

# THE STRATEGIC PLAN OF THE HYDROMETEOROLOGICAL PREDICTION CENTER FISCAL YEARS 2012-2016



## INTRODUCTION

Over the next ten years, the National Weather Service (NWS) of the National Oceanic and Atmospheric Administration (NOAA) envisions a major transformation in weather services. As stated in the new NWS Strategic Plan, advances in science and technology, deeper and broader skills among our workforce, close partnerships, and improved decision support services will build a Weather-Ready Nation that effectively prepares for and responds to weather-dependent events. The Weather-Ready Nation, built in partnership with other NOAA Line Offices, other governmental agencies, and the private sector, will enable people to improve their quality of life and their economic well-being.

The NWS has identified six goals that focus on critical weather-dependent issues:

- 1) Improving weather decision services for events threatening lives and livelihoods.
- 2) Delivering a broad suite of improved water forecasting services to support management of the Nation's water supply.
- 3) Enhancing climate services to help communities, businesses, and governments understand and adapt to climate-related risks.
- 4) Improving sector-relevant information in support of economic productivity.
- 5) Enabling integrated environmental forecast services supporting healthy communities and ecosystems.
- 6) Sustaining a highly-skilled, professional workforce equipped with the training, tools, and infrastructure to fulfill the mission.

To support these goals the Hydrometeorological Prediction Center (HPC) has developed this strategic plan. The HPC plan has four components, which are highly intertwined with each other and with the NWS Strategic Plan:

- 1) Partners & Customers -- Expanding decision support services focusing on high-impact events through enhanced collaborative activities with partners, customers, and other stakeholders.
- 2) Products and Services -- Focusing and delivering science-based, high-impact products and services responsive to changing customer requirements.
- 3) Science and Technology -- Strengthening the Center's foundation in science and technology infusion to improve forecast performance and customer responsiveness, especially for high-impact events.
- 4) People and Infrastructure -- Evolving the workforce, organization, and culture to respond to emerging challenges rapidly and effectively.

The achievement of the actions laid out in this plan will require HPC to be nimble and creative in its responsiveness to the needs of its partners and customers, to be visionary in anticipating future challenges and opportunities, and to strive constantly for organizational improvement and professional development. In fulfilling the vision of this strategic plan, HPC will be doing its part in meeting America's vital needs by building a Weather-Ready Nation.



