NWS Digital Services

Operations Concept

June 2004

Preface

Advances in information technology are changing the way Americans work and live. This information revolution presents challenges and opportunities for the National Weather Service (NWS).

Government agencies, private-sector partners, and citizens rely on NWS information for business and personal decision-making. In the Internet-era, more sophisticated customers are asking us to deliver the same accurate information in faster and more user-friendly formats while ensuring the same reliability of service.

NWS leaders agree improved services will evolve by redesigning operations oriented around digital services. The first step has been to create the National Digital Forecast Database (NDFD). Digital services provided through the NDFD will support the growing demand for weather information.

This Operations Concept for NWS Digital Services begins by describing the NDFD as the starting point for digital services. Additional cultural and technical changes will be necessary to transform operations successfully. Those changes are also highlighted in this brief document.

In order to be successful, the NWS intends to engage partners and customers more frequently. As such, your feedback is very important to us as. For questions or comments about this document, please contact us at nws.ndfd@noaa.gov

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NWS Digital Services Vision

To meet customer and partner needs for high quality, accessible, and reliable digital weather, water, and climate services.

1. Introduction

National Oceanic and Atmospheric Administration's (NOAA) National Weather Service (NWS) mission responsibilities focus on the provision of weather, water, and climate forecasts and warnings to protect life and property and enhance the national economy. The mission also states "NWS data and products form a national information database and infrastructure which can be used by other governmental agencies, the private sector, the public, and the global community." In order to complete its mission, the NWS relies on partnerships (e.g., the media and commercial weather companies) to distribute NWS observations, forecasts, and warning information and to provide additional information and services of their own.

Technology and innovation have provided new information exchange pathways, including the Internet. NWS partners, as well as the general public, are becoming increasingly sophisticated and have new requirements for NWS' weather, water, and climate information (simply stated as 'weather information' throughout the remainder of this document). Users are demanding faster access to information that is more accurate, easier to understand, and provided in new formats.

The National Research Council's (NRC) 2003 report *Fair Weather: Effective Partnerships in the Weather and Climate Services* recommended the NWS take steps to improve the effectiveness of the weather and climate enterprise. The report's recommendation #5 states:

> *"The NWS should make its data and products available in Internet-accessible digital form. Information held in digital databases should be based on widely recognized standards, formats, and metadata descriptions to ensure that data from different observing platforms, databases, and models can be integrated and used by all interested parties in the weather and climate enterprise*."

The NWS has begun to meet the changing needs of its customers and partners and follow the recommendation of the NRC. The new business strategy is called the NWS Digital Services Program. New digital weather forecast information is created and stored at local offices and National Centers for Environmental Prediction (NCEP), and also transmitted to a centralized database known as the National Digital Forecast Database (NDFD).

This document provides an operations concept for the initiation of official Digital Weather Services. It does not address digital services currently being provided by the hydrologic services program and digital model output currently available to the public. This document includes the following:

- Explanation of the operational philosophy for NWS in the digital era
- Strategy for providing weather-related products and services to users
- Description of the primary benefits of weather information in digital formats
- Steps for achieving success in providing the Nation with Digital Services

NDFD, and the products and services derived from it, will be a starting point for Digital Services. The expansion of the database may include such things as historic data, observations, the addition of a vertical dimension, and watch/warning bulletins. Descriptions of these enhancements, as well as the integration of climate and hydrologic services, will be added to future iterations of this document.

2. Transforming Operations

2.1 Operations Philosophy

The NWS operational philosophy for local Weather Forecast Offices (WFO) (See Appendix A) embraces three basic themes. The first identifies the WFO forecaster as the local expert, decision maker, and information source for hazardous and high-impact events. The WFO team focuses resources when and where needed and redistributes routine tasks to other offices when necessary to meet this primary role.

The second core function is to ensure the information flow with partners and customers is optimized. Feedback is gathered and used to identify service changes necessary to meet new customer requirements. The value of innovation is measured and course adjustments are made to ensure information technologies are implemented effectively. Customer education requirements are also addressed to maintain customer satisfaction.

Third, collaboration maximizes sharing of hydrometeorological expertise and helps produce the most accurate forecasts and warnings. Forecasters at local NWS offices and regional/national centers work together to construct a national digital database of weather information. The combined expertise ensures situational awareness of developing significant weather events. This enables forecast offices to meet mission goals in continuing to deliver accurate and timely watches and warnings.

2.2 Local Digital Services

Digital forecast information will be derived from the local digital database maintained at each office. The following requirements are satisfied by the creation of the local database:

- Ability for rapid updates based upon the changing weather situation
- Very high temporal and spatial detail which is then used to populate the NDFD
- Interpretive and/or supplemental information to meet local customers needs

2.3 National Digital Services

National digital forecast information will be derived from the national database. Requirements for the NDFD and derived products include:

- Database currency will be maintained through coordinated local updates
- Standard formats of grids and derived graphical products will be used
- Standard time and space conventions will be followed

2.4 Backup

The NDFD will have multiple points of entry, with backup capabilities in place in case of system or office outages. This will guarantee a full database is available and current at all times. Quality assurance checks at multiple levels in the organization will ensure data completeness and reliability.

2.5 Verification

Verification of forecast elements in the NDFD will assure the scientific integrity of the data. Feedback from verification will be provided to developers and forecasters so that they may work toward continuous improvement in accuracy. Consistency and availability metrics will also be used to ensure dependable digital services exist.

