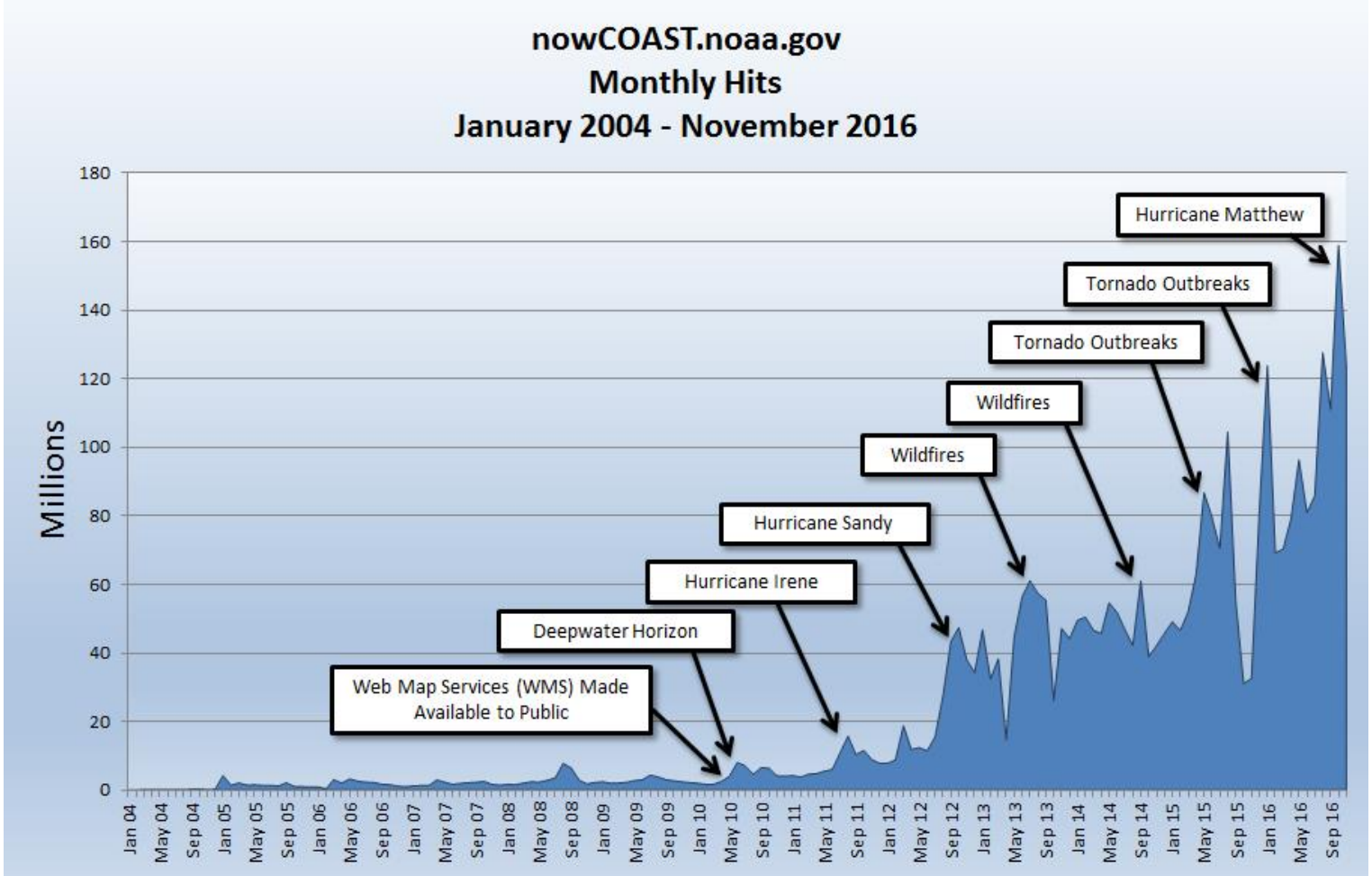


NWS MRMS Quantitative Precipitation Estimate

Ability to click on point on map to get numerical value

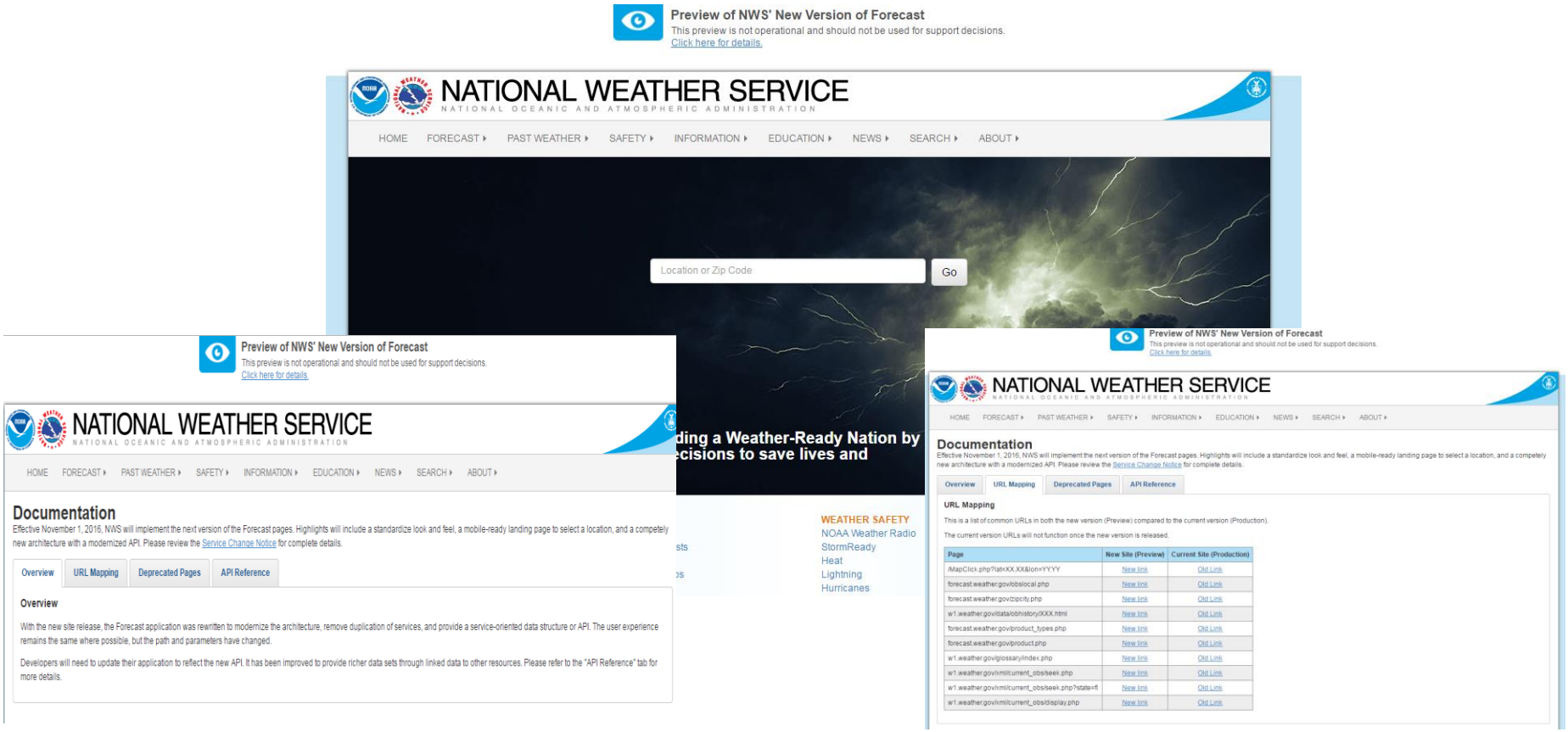
Use of GIS / NowCoast Services

NOAA's nowCOAST has become a critical data source for NOAA and NOAA's users and partners, many of which provide 24 x 7 decision support function to theirs users.