James E. Hoke, Director, HPC  
December 29, 2011

## HPC MISSION

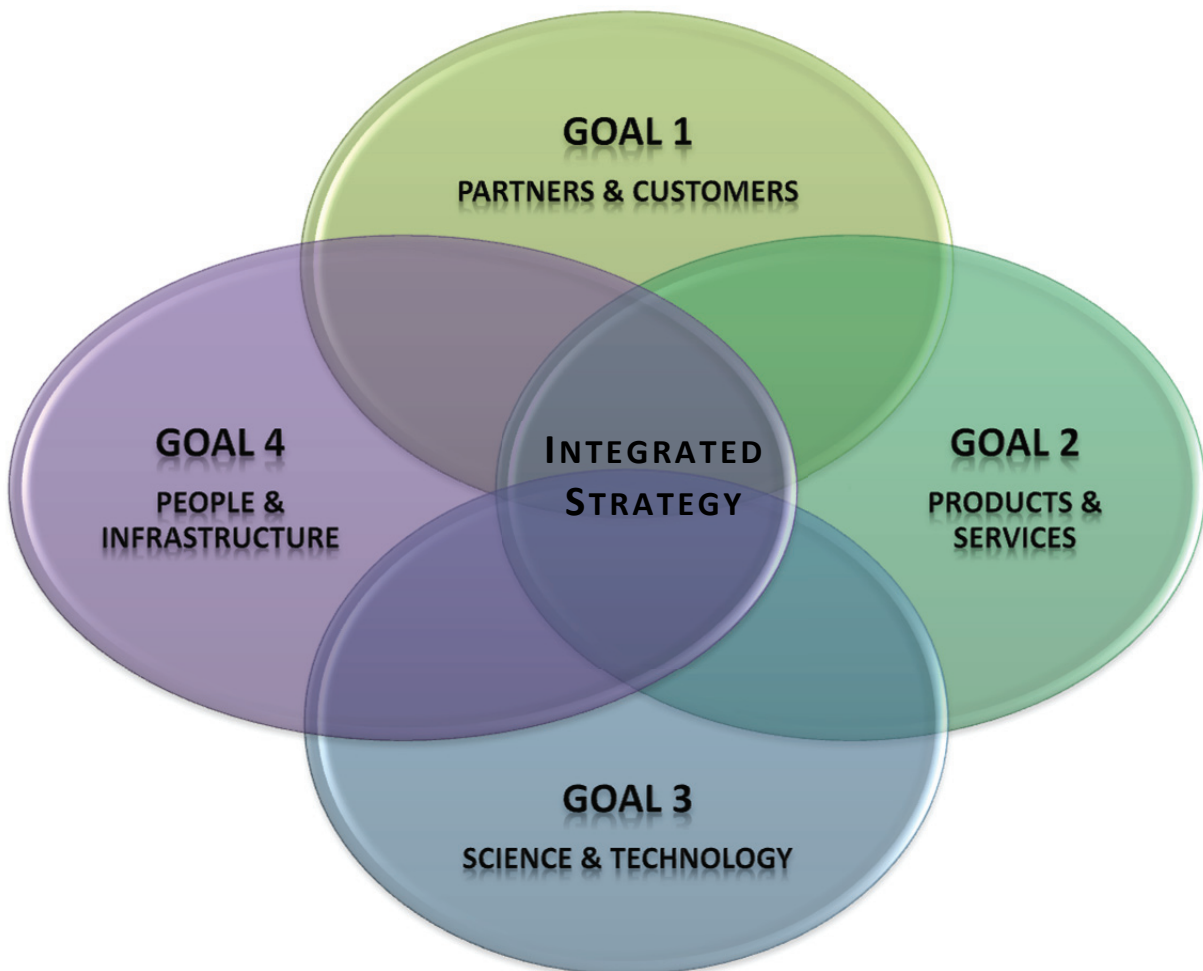
*(Why we exist)*

A leader in the collaborative weather forecast process  
delivering responsive, accurate, and reliable  
national forecasts and analyses

## HPC VISION

*(What we hope to achieve)*

America's *Go-To* Center  
for high-impact precipitation events and forecast guidance  
out to 14 days  
for a *Weather-Ready Nation*



## 1.0 PARTNERS & CUSTOMERS

**Expand decision support services focusing on high-impact events through enhanced collaborative activities with partners, customers, and other stakeholders.**

### ***Central Role of Partners & Customers in Decision Support Services***

- 1.1 Anticipate and respond to evolving partner and customer requirements and needs.
  - 1.1.1 Formalize processes to understand requirements and critical operational thresholds.
  - 1.1.2 Engage partners and customers regularly to provide product and service updates, solicit feedback, and identify lessons learned.
  - 1.1.3 Increase responsiveness to short-notice high-priority requests.
  - 1.1.4 Develop products and services that promote economic opportunity and productivity, as well as healthy communities and ecosystems, in response to partner, customer, and other societal needs.

### ***Information Availability***

- 1.2 Enhance the availability, display, and delivery of information.
  - 1.2.1 Provide increased ensemble-based forecast probability distributions and quantification of forecast uncertainty.
  - 1.2.2 Increase access to current and archived information.
  - 1.2.3 Enhance the Center's web presence and utility.
    - 1.2.3.1 Deliver a user-friendly and interactive web interface.
    - 1.2.3.2 Expand the use of multimedia.
  - 1.2.4 Use innovative delivery methods including social media and mobile friendly products to convey products to users.
  - 1.2.5 Deliver information in partner- and customer-required formats, such as those compatible with geographic information systems (GIS).

### ***Collaborative Operating Mode***

- 1.3 Expand collaboration with partners and customers before, during, and after high-impact precipitation events.

#### ***NOAA Partners***

- 1.3.1 Expand real-time collaboration with NWS field offices and regions to improve forecasts of high-impact events and the use of ensemble-prediction techniques.
- 1.3.2 Focus collaboration with NCEP Centers on topics, such as:
  - *Convective prediction, including the transition from severe weather threats to flood threats*
  - *Winter weather*
  - *Prediction of high-impact precipitation events beyond 7 days*
  - *Hazard forecast summary charts*
  - *High-resolution and ensemble modeling*
  - *Precipitation associated with tropical cyclones before, during, and after landfall, as well as backup of the NWS tropical-cyclone forecast program*
  - *Transition in coastal zones from land to marine forecasts*