3. Benefits

The NWS will create coalitions and build stronger partnerships to meet the demands for weather information. The system architecture will be designed to provide the commercial sector with direct access to the digital database to support their business processes. Academia's need to access the digital database will also be satisfied. Ultimately, this new business strategy will streamline data exchange and optimize the weather enterprise for the Nation.

The following is a list of the primary benefits to be realized by the NWS' move to Digital Services:

- ***More Timely and Consistent Weather Information*** - Information that is up-to-date, available on demand, and provided with spatial and temporal consistency to help users make more informed decisions.

- ***Information Delivered in a Variety of Formats*** - Product formats (e.g., grids, graphics, and text) meet the needs of a diverse customer base.

- ***Higher Temporal and Spatial Resolution*** - More detailed forecast information taking into consideration rapidly changing weather scenarios and geographic features that influence the weather.

- ***Support for Weather Enterprise*** - Furnish commercial weather providers with digital data in standard formats to allow creation of a wide range of products to meet their customers' needs.

- ***Easier Access*** - To reach as many businesses and households as possible, digital data will be made available over the Internet and traditional dissemination systems in standard formats accessible to a variety of devices.

4. Roadmap for Achieving Success

The NWS is aligning its business processes to produce and deliver services that satisfy the Nation's need for digital climate, water, and weather information. The business strategy includes a commitment to customers and partners and a goal to achieve operational and organizational excellence.

4.1 Improving Partnerships

The following are steps to improving partnerships and creating better informed customers**:**

- ***Building Coalitions*** **-** Unprecedented levels of cooperation must be achieved between the NWS and the private sector to meet America's growing need for weather information.

- ***Exploiting Communication Technology*** **-** New methods of digital data exchange need to be developed and tested with academia and business partners to transition services using state of the art science.

- ***Increasing Data Resolution*** **-** Higher resolution data will meet diverse customer needs for site specific and time critical weather information.

- ***Maximizing Value of Data*** - Emphasis on education will ensure customers understand how to access, interpret, and use digital information.

4.2 Improving Services

Improved services will evolve as the following procedures are implemented:

- ***Database Centric Operations*** **-** Second to the protection of life and property (through the issuance of watches and warnings), priorities must be organized around the availability, accuracy, timeliness, and consistency of the local digital database.

- ***Automated Generation of Products*** - Efficiencies are reached by the automation of a variety of products generated from a single digital data set.

- ***Infused New Science*** - Improved access to observations, forecast models and local techniques will result in more accurate weather, water, and climate predictions.

- ***Performance Assessment*** - A robust verification scheme will be used to determine when and where human expertise adds improvement over model guidance.

- ***Heightened Collaboration*** - Internal collaboration is necessary to tap expertise at all levels of the agency and enhance forecast accuracy and consistency.

4.3 Achieving Organizational Excellence

Organizational excellence will be achieved through the following best practices:

- ***Agency Commitment*** **-** All levels of the organization will continually reassess priorities and redirect appropriate resources to support and meet the growing demand for digital services.

- ***Building Trust*** - Frequent dialogue between senior management, employees, customers, and other stakeholders will ensure alignment with business strategies and goals for digital services.

- ***Building Constituencies*** - Program updates will be shared with customers and partners. Feedback will be collected to make certain the most effective business plans exist for creating optimized interoperable information systems.

- ***Emphasis on Training*** - Improve proficiency by training forecasters how to create and manage high resolution weather information. Customer relations management training will also help create better communication and responsiveness to users' needs.

- ***Decentralized Control*** - Local and regional oversight will maximize daily operational efficiency and consistency, and ensure compliance with national standards.

5. Summary

Digital services provided through the NDFD will support the Nation's growing demand for reliable weather information. The initial digital services will be supported through the implementation of new technology and science, enhancing collaboration between local, regional, and national weather experts, and adjusting current business processes.

To achieve organizational excellence and program success, the NWS must follow a prescribed set of best practices, and improve partnerships to create better informed customers. NWS leaders agree improved services will evolve by redesigning operations oriented around digital services. Increased access to, and use of this detailed, accurate, and consistent source of weather information will help decision makers in all sectors of society. The resulting benefits will ultimately enhance public health and safety, protect the environment, support the economy, and minimize the impacts of hazardous weather throughout our Nation.

APPENDIX A

NATIONAL WEATHER SERVICE
Weather Forecast Office
Operations Vision and Philosophy

National Weather Service Corporate Board
August, 2003

National Weather Service
Vision
Weather Forecast Office Operations

A **flexible, agile operation**, founded on distributed, local expertise, which:

optimizes modern technology,
emphasizes situational awareness,
focuses resources when and where needed,
in weather, water and climate services, in order to
provide timely and accurate forecasts, warnings, and information:
using a **collaborative** process, and with
emphasis on hazardous and high-impact events,
to **protect life and property** and **enhance the national economy**.

National Weather Service
Philosophy
Weather Forecast Office Operations

Priority Event Driven

- Primary role is to serve as local expert, decision maker, and information source for hazardous and high-impact events
- Resources focused when and where needed
- Adjusts to meet event demands by augmenting staff and/or redistributing routine tasks to other National Weather Service offices/centers

Focus on Service and Information Flow

- Primary provider of critical local weather and water warnings and forecasts, climate services, and other weather and water information
- Communication and coordination
- Partnership building and outreach
- Providing local customer input to national requirements
- Adapting to new service delivery requirements
- Data collection, quality control, maintenance

Relies on Collaboration

- “Our” National Weather Service forecast, produced through collaboration (e.g. with other Weather Forecast Offices, National Centers, River Forecast Centers, Center Weather Service Units)
- Provides local expertise and input to forecast process and database