National Centers for Environmental Prediction

Strategic Plan
for
2005 - 2009

Director's Message

Meeting the challenge to provide science-based products and services in support of the National Oceanic and Atmospheric Administration (NOAA) role in addressing the nation's growing demand for timely and accurate environmental information, the National Centers for Environmental Prediction (NCEP) aggressively strives to implement improvements designed to meet or exceed the expectations of a growing user community. As the central component of NOAA's National Weather Service (NWS) forecast process, NCEP is at the forefront to capitalize and implement emerging scientific and technological advances. Our preeminent role in accelerating the implementation of advances in science and technology into operational products and services through operational and developmental testbeds necessitates outreach and collaboration beyond the NWS and the NOAA to other federal agencies, academia and the public sector.

NCEP is a recognized global leader providing a seamless suite of operational environmental analysis, diagnostics and forecasts for a domain that now ranges from the sun to the sea. In order to meet the challenges of weather, ocean, climate, water and space prediction services, and address air quality, ecosystems and other environmental issues, NCEP must serve as a catalyst to coordinate, cooperate and collaborate through applied research, training, technology transfer and implementation of a common modeling infrastructure for global to regional application. The success of NCEP's accomplishments depends on our external partnerships, along with addressing the needs of our world-class employees to enable NCEP to best meet the evolving NOAA mission more effectively and efficiently.

This strategic plan outlines NCEP's objectives to meet NOAA strategic goals over the next five years. The challenges ahead for improving current products, expanding capabilities from the sun to the sea, and addressing important global environmental issues beyond the standard climate-weather and related ocean predictions are great, but not insurmountable. As we play our part in the NOAA effort to meet these challenges, I applaud and note the efforts of everyone connected with NCEP and am confident, indeed very proud, that together we will achieve NCEP's vision of being the nation's first choice, first alert and preferred partner to provide the central backbone of the Nation's climate, weather and ocean prediction capability that serves an ever-widening array of users and partners in government agencies, the research and academia communities and the private sector.

Dr. Louis W. Uccellini
Director, NCEP

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Mission

NCEP delivers
analyses, guidance, forecasts and warnings
for weather, ocean, climate, water, land surface
and space weather
to the Nation and the world.

NCEP provides science-based
products and services
through collaboration with partners and users
to protect life and property, enhance the Nation's economy
and support the Nation's growing need for
environmental information.

Vision

America's first choice, first alert and preferred partner for climate, weather and ocean prediction services

Statement

NCEP...Where America's climate, weather, and ocean prediction services begin

www.ncep.noaa.gov

Partners and Users

Partners

NOAA Mission Goal Teams and Line Offices
NWS Forecast Offices
Academia
International Organizations
Military
Other Federal Agencies
Private Meteorologists
Research Laboratories
State and Local Emergency Managers
Wild Fire Agencies (Federal/State)
Technology Vendors
Media

Users

American Public
Agriculture
Air Quality
Coastal Resource Managers
Educational Communities
Emergency Managers
Energy Sector
Federal, State, and Local Agencies
Homeland Security
Investment Community
International Community
Marine Sanctuaries
Media (National/International)
Military
Ocean Community
Public Health
Recreation
Retailers
Satellite Operations
Scientific Researchers
Space Weather Industry
Transportation: Air, Marine and Surface
Water Resource Managers

Core Products and Services

Analyses and Assessments

Unified NWS Surface Analysis
Ocean, Atmosphere, Land Surface Analysis
Sea State
Hazards Assessment
Drought Assessment
National Tornado/Severe Storm Report Summaries
Computer Model Performance Assessments
Performance Verification

Guidance

Winter Weather and Heavy Precipitation
Convective Storms Outlooks
Mesoscale Weather Discussions
Numerical Weather Prediction Out to 16 Days
Numerical Climate Prediction Out to 9 Months in Advance
Flash Flood
3 – 7 Day Temperature, Precipitation, and Weather Systems (Input for National Digital Forecast Database)
Climate Probabilities for Seasonal to Interannual Timeframes
Solar Cycle