#### **High-impact Precipitation Events**

*HPC is a center of excellence in the prediction of high-impact precipitation events. In the cool season these events include blizzards, snowstorms, ice storms, and lake-effect snows. Precipitation associated with hurricanes, mesoscale convective complexes, and squall lines are warm season examples.*

- 1.3.3 Focus efforts with the NOAA Research line office to accelerate the research-to-operations transition.
- 1.3.4 Expand collaboration with the NOAA Satellite line office to enhance short-term, high-impact precipitation forecasting.
- 1.3.5 Exploit the second-generation Advanced Weather Interactive Processing System (AWIPS II) to enhance collaboration with Weather Forecast Offices (WFOs), River Forecast Centers (RFCs), and other National Centers.
- 1.3.6 Participate in the development of the multi-agency National Water Center to expand and improve river and flood forecasting, enhance water resource management, and accelerate the application of research to real-world uses.
- 1.3.7 Partner with the hydrologic community to address such challenges as too much water, too little water, and poor water quality.

***Federal Partners***

- 1.3.8 Assess, coordinate, and share resource capabilities with Federal partners to improve responsiveness for high-impact precipitation events.
  - 1.3.8.1 Work with DHS/FEMA to expand event-driven support for high-impact precipitation events, including winter weather.
  - 1.3.8.2 Participate in the Integrated Water Resources Science and Services (IWRSS) consortium in developing a highly collaborative and integrative framework for providing a seamless suite of water resources information across broad temporal and spatial scales.
  - 1.3.8.3 Work with the Army Corps of Engineers, Bureau of Land Management, and others to address such hydrologic challenges as river and reservoir management.
  - 1.3.8.4 Explore collaborative opportunities on topics such as road hazards, threats to ecosystems, and human health.

***Partners in Academia and America’s Weather Industry***

- 1.3.9 Leverage the media’s unique capabilities to reach the public.
  - 1.3.9.1 Offer to the media detailed training on the Center’s products and services.
  - 1.3.9.2 Develop the video capability to broadcast at a moment’s notice from the Media Center before, during, and after high-impact precipitation events.
- 1.3.10 Involve the larger research community to address existing and emerging precipitation forecast challenges.
- 1.3.11 Leverage science and technology innovations and other capabilities with America’s weather industry.

***International Partners***

- 1.3.12 Provide rapid response to international requests for assistance before, during, and after high-impact events.

***Brand Recognition***

- 1.4 Achieve national brand recognition as America’s “Go-To Center” for high-impact precipitation events, including winter weather.
- 1.5 Take advantage of the new NOAA Center for Weather and Climate Prediction (NCWCP) facility to convey a high-tech, situationally aware, 24x7 operational Center focused on high-impact events.

## 2.0 PRODUCTS & SERVICES

**Focus and deliver science-based, high-impact products and services responsive to changing customer requirements.**

### ***National Operations Center***

- 2.1 Establish the Center as an integral part of NOAA's National Operations Center (NOC) for high-impact weather.
  - 2.1.1 Support and enhance NOC operations as required to ensure uninterrupted 24x7 service to senior government decision makers on significant real-time environmental events worldwide.
  - 2.1.2 Engage media and other national partners on real-time events threatening lives and property, enabled by a 24x7 in-house capability for live on-camera presentations.
  - 2.1.3 Generate real-time weather summaries for the NOAA.gov and Weather.gov websites.
  - 2.1.4 Execute on-demand forecast capability for anywhere in world.

### ***Quantitative Precipitation Forecasting***

- 2.2 Increase the relevance and utility of quantitative precipitation forecasts (QPFs) to users.
  - 2.2.1 Produce precipitation forecasts with 10% greater accuracy than the NCEP ensemble forecast system or the statistical postprocessing of model forecasts available at the time.
  - 2.2.2 Increase horizontal forecast grid resolution from 32 km to 2.5 km.
  - 2.2.3 Implement mesoscale discussions and graphics as part of a national meteorological watch (met watch) for heavy precipitation events.
  - 2.2.4 Assess the value of increasing forecast issuance frequency for QPF and implement as appropriate.
  - 2.2.5 Extend to 10 days the range of quantitative precipitation forecasts from the current 5 days.
  - 2.2.6 Extend to 7 days the range of the Excessive Rainfall Outlook from the current 3 days.

