

National Weather Service **Transformation Roadmap**

PEOPLE INFRASTRUCTURE ECOSYSTEMS
2033

NOAA's
NATIONAL WEATHER SERVICE



2033 Target State

A Weather-Ready Nation. A society that is prepared for and responds to weather, water, and climate-dependent events. A more nimble, flexible, and mobile National Weather Service providing indispensable services eye-to-eye with decision makers in all communities.

In 2033, the nation and our workforce will have a National Weather Service enabled by enhanced capabilities, technologies, and tools to address the last critical mile of Impact-based Decision Support Services (IDSS) and to support core partners and the public with high-end, probabilistic hazard information. This will be realized through a nimble forecasting process that harnesses cutting-edge technology to create the world's best community-centric water, weather, and climate products and warnings, a mobile suite of capabilities that is untethered from traditional infrastructure to allow our workforce to work even closer with the communities we serve, and a flexible operating model that enables our workforce to meet our partners where they make decisions to deliver trusted, eye-to-eye, science-based, last-critical-mile decision support services.

Working with partners, our science-based decision support services will ensure that every citizen is equitably protected. This will take a whole-agency approach that includes observations, modeling and analysis, systems and engineering, service delivery, as well as people and partnership-focused efforts that enable, support, or accelerate our vision. Together we will have built a Weather-Ready Nation.



Drivers for Change: Why Transform Now?

The rapidly increasing frequency of billion dollar disasters places the NWS at the forefront of managing and reducing societal impacts to the Nation. The NWS must transform the manner in which we provide our forecasts, warnings, and IDSS and work eye-to-eye with our partners to eliminate barriers that prevent the public, especially those living in vulnerable communities, from receiving, understanding, and acting upon the lifesaving services we provide.

In order to do this, we will: (a) adopt a robust, reliable, and community-centric paradigm for dissemination of life-saving information, (b) exploit technology solutions (e.g. cloud) to enable our workforce to become nimble, flexible, and mobile inside emergency operations centers in communities we serve, (c) invest in the last critical mile and provide decision support services that account for the changing demographics of society and the unique vulnerabilities of each community we serve, and (d) invest in science and Research to Operations (R2O) to make the forecast even better.

The need for onsite service delivery and decision support is driven by NWS partners and state and local organizations in the field who rely on our ability to provide critical, life-saving information, not only for the billion-dollar disasters but also for the day-to-day weather, water, and climate events. The NWS is focused on establishing a Whole-Community engagement approach for education and outreach by applying social and behavioral science to save more lives and fully realize the vision for a Weather-Ready Nation.

The feedback below is just a small sample from our partners, highlighting the critical need to work together:

"Having several large sporting venues in our county, we need on-site NWS support several times a year. The advantage of having NWS staff on site is they are focused on our specific area and able to present to event leadership detailed information to support critical decision making."

- **Matt May**, Director, Wyandotte County, KS Unified Government Emergency Management

"Most recently, based on observation of rapidly changing weather conditions, stream gauge readings and [the NWS forecaster's] historical knowledge of past impacts in the same area, he personally called and alerted us to an impending flash flood with enough time for us to evacuate the affected community. I couldn't ask for a better hydrologist partner than Kevin Kodama. I know his work has saved many lives in the state of Hawaii and the city and county of Honolulu."

- **Mr. Hirokazu Toiya**, Director of City and County of Honolulu, Department of Emergency Management

"One of the strengths of the NWS is being close to county seats - that would be hard to give up. You have to be where decisions are being made"

- **Mary Glackin**, former NOAA Deputy Under Secretary

Roadmap – A Visionary Target State

The *NWS Strategic Plan 2023-2033* outlines how the NWS will fundamentally transform how it carries out its core mission. The NWS will implement a reliable, mobile-ready infrastructure by migrating the Advanced Weather Interactive Processing System (AWIPS) to the cloud to enable our skilled team of experts to work eye-to-eye with the communities we serve. NWS will focus our education and outreach on vulnerable communities to increase the preparedness and resilience for those most in need. This will be accomplished by applying Social, Behavioral, and Economic Science (SBES) directly to our mission and through the delivery of community-centric warnings in the languages people understand best.

In building a Weather-Ready Nation, NWS will save lives and protect property by reinforcing our role as the trusted authoritative partner when communities are faced with imminent threats of hazardous weather, floods and climate change. Continued investments towards the cloud in our dissemination capabilities are essential to reliably and quickly deliver critical observations, model guidance, forecasts, and watch and warning information, further making us nimble, flexible and mobile.

Finally, to ensure NWS has the workforce for our future, one that mirrors and relates to the communities we serve, we must invest in training; in diverse, equitable, inclusive and accessible efforts to attract as well as keep our highly-skilled workforce; and in creating a sense of belonging and safety so our people thrive. Take care of your people and they will take care of the mission.