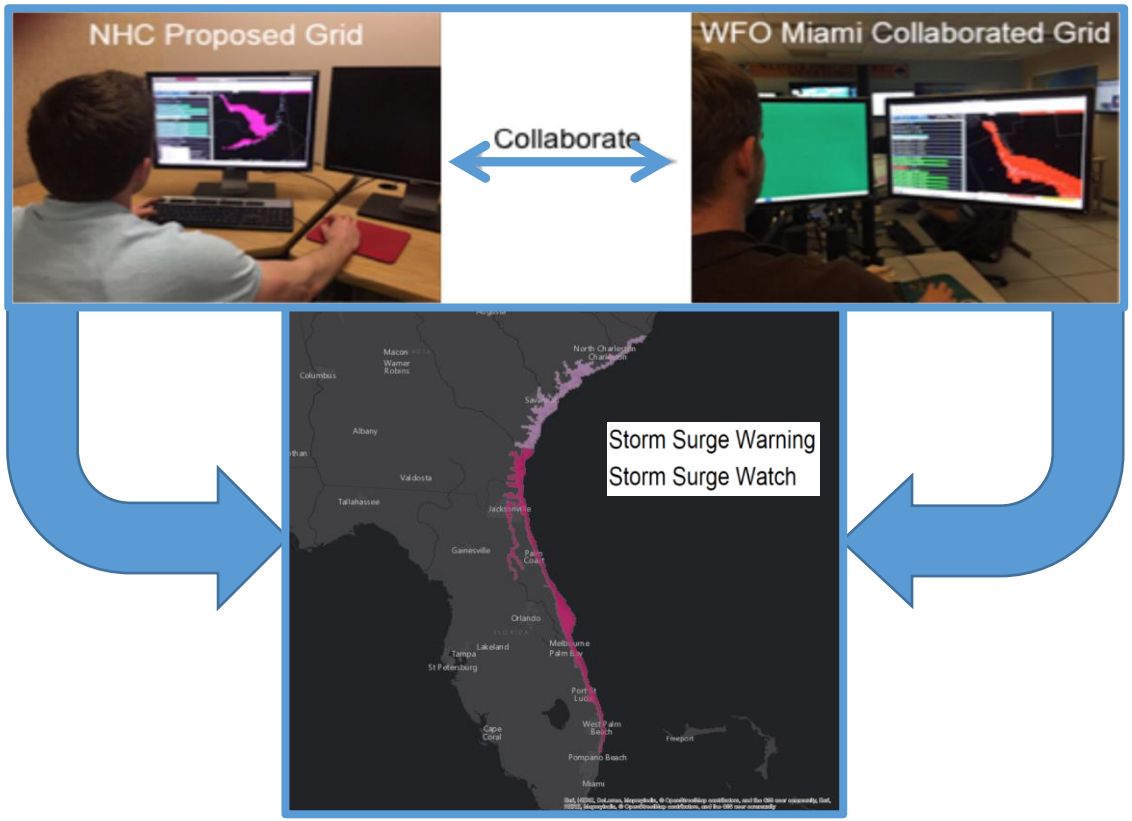
Forecast.Weather.Gov

- **Scheduled deployment on March 7, 2017: https://forecast-v3.weather.gov**
- **Public Notification Statement: http://www.nws.noaa.gov/os/notification/pns16-35forecastgov.htm**



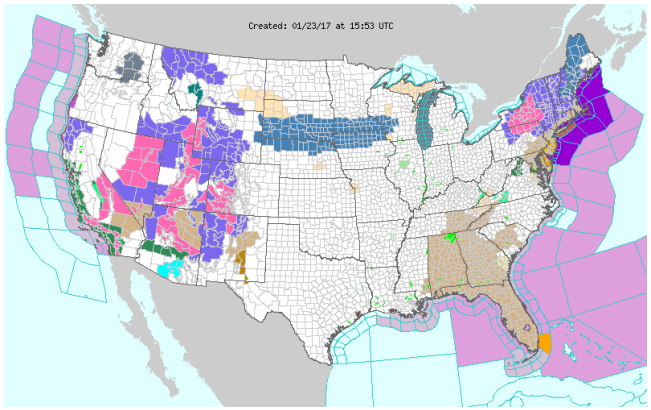
New Storm Surge Watches / Warnings in 2017

- Separate warnings for tropical cyclone wind and surge hazards
- Created via a collaborative process between NHC and WFOs
- First NWS grid-based warning

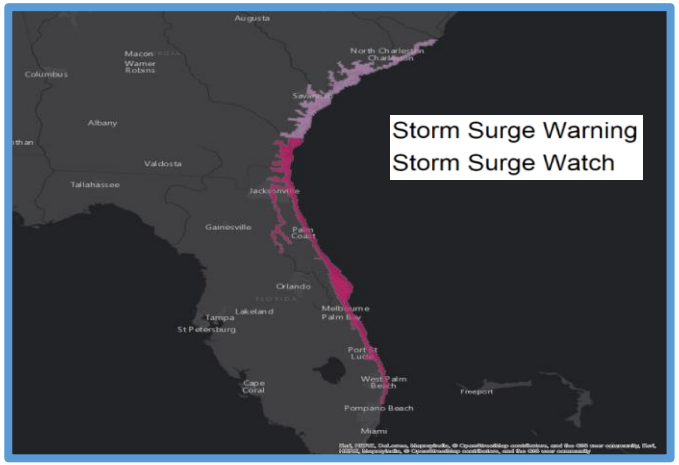


New Storm Surge Watches / Warnings Dissemination Methods

- Weather.gov
- Forecast.weather.gov (point – click)
- GIS – idpgis.ncep.noaa.gov & nowCOAST
- National Digital Forecast Database (NDFD)
- NOAA Weather Radio