#### **National Meteorological Watch (Met Watch) for High-impact Precipitation**

*Around the clock HPC will monitor weather forecasts from numerical models and the latest weather observations to help ensure forecasts of high-impact precipitation events are of the highest possible accuracy, consistency, and timeliness.*

### ***Winter Weather Forecasting***

- 2.3 Increase the relevance and utility of winter weather forecasts to users.
  - 2.3.1 Produce winter weather forecasts with 10% greater accuracy than the NCEP ensemble forecast system or the statistical postprocessing of model forecasts available at the time.
  - 2.3.2 Increase horizontal forecast grid resolution from 5 km to 2.5 km.
  - 2.3.3 Implement mesoscale discussions and graphics as part of a national met watch for hazardous winter weather events.
  - 2.3.4 Assess the value of increasing issuance frequency for winter weather forecasts and implement as appropriate.
  - 2.3.5 Extend to 7 days the range of winter weather forecasts from the current 3 days.

### **Other Gridded Forecast Guidance**

- 2.4 Enhance gridded forecast guidance to support a seamless and comprehensive NWS environmental analysis and forecast database through improved forecaster tools, collaborative techniques, and automation.
  - 2.4.1 Work with other NWS offices and NWS national and regional headquarters to design and populate a collaborative Common Operating Picture (COP), a subset of the broader Data Cube.
  - 2.4.2 Extend to 14 days the range of forecast guidance for temperature, probability of precipitation, wind, dewpoint, and certain other fields from the current 7 days.
  - 2.4.3 Produce forecasts of temperature, dewpoint, probability of precipitation, and wind with 10% greater accuracy than the NCEP ensemble forecast system or the statistical postprocessing of model forecasts available at the time.
  - 2.4.4 Increase the issuance frequency to 4 times a day for this gridded forecast guidance from the current once daily.
  - 2.4.5 Increase horizontal resolution of forecast grids to 2.5 km from the current 5 km.

### **Foundational Datasets**

*The NWS will implement the Data Cube, a digital repository of all weather, water, climate, marine, and space weather information, accessible by everyone, with these data available in interoperable formats. A portion of the Data Cube will contain the best estimate of the NWS as to the current and forecast state of the environment. The Common Operating Picture, a subset of the Data Cube, will represent the official forecast of the NWS.*

### **Ensembles, Probabilities, and Forecast Uncertainty**

- 2.5 Be a leader in developing and integrating real-time forecast information involving model ensembles, probabilities, and uncertainty into the NWS forecast process.
  - 2.5.1 Provide real-time ensemble-based probability distributions for all possible Center forecasts.
  - 2.5.2 Develop and implement methods to quantify and convey forecaster confidence and uncertainty.

### **International Desks**

- 2.6 Increase the in-house and distributive training capacity of the Center's International Desks.
- 2.7 Expand the climate scope of the Center's training desks, based on partner requirements and in association with the Climate Prediction Center.

### 3.0 SCIENCE & TECHNOLOGY

**Strengthen the Center’s foundation in science and technology infusion to improve forecast performance and customer responsiveness, especially for high-impact events.**

#### ***Research to Operations & Operations to Research (R2O & O2R)***

- 3.1 Expand the capacity of the Hydrometeorological Testbed at HPC (HMT-HPC) to accelerate R2O.
- 3.2 Accelerate O2R by engaging the research community on critical operational challenges and providing access to data archives.
- 3.3 Expand collaboration with other NOAA testbeds to address community forecast and research challenges and share best practices.
- 3.4 Integrate social science research methods and capabilities into service areas, forecast tools, and decision support systems.
- 3.5 Enhance the use of numerical modeling and observations, with particular emphasis on the transition of emerging ensemble forecasting techniques into operations.
- 3.6 Expand the Center’s role in the year-round use of targeted observations to improve forecasts of high-impact events.

#### **Hydrometeorological Testbed at HPC**

*The HMT at HPC was established to accelerate the assessment and implementation of new technology, research results, and other scientific advancements from the research and development communities into HPC operations to enhance HPC products and services. The HMT-HPC is designed to enhance and extend forecast skill for high-impact weather, especially precipitation, by facilitating interactions among researchers and operational forecasters.*

#### ***Application of Technology***

- 3.7 Integrate technology and workstation-based tools into forecast operations to advance the Center’s performance for:
  - *Response time*
  - *Production efficiency*
  - *Product utility*
  - *Product accuracy*
  - *Product reliability*
  - *Product dissemination*
- 3.8 Facilitate collaboration as a core operating protocol for product and service delivery with state-of-the-art technology, tools, and methods.
- 3.9 Develop tools to streamline the preparation of products wherever possible to optimize the value of the forecaster in the forecast process.
- 3.10 Establish comprehensive back-up capability for the Center’s products and services.