To develop specific recommendations and ideas for realizing the new NWS Strategic Plan and 10-year vision, the NWS has established Change Initiative teams. This document serves as a strategic roadmap that describes what we need to achieve our target-state vision and how we can get there over a ten-year period. It outlines the major capabilities and concepts that must be delivered over this ten-year period in order to achieve the NWS vision. The roadmap allows the workforce and key stakeholders to have a collective understanding of the target state and critical paths towards achieving that target state, leadership to be strategic when evaluating new initiatives for the planning and execution tasks required of federal agencies, and agency heads to communicate the transformation narrative and vision to garner the additional resources, support and buy-in needed to achieve success.

There are many uncertainties in the years ahead, so the roadmap is a living document and an unconstrained articulation of what we need to transform NWS. As we continue to move forward, the roadmap will be more detailed and the NWS Annual Operating Plan, along with budget planning documents, will contain the specificity needed for implementation.



People

The success of the transformation of the NWS requires the success of our entire workforce. In 2033, NWS recruitment tactics and career advancement opportunities will have enhanced employee well-being and ensured that our people reflect the diversity of our country as we reach out to all communities. Because our workforce will mirror the communities we serve and understand their cultures and context, we will have even more trust in the services we deliver. By having built a workforce that reflects the diversity of the American people, we will have transformed the effectiveness of our services for a Weather-Ready Nation.

In addition, diversity also cultivates a healthy organization, resulting in more efficient, effective, and sustainable execution of its strategic vision and mission – a transformed NWS. A holistic approach to the NWS employee experience will continue to attract diverse talent and result in higher retention, further supporting a culture that values employee wellness. Attention to building this diverse workforce is a priority, as are practices that retain this workforce. NWS will continue to ensure healthy work environments for all offices, where teams and employees thrive, and will foster extensive leadership development at all levels, especially where managers and supervisors embody empathy, transparency, authenticity, accountability, and humility.

The NWS will move to mission-focused staffing. Our workforce will operate with increased flexibility and access to knowledge resources to ensure a highly skilled and effective workforce able to meet the NWS mission. NWS employees will have the ability to seamlessly train and upskill their capabilities in partnership with the academic and enterprise community who will help to drive the innovation and adaptability needed for the changing needs of all communities. Our people will also have the interdisciplinary skills needed to be a more adaptable and innovative workforce that meets the needs across all NWS programs. A robust information technology infrastructure will allow seamless collaboration across all NWS offices and directly with NWS core partners for delivering impact-based decision support services. The NWS workforce will remain agile to keep up with the changing science and technology and episodic nature of extreme events while remaining relevant to its core partner and user requirements, needs, and demands.

By providing more workforce flexibility than ever before, our dedicated staff will be able to devote more time to training, continuing education, improving workplace culture and total worker health, and innovating and developing crucial new tools to further enhance the provision of life-saving information to the partners and communities we serve. In achieving our 10 year strategic plan, we are taking into consideration input from over 200 Local Office Team interviews and thinking about how to better leverage our people, their strengths, and their interests in ways that lead to a NWS that does not necessarily do all things in all places at all times, but a NWS that most effectively leverages technology to deliver eye-to-eye IDSS. The NWS bargaining unit will be critical to determining exactly where and how this happens over the next few years.



Infrastructure

Resilient and reliable infrastructure is the foundation of the NWS' transformative efforts. As the number of billion-dollar disasters continues to increase, the demand for IDSS from the NWS will continue to grow. To meet this demand, the NWS will ensure access to technology and tools that enable NWS personnel to provide world-class weather, water and climate services to decision makers anytime, anywhere. Transforming the Advanced Weather Interactive Processing System (AWIPS) to a cloud framework will give forecasters efficient, secure remote access to the system, thereby allowing them to be more nimble and flexible in providing IDSS in embedded partner locations. Additionally, the NWS will maintain a strong dissemination infrastructure so it can communicate essential warnings and forecasts to the American public.

Transformation and our ability to deliver trusted decision support services will be advanced by our vast network of observing systems, ranging from radars, ocean and coastal stations, and surface and upper air observations, to satellites a million miles away. These observations, delivered by NWS systems, provided by partners, or procured commercially, are the backbone of world class modeling and analysis and provide the situational awareness that allows us to issue warnings to the American public and provide IDSS to all of our partners.

NWS modeling systems underpin its ability to predict the weather. These systems will evolve to leverage a better understanding of how Earth systems work, the observations described above, technological innovation in high performance computing, and machine learning techniques in a simplified suite of modeling systems that fully meet the needs of NWS stakeholders while accelerating model development and the transition to NWS operations.