- WEA (Wireless Emergency Alerts) / EAS (Emergency Alert System)
  - Currently SSW are not listed as alerts allowed to pass through wireless carrier gateways
  - NWS requesting through CTIA (Wireless Association) to allow SSW to pass through and activate WEA by June 2017



NOAA Weather Radio Status Update

NOAA Weather Radio Current Activities

Transition NWR Operations to BMH	• Completed the development and deployment of the Broadcast Message Handler (BMH) • BMH - enterprise based application which replaces the aged and obsolete NOAA Weather Radio (NWR) Console Replacement System (CRS). • BMH functionality meets and exceeds the functionality of the CRS and provides a scalable environment for implementing future improvements and upgrades.
NWR Transmitter Refurbishments	• Completion of the Solid State Transmitter replacement and site refurbishment for all legacy "tube technology" locations – final 5 underway • The solid state technology allows the site Preventative Maintenance Interval to be extended 3-fold and increases the equipment Mean-Time-Between-Failures (MTBF) by five-fold. • NEXT STEPS: current "analog" audio telecommunication connections between Weather Forecast Offices and transmitter sites will be upgraded to IP based connections and wireless technologies, where possible
Transformational Change	• Phase I (FY16) Stakeholder Engagement – Social science methods included in-person interviews, surveys, and focus group sessions • Phase II (FY 17-18) Design & Engineering – Stakeholder needs analysis inputs reviewed and prioritized for inclusion in the requirements development process and product/project life cycle implementation. Requirements development and vetting underway in 2017.

Weather Information Mass Dissemination (WIMD)
Transformational Change (TC)
Phase I: Stakeholder Engagement Summary

Tyra Brown, Ph.D.
Project Lead
Office of Dissemination

AMS Partners Meeting
Thursday, January 26, 2017
Seattle, Washington

Discussion Points

- "The Big Picture" Weather Information Mass Dissemination

  Why: To support the evolution of the NWS requires *improved delivery of weather and warning information through increased functionality, use of advanced technology, and cost sustainability*

- NWS Transformational Change Overview
- Phase I Stakeholder Engagement & Key Findings

  Dr. Laura Myers, Director, Center for Advanced Public Safety

  University of Alabama

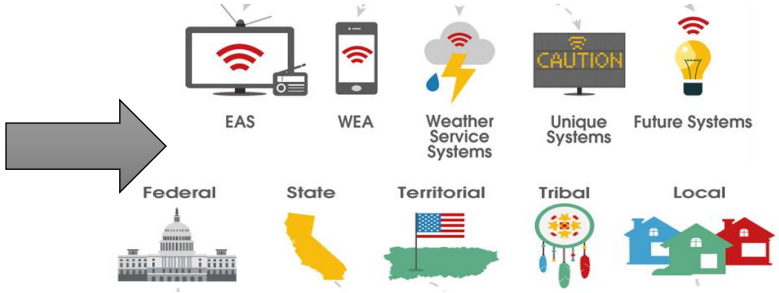
- Takeaways

WIMD "Big Picture"

Big Picture

CURRENT

- IP Telecoms Upgrades
- WEA message increase
- Moving to Industry Standards (CAP 2.0)



WIMD TC Phase I Stakeholder Engagement

3 GOALS: SUSTAINABILITY, IMPROVED TECH CAPABILITY, MEET USER NEEDS

- What We Do Not Know:

  Solutions

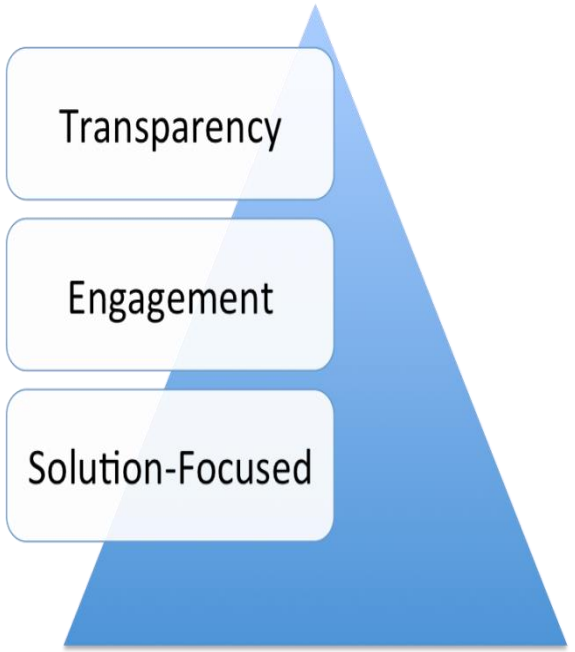
- What We Do Know:

  A Type of Hybrid System

FUTURE

NWS Transformational Change

Transformational Change is an objective and transparent decision-making process to guide significant organizational and operational changes within the NWS.