### **Verification**

- 3.11 Advance the verification of forecast products.
  - 3.11.1 Enable access by all users to verification information.
  - 3.11.2 Offer an interactive verification system allowing stratification by geographic area, time, and threshold.
  - 3.11.3 Improve feedback to forecasters and modelers through advanced forecast verification techniques, including impact-based verification.

### **S&T Collaboration and Partnerships**

- 3.12 Strengthen and broaden collaborative efforts with the research and technology communities.
  - 3.12.1 Participate in joint projects with the research, academic, and operational communities.
  - 3.12.2 Expand collaboration with the Environmental Modeling Center on model development and post processing of numerical forecasts.
    - 3.12.2.1 Expand the Scientist Exchange Program between the two centers.
    - 3.12.2.2 Formalize communications between Center forecasters and modelers.
  - 3.12.3 Partner with the NWS Office of Science and Technology to develop enhanced guidance products.

## **4.0 PEOPLE & INFRASTRUCTURE**

### **Evolve the workforce, organization, and culture to respond to emerging challenges rapidly and effectively.**

#### ***Proactive Partnership of Trust with the Employees Organization***

- 4.1 Consult with representatives of the National Weather Service Employees Organization (NWSEO) as early as possible on all proposals involving changes affecting the staff.
- 4.2 Encourage a vibrant and collaborative relationship with the NWSEO at all levels to maximize the ability of HPC and the rest of the NWS to advance the common goals of these three groups.

#### ***Evolving Role of the Forecaster***

- 4.3 Transition the forecaster from performing traditional roles to performing more complex and higher-order decision making in the forecast process.
  - 4.3.1 Train all staff in decision support and customer service.
  - 4.3.2 Develop a cadre of Emergency Response Specialists to perform the highest level of decision support.
  - 4.3.3 Train staff in the generation and use of probability distribution information, including its application to forecast uncertainty and forecaster confidence.
  - 4.3.4 Devise and test future roles of the forecaster through the Hydrometeorological Testbed.

#### ***Skilled & Ready Workforce***

- 4.4 Align staffing profile to meet strategic needs.
  - 4.4.1 Frequently assess skillset of workforce to determine training and hiring opportunities to ensure the Center meets evolving partner and customer requirements.

- 4.4.2 Adjust staffing and provide training opportunities to meet information technology demands.
  - 4.4.3 Increase product development capabilities.
  - 4.4.4 Strengthen outreach and user relationship management.
  - 4.4.5 Fill critical leadership and administrative gaps.
- 4.5 Develop and retain a highly skilled and competent workforce to align with the Center's strategic future.
- 4.5.1 Develop a training program to evolve all Center staff from traditional roles to future roles.
  - 4.5.2 Expand short-term exchange programs and longer-term rotational assignments with other centers, field offices, and other organizations to foster an integrated NOAA product suite and a greater mutual understanding among government agencies and the Weather Enterprise.

### ***Culture***

- 4.6 Achieve a nimble, creative, and highly productive workforce positioned to anticipate change and quickly respond.
- 4.6.1 Provide training and experiences for operating with flexibility, responsiveness, and creativity.
  - 4.6.2 Utilize employee teams for addressing emerging product, service, and organizational challenges.
- 4.7 Strengthen the Center culture of mutual trust, teamwork, commitment, and service to others.
- 4.7.1 Provide training and experiences for building expertise in teamwork, conflict management, and effective interpersonal communications.
  - 4.7.2 Cultivate a mutually respectful and productive labor-management relationship.
  - 4.7.3 Optimize the different perspectives, experiences, and skills of the multi-generational workforce.
- 4.8 Recognize and reward efforts to advance science and technology infusion, teamwork, innovation, and challenging the status quo.

### ***Leadership & Management***

- 4.9 Sponsor workshops and meetings to engage the community on the emerging meteorological landscape and challenges.
- 4.10 Strengthen leadership and management by enhancing coaching, mentoring, and accountability.
- 4.11 Promote opportunities to position employees for leadership and management roles within the Center, NCEP, NWS, NOAA, and elsewhere.