

# PROBABILISTIC IDSS

## ROADMAP



# The Probabilistic Impact-based Decision Support Services (IDSS) initiative envisions a future expanded role for NWS

staff providing decisions on makers and communities with a comprehensive range of possible outcomes to support crucial decisions regarding high-impact weather, water, and climate-related events.

Since 2018, support of the National Weather Service (NWS)

Strategic Plan 2023-2033 and Transformation Roadmap,

Proposed IDSS is an essential part of a new practice strategy

that will enable the agency to prepare our core partners,

communities and the vulnerable to take proactive actions as early as

possible in the face of hazardous weather and flooding.

The communities we serve are complex, each's created, or led, by a

unique set of weather-ready challenges that lead to the social

vulnerabilities. Compared to the majority of communities in the

United States, the most vulnerable ones experience excess

weather-related deaths and property damage estimated

conservatively at \$500V annually. Accurate deterministic forecasts

are not enough to assure that everyone experiences a positive

outcome when threatened by hazardous events such as a land-

falling hurricane or massive winter storm. To account for this

complexity, NWS must be messaging as we as decision support

services to emergency managers must be delivered in a calibrated

and reliable product suite framework in order to reduce the

disproportionate impact of these events on vulnerable populations

in their [Priority List for Weather Research Report](#), the NOAA

Science Advisory Board highlighted the importance of better

understanding the nature and needs of the communities we serve,

and to deliver our life-saving weather information according to

those needs, in the last Critical View of our vision.

To fully realize our Probabilistic IDSS vision, we will evolve our

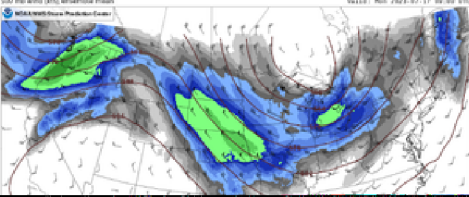
partner-focused work force and operations model that is enabled by

non-traditional data, adaptive interpretive tools, and a core NWS

culture based on trust and teamwork.



# KEYS TO ENABLING PROBABILISTIC IDSS

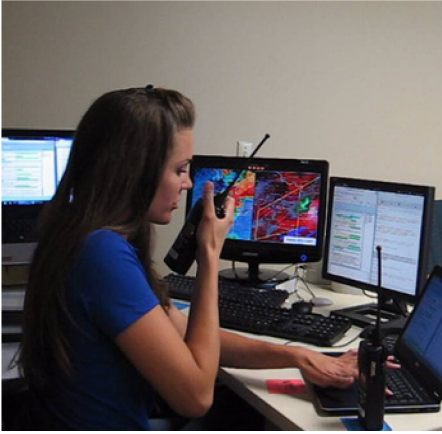


**Foundational probabilistic data** of such high quality that our scientific experts do not need to modify it. This will give our experts enough

A portable, dynamic, appropriately engineered, and operationally supported system integrated across all field entities allowing our scientists to visualize, interrogate, and disseminate this probabilistic information.

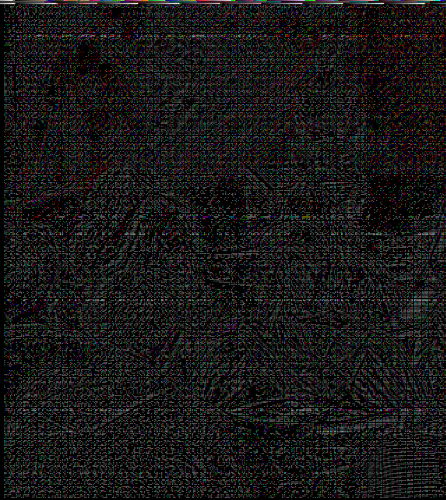
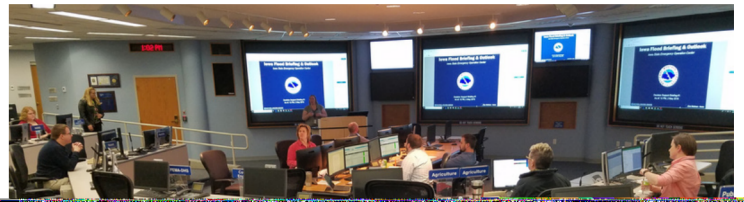
An organizational culture and capacity that empowers our workforce to build strong relationships with our Core Partners so we know what decisions our partners are making, impact thresholds, and time sensitivities.

We will ask questions informed by social science data such as, "What decisions do you need to make?" not "What services do you want?".



Scientists who can **identify and interpret** meteorological, hydrological, climatological, and other environmental phenomena, and their potential **impacts**, and communicate in a way that relays the most likely outcome, while still conveying uncertainty in a way that is **clear to the decision maker**.

An **operating model** that prioritizes and enables scientists to support decision makers in an



A framework to implement a robust, reliable feedback loop between our users and our scientists to continuously improve our data and services. Environmental and social, behavioral, and economic science (S3HS) data is used to assess both the quality of our forecasts and user decisions to ensure we are meeting our mission.

A robust, continuous training model which allows our workforce to learn from past hazardous events, test and implement improvements and get repetitions in operational settings with our partners.



# GOALS & KEY OBJECTIVES



# GOAL

## Provide Foundational Data to Support the Next Generation of Service Delivery

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Develop and support high quality operational science weather, water, and climate data to provide the best possible information for decision making. This will enable operational scientists to focus their efforts on analyzing and communicating this information to support our partners.