PHASE I STAKEHOLDER ENGAGEMENT & KEY FINDINGS

Dr. Laura Myers, Director
Center for Advanced Public Safety
University of Alabama

Preliminary Stakeholders

- Internal Government Partners
- Broadcast Meteorologists
- Emergency Managers
- Technology Industry

Key Finding Categories

- Modalities
- NWR
- Social Shifts
- Capabilities

Modalities

- NWR & Sirens
- TV
- Alerts
- Apps
- 2 or more for increased redundancy & coverage
- Bandwidth Issues
- WEA 90 characters limitation
- EMs prefer alert notification systems (iNWS Chat, others)

- Rural Communities
- Water Oriented (rivers, lakes, marine, fishing, boating)
- Provides weather info throughout warning process – before, during, and after event
- Available inside shelters
- Schools, Hospitals, etc. areas with limited cell phone access
- In home alerting, ability to “turn on” devices
- Better refresh than the websites
- Honest broker of accurate weather info, advisories, hazards and non-weather

Societal Shifts

- Growing senior population
- Social Amplification of Risk (Old to Young)
- Warnings on the go
- Instructional and visual messaging for protective action
- Impact-Based Decision Support Services (IDSS)

Capabilities

- Detailed information
- Location and timing
- False alarm reduction and overwarning
- Nighttime warnings
- All Clear information
- Ability for NWR to “Go Live” voice
- Partner notification (pre-event)

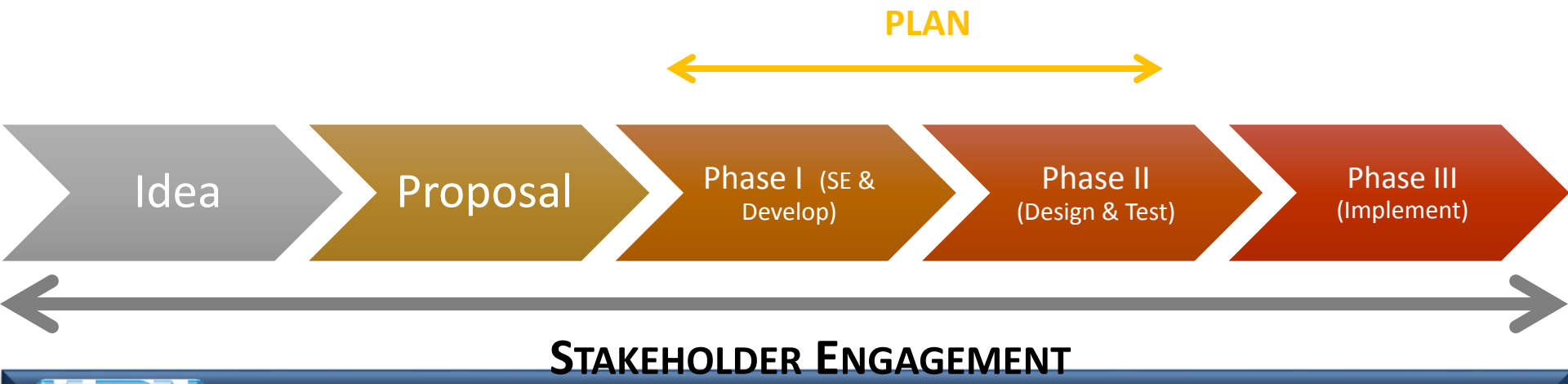
Takeaways

- **Transformational Change Principles**: Transparency & Inclusion
- **Priority**: Strengthening relationships and meaningful engagement with our partners
- **Evolving NWS**: WIMD supports OWA and IDSS initiatives to build a WRN

Next Steps

- Start Phase II – Design & Testing
  - FY17 - Define Requirements

Continued Stakeholder Engagement (wider participation)



Contact: tyra.brown@noaa.gov
laura.myers@ua.edu