

PROBABILISTIC IDSS ROADMAP



VISIONS FOR SUCCESS

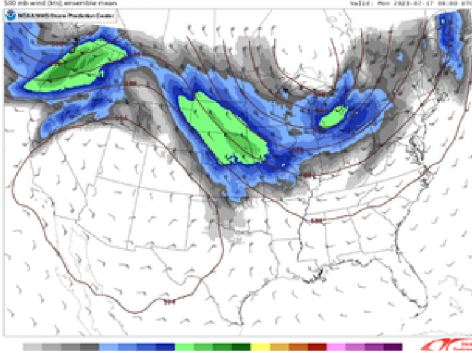
The Probabilistic Impact-based Decision Support Services (IDSS) initiative envisions a future expanded role for NWS staff providing decision-makers and communities with a comprehensive range of possible outcomes to support crucial decisions regarding high impact weather, water, and climate-related events.

Established in support of [The National Weather Service \(NWS\) Strategic Plan 2023-2033](#) and [Transformation Roadmap](#), Probabilistic IDSS is an essential part of a multi-faceted strategy that will enable the agency to prepare our core partners, communities and individuals to take protective actions as early as possible in the face of hazardous weather and flooding.

The communities we serve are complex; each is characterized by a unique set of weather-ready challenges that trace to their [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 \$500M 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 public messaging as well as decision support services to emergency managers must be delivered in a calibrated and reliable probabilistic framework in order to reduce the disproportionate impact of these events on vulnerable populations. In their [Priorities 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 Mile of our Mission.

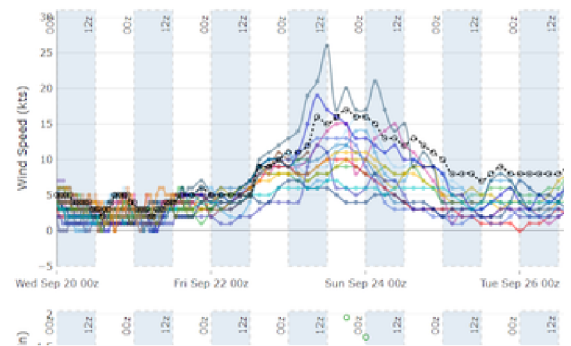
To fully realize our Probabilistic IDSS vision, we will develop a partner-focused workforce and operations model that is enabled by rich foundational data, adaptable interpretive tools, and a OneNWS culture based on trust and teamwork.

KEYS TO ENABLING PROBABILISTIC IDSS



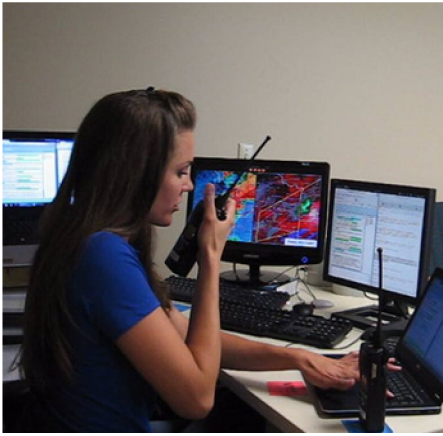
Foundational probabilistic data of such high quality that our scientific experts do not need to modify it. This will give our experts enough time to analyze, interpret and effectively communicate this information through our products and services..

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, **important 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 integrated way.

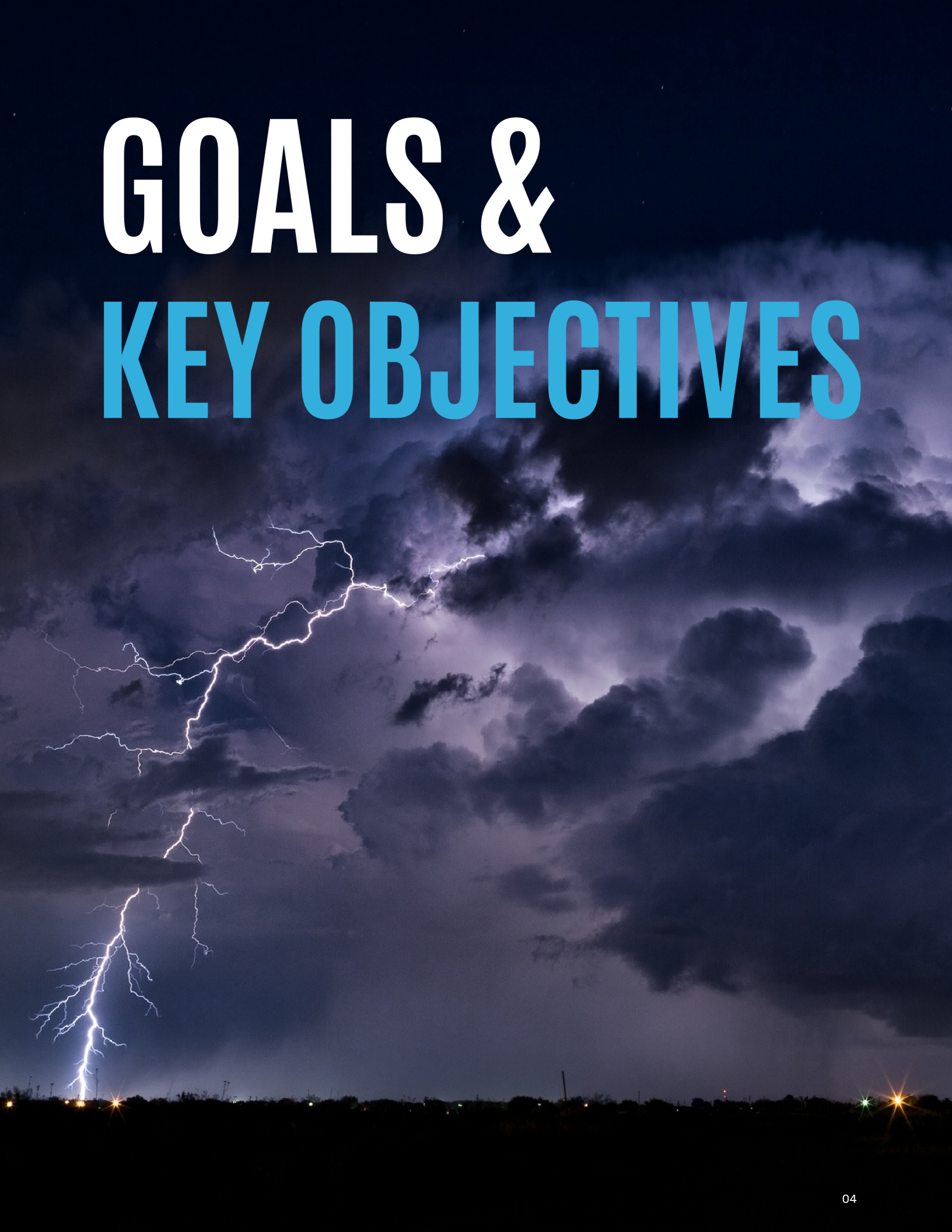


A framework to **implement a robust, reliable feedback loop between our users and our scientists** to continuously improve our data and services. Environmental and social, behavioral, and economic science (SBES) data is used to **assess both the quality of our forecasts and user decisions to ensure we 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 1

Provide Foundational Data to Support the Next Generation of Service Delivery

Develop and support high quality probabilistic 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



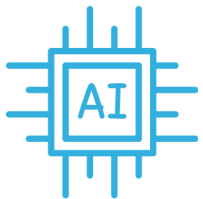
Centrally host our weather, water, climate and SBES information in an accessible, reliable **data lake**.



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

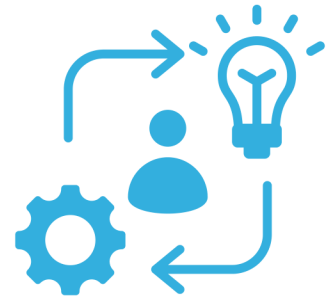
Create an Adaptable Probabilistic IDSS Operations Paradigm

Clearly define the future operating roles, responsibilities, forecast process, and workflows of the workforce through an iterative and inclusive process. This new paradigm must ensure the ability to utilize mutual aid to access the resources necessary to meet the mission. This would be collaborated with the NWS Ops Model 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.

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.

goal 2

KEY OBJECTIVES

Provide an Integrated Suite of Tools to Analyze, Interpret, and Deliver Probabilistic IDSS

Provide our scientists with the tools to identify and interpret meteorological, hydrological, and climatological phenomena and their potential impacts. Tools must also support the ability to communicate this information in a way that acknowledges uncertainty, is seamless across geography and time, and is clear to the decision maker.

G O A L 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, their important thresholds, and time sensitivities.

KEY

OBJECTIVES



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



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



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

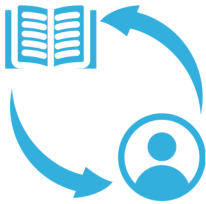
Implement a New, Continuous Experiential Learning Framework

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

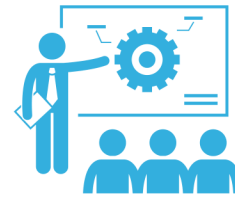
A water tower silhouette is visible on the left side of the image. The background is a blue sky with several bright lightning bolts striking down. The text 'GOAL 5' is overlaid in large white letters across the bottom of the image.

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

Use weather, water, climate, and SBES data to assess both the quality and value of Probabilistic IDSS and user decisions to ensure we are meeting our mission.

GOAL 6



Implement a **robust, reliable feedback loop** among modelers, developers, data providers, operational staff, and stakeholders.

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



Apply **probabilistic verification methods** to our foundational data and make it available in a near real-time basis in a national verification system.

Establish **SBES-endorsed metrics** for measuring the quality of user decision-making to initiate next generation GPRA measures.



Ensure **dedicated time for our workforce** to conduct performance evaluation in the new operational paradigm

goal 6

KEY OBJECTIVES

TEAM

Probabilistic IDSS

Change Initiative Leads

Grant Cooper | Stephan Smith

Team Captains

Kathryn Gilbert | Richard Bandy

NWSEO Representatives

Andy Boxell | Katie Landry

Consultants

Justin Bienio

Kofi Sarfo-Kantanka

Valerie Were

Core Team

Andy Foster (AFS)

Bruce Smith (WFO GRR)

Dana Strom (MDL)

David Levin (AR HQ)

David Vallee (OWP)

Greg Mann (WFO DTX)

J.J. Brost (OPG)

Jeff Waldstreicher (ER HQ)

Jessica Brooks (CR HQ)

Ji Sun Lee (STI)

Kevin Scharfenberg (OCLO)

Matt Jeglum (WR HQ)

Matt Moreland (SR HQ)

Sarah Perfater (STI)