A fully probabilistic, multi-model National Blend of Models will automatically update the foundation of the official forecasts on a near continuous basis, freeing meteorologists to be face-to-face with our partners, increasing trust, and improving decision making and outcomes for all communities. Meteorologists' time is also invested in improving the science, R2O, and applications to make the forecast and IDSS better. In 2033, the Radar Next program will have started to improve on the current NEXRAD performance and, coupled with data assimilation, will ensure NWS applied science experts' continued ability to identify and predict severe weather and issue life-saving watches and warnings to the public. This program directly supports NOAA's strategy of improving local and in-situ observations, which are foundational for the climate value chain articulated in the NOAA Strategic Plan.



Future

In 2033, our employees will be “science first responders” delivering high-quality, science-based IDSS – telling people what they need to know in order to make life-saving decisions. The NWS will continue to utilize its knowledgeable and highly-skilled operational meteorologists, hydrologists, and science experts. However, unlike today, where our workforce is often divided into standardized offices and expected to be jack-of-all-trades, the agency will have shifted to a distributed workforce that possesses a mastery in various parts of the forecasting process. Cadres of specialists and centers of excellence will exist, allowing flexibility in who performs certain functions and where contributions will be made to the forecast – a forecast that will be underpinned by probabilistic data and translated into probabilistic IDSS, bringing science back into the process.

To make this a reality, NWS offices will have to maximize our ability to embed in the communities we serve. Offices will also provide mutual aid wherever it is needed by utilizing the best of operational meteorological expertise shift. Those on the front lines within the offices will be delivering high-quality, community-centric products, services, and warnings to be used by NWS personnel working directly with our partners to ensure they have the most up-to-date and reliable information to make informed life-saving decisions for the communities they serve. By leveraging advances in modeling and technology, our workforce will have more time devoted to providing value-added IDSS. Our workforce will serve as an authoritative source to embolden agency partners from national, regional, and local levels to make the best decisions, informed by science and clear of any misinformation or disinformation, so they can take the necessary actions to best serve the communities that depend on them.

Our alerts will be underpinned by probabilistic hazard information, allowing decisions to be made based on unique thresholds from minutes to days to months. Understanding that broadstroke calls to action do not always result in the intended outcome, we will utilize plain language messaging and highly-precise alerting to achieve a community-centric approach to communicating critical information in the most timely manner. We will transform our current “wide-swath” alerts to very specific, dynamic, and continuously updating/moving alerts to help us remain nimble and flexible in our IDSS delivery. We will also seek to leverage algorithm approaches, including Artificial Intelligence and Machine Learning, to provide advance notice of the onset of hazardous weather so our operational meteorologists can spend more time analyzing data and crafting highly precise messaging that will then be delivered eye-to-eye with decision makers.



Our highly precise messaging will cover all hazards threatening the communities we serve. The NWS is globally recognized as the premier water prediction agency, developing and providing state-of-the-science, actionable hydrologic services and intelligence for every community nationwide. Enabled by a fully integrated Hydrologic Services program, the NWS will continue to serve as the authoritative source that decision makers rely on from minutes to years, summit to sea, floods to droughts. The NWS will lead the science and water enterprise to address growing threats to our national and economic security from competing demands for our increasingly limited and stressed water supply, population growth, and climate change.

We understand the vast endeavor ahead as we transform our agency and its services. Our efforts will require the full participation of our incredible workforce, but even then, we cannot do it alone. To achieve transformational service delivery and customer experience, the NWS will leverage the expertise and services of the other NOAA line offices. We will work alongside our key partners and stakeholders in all communities; forge new partnerships anywhere we find an opportunity, including globally within the international community, to learn from and benefit from how our peer international meteorological services are transforming; and will we explore commercial partnerships for data and other technological advances that will be critical to transforming our services.





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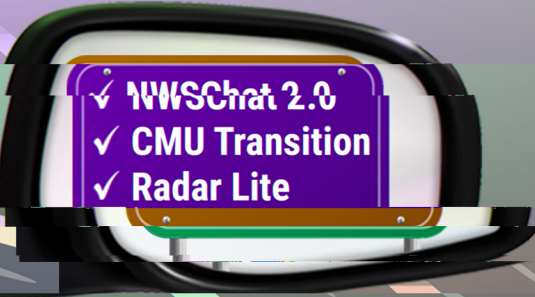
Begin Implementation of New Ops Model	FY25
Operational AWIPS in the Cloud	FY28
Probabilistic IDSS	FY29
Full Implementation of Ops Model	FY30
Finalize Next Radar Design	FY32

Nimble, Mobile, Flexible National Weather Service	FY33
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No changes to using local expertise

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U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Weather Service