# KEY OBJECTIVES



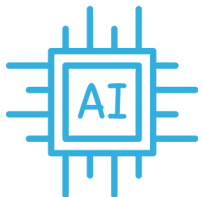
**Centrally host** our weather, water, climate and SBES information in an accessible, reliable **data lake**.



Generate the highest quality **Earth Modeling System** with advanced ensemble prediction capabilities to support the generation of skillful probabilistic guidance.



Produce a **next generation calibrated suite of model-integrated and post-processed guidance**.



Leveraging the **best new scientific techniques available**, including Artificial Intelligence where appropriate.



Produce **comprehensive risk-based information** (coupled weather / water / climate and SBES data).



Produce a **trusted analysis of record** for verification and calibration of our probabilistic data.

# GOAL 2

## Create an Adaptable Probabilistic IDSS Operations Paradigm

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Clearly define the future operating roles, responsibilities, forecast process, and workflows of the workforce through an iterative and inclusive process. This new

access the resources necessary to meet the mission.

is working in accordance with the VWS Ops Voice and

Staffing Requirements Teams

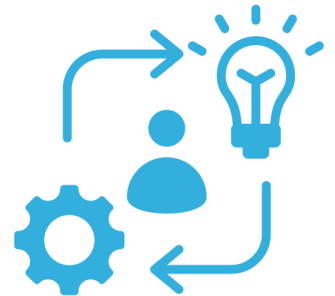




Establish a **comprehensive probabilistic IDSS operational paradigm** including roles and responsibilities of the workforce to prioritize decision-making rather than database production.

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**Leverage test beds and proving grounds** to test and demonstrate new techniques and methods that allow our workforce explicit **opportunities to influence the future operational paradigm.**



**Address culture change** through constant communication and demonstrable successes.

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goal 2

# KEY OBJECTIVES

Provide an integrated  
Set of Tools to Analyze,  
Interpret, and Deliver  
Prognostic OSS

Provide our scientists with the tools to  
analyze and interpret meteorological,  
hydrological, and climatological  
phenomena and their potential impacts  
on the sustainability of the  
community. Provide information in a way  
that acknowledges uncertainty, is  
transparent across the organization,  
and is clear to the decision maker.

**GOAL 3**

**KEY OBJECTIVES**

Develop and operationalize **data visualization interrogation tools** (e.g. DESI and WSUP), leveraging the latest technological and scientific advancements, including Artificial Intelligence where appropriate.



Fully realize an **integrated IDSS Management System** that is accessible from any location to support remote staff and mutual aid.



Utilize SBES research to inform new and improved **probabilistic products and communication methodologies**.



Design **web services** to access our data and allow for partner-customized data visualization and interrogation.

# GOAL 4

## Strengthen Relationships to Improve Service Delivery

Develop an organizational culture and capacity that empowers our scientists to build strong relationships with our Core Partners, so we know what decisions our partners are making, the important thresholds, and time sensitivities.



Implement a consistent approach (using SBES-endorsed best practices) to **gather feedback from partners to better understand their needs.**

**KEY**

**Develop an educational**



Develop an educational outreach framework for probabilistic information consisting of a standard "look" for partner education, cost-loss training, and developing a culture of partner-centric After Action Reviews, etc.



Operationalize an BSS Management System for collecting partner profiles as part of the BSS Operations Cycle and to ensure prioritization of vulnerable communities and support partner engagement.

COMMUNITY

# Implement a New, Continuous Experiential Learning Framework

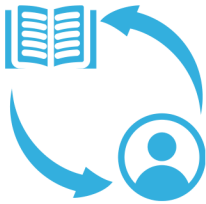
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Ensure the NWS operational workforce develop expertise in analyzing, understanding, and communicating uncertainty/probabilistic information.

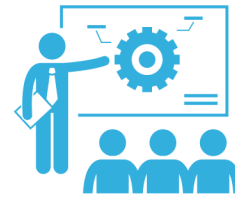
A water tower silhouette is visible on the left side of the image. The background is a blue sky with several bright lightning bolts striking down. The text 'GOAL 5' is overlaid in large white letters across the bottom of the image.

**GOAL 5**

# KEY OBJECTIVES



Incorporate **continuous, experiential learning requirements** into the Probabilistic IDSS operational framework with **dedicated staff time and dedicated supportive resources.**



Provide NWS scientists with **an experiential learning environment that integrates Core Partners** and uses tools and data sets mirroring operations to the maximum extent possible.



Make training available to the full NWS workforce on **understanding, utilizing, and communicating** uncertainty and probabilistic information



**Realign and expand training resources** to support iterative experiential learning for the workforce.



**Create a new mechanism** to prioritize training requirements and resources across portfolios.

# Measuring Success and Continuous Service Improvement

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Use weather, water, climate, and SBES data to assess both the quality and value of

products, services, and user decisions to ensure we are meeting our mission.

GOAL

2





Implement a **robust, reliable feedback loop** among modelers, developers, data



Apply **probabilistic verification methods** to our foundational

to make it a near reality in a national decision system.

providers, operational staff, and stakeholders.

data and available in time basis verification

Evaluate performance and BSS value to ensure results are incorporated into service improvements.



Establish S&S endorsed metrics for measuring the quality of user decision-making leading to private next-gen C2A or C2A measures.



time for our product performance low operational



Ensure dedicated workforce to conduct evaluation in the new paradigm

goal 6

OWNERS

KEY

© BUNIC

# TEAM Probabilistic OSS



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