Forecasts

Precipitation Amount, Type and Probability
Fire Weather Outlooks
High Seas Wind/Wave (Tropical & Extratropical Regons)
Offshore Waters
Air Quality
Aviation Icing, Ceilings, Visibilities, Convection and Turbulence
Global Winds and Significant Weather at Flight Level
Geomagnetic Storms/Space Radiation Events
Monthly to Seasonal Climate Outlooks
Extended Range Outlooks (6-10 Day/8 – 14 Day)
ENSO Diagnostic Discussion
U. S. Seasonal Drought Outlook
Seasonal Hurricane Outlooks

Watches and Warnings

Hurricanes and Tropical Storms
Tornadoes and Severe Thunderstorms
Aviation Hazards
Marine Hazards
Space Hazards
Climate Extremes

Infrastructure/Technology

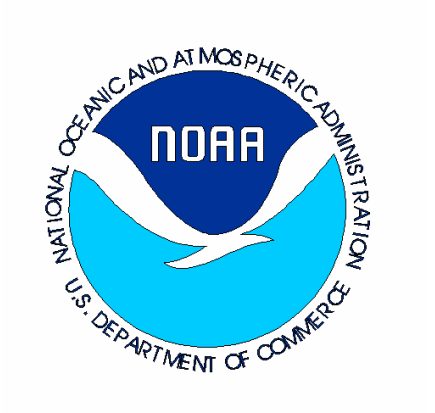
Infrastructure

Computers (from Central Computer System to Workstations to Laptops)
Weather/Water/Climate Models (Mesoscale to Global)
Code and Computer Maintenance
Model Execution (4 Cycles Per Day)
Communications (Data In – Products Out)
Data Access: Display and Forecast Preparation Systems (Web and Workstation Based)
Product Delivery (from Family of Services to Web Based))
Test Beds

Technology

Global Data Access
Data Assimilation
Modeling
Model-Data Postprocessing
Workstation-Based Forecasting Techniques
Meteorological Workstations for Global to Local Applications
Access Through World Wide Web

Section I: NCEP's Contribution to NOAA Strategic Planning Goals



2005-2009

NOAA Strategic Goals

Goal 1: Protect, Restore, and Manage the Use of Coastal and Ocean Resources through an Ecosystem Approach to Management

Outcomes and Strategies

- Participate in defining *ecosystem* and delineate the environmental role of NCEP in NOAA's ecosystem assessment and prediction advancements

- Provide modeling and forecasting information in support of NOAA's goal to pilot one ecosystem-based region in the U.S.

- Provide an ocean analysis and prediction system based on expanded global observation network and partnerships based on a community model approach

- Facilitate integrating NOAA environmental products toward "one stop shopping" for users and partners

- Provide Weather Forecast Offices (WFOs) with ecosystem guidance, data and tools to meet local needs

- Provide numerical model assets to support salinity freshwater management in coastal waters and define the climate/ecosystem interaction.

Goal 2: Understand Climate Variablity and Change to Enhance Society's Ability to Plan and Respond.

Outcomes and Strategies

- Implement, sustain and improve the operational coupled (ocean, land, atmosphere, cryosphere) Climate Forecast System to provide more accurate, ensemble-based

prediction system for Seasonal to Interannual (SI) forecasts; and apply to the prediction of extreme climate events (drought, heat waves, etc.)

- Advance sub-seasonal to interannual climate prediction by improving analysis of the climate system, using ensembles of multiple, high-end earth system and climate models

- Provide improved reliability (consistency) and skill for probabilistic forecasts of temperature and precipitation indicating departures from normal for subseasonal, monthly, and seasonal outlooks

- Increase participation and lead in global, international climate and weather experiments, including the North American Monsoon Experiment (NAME) and African Monsoon Multidisciplinary Analyses (AMMA)

- Improve the bridge linking climate research, operations, applications and training

- Accelerate the transition of proven research results to improved operational climate forecasts, products and services through the creation of a ClimateTest Bed facility

- Provide and develop leadership and funding to support the next and future generation Reanalyses (i.e., an Ongoing Analysis of the Climate System) as a nationally and internationally coordianted requirement for integrating Global Earth Observation System of Systems (GEOSS) data into long time series products, which improve our understanding of the climate system from data to attribution

Goal 3: Serve Society's Needs for Weather and Water Information

Outcomes and Strategies

- Improve critical weather and water information and services (including severe convective weather, tropical cyclones, winter storms, quantitative precipitation, floods, fire weather and space weather)

- Improve the accuracy and lead times in weather and water predictions, especially for extreme events

- Integrate space weather services into the NWS seamless suite of products

- Integrate NOAA assets to deliver water resource information and predictions

- Support national air quality forecast capability in partnership with EPA

- Integrate and improve NOAA's environmental information products and services for the Nation's coastal zones

- Provide confidence limits via probabilistic forecasts across the environmental spectrum to communicate levels of uncertainty

- Become the world leader in operational environmental modeling (and data assimilation) with a unified weather/water model and complete ocean modeling capability

- Become a "one stop" source for NOAA in environmental information and services

- Incorporate new science and technology into services, including reducing transition time into operations through the Hazardous Weather and Hydrometeorological Test Beds

- Improve dissemination of products with standardized

models of data formats and one stop shopping approach

- Expand participation in THe international Observing System Research Program and Experiment (THORPex) aimed at improving forecasts out to 14 days

- Expand NCEP's international training programs, building upon the successful international training desks for Africa, South Africa and Central America

- Extend and enhance interagency partnerships particularly with DOD, NASA, etc.

- Incorporate human and economic impacts and influences in environmental models and predictions

Goal 4: Support the Nation's Commerce with Information for Safe, Efficient, and Environmentally Sound Transportation

Outcomes and Strategies

- Support Recommendations in the U. S. Commission on Ocean Policy Report to enhance the ocean and coastal information management and communications program to deliver information products relevant to national, regional, state and local needs on an operational basis

- Improve ocean data assimilation and modeling with the goal of designing an integrated earth environmental data and information system

- Expand support for transportation modes (land, air, and water) and interface of these modes

- Provide transportation specific products from short-term to climate services to enable economic sectors to plan better and enhance their risk management capabilities

- Provide a suite of operational oceanographic products to assist the ocean transport system's safety and effeciency

- Target strategic partnerships with Government and commercial transportation organizations to improve forecasts impacting air, road, lake and ocean transportation

Goal 5: Provide Critical Support for NOAA's Mission

Outcomes and Strategies

- Provide support to High Performance Computing and Information Technology

  - Award contract for consolidated NOAA Operational Central Computer System (CCS) acquisition

  - Develop and maintain an information technology enterprise that is secure, reliable, cost-effective and encourages information sharing

  - Improve and support a strong foundation for excellence throughout NOAA through the use of world-class information technology capabilities and support systems

- Ensure continuous observation of critical environmental conditions through NOAA satellite and aircraft programs

  - Prepare for the next generation of NOAA satellites

  - Continue support and advocacy of the mutual collaboration with NASA and DoD at the Joint Center for Satellite Data Assimilation to accelerate the use of observations from earth-orbiting satellites in operational numerical analysis and prediction models

- Maximize utilization of NOAA's P-3 and G-IV aircraft for hurricane surveillance and winter storm reconnaissance program

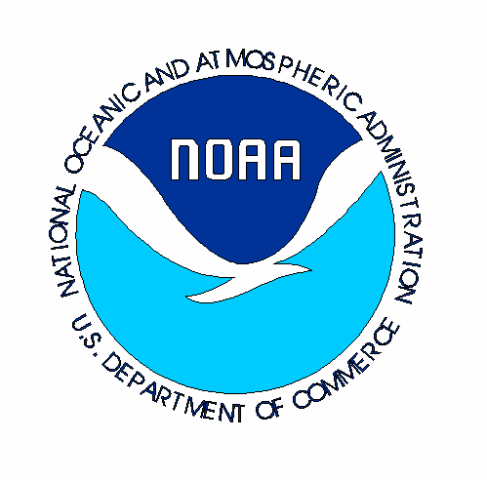
- Plan for, construct, and maintain facilities with improved co-location of NOAA services and partners

  - Relocation of Storm Prediction Center to Norman, OK National Weather Center

  - Relocation of NCEP/Camp Springs to the University of Maryland's Enterprise Campus

  - Advocate for adjacent Advanced Study Institute facility joining NOAA, NASA and University of Maryland

Section II: NCEP's Strategies and Objectives to Meet NOAA's Service, Delivery and Improvement Goals



2005-2009

Strategies/Objectives

1.0 Produce and Deliver the Best Products and Services

Anticipate user needs and strive to exceed expectations in product and service development and delivery through collaboration with all NOAA Mission Goal Teams (See Section I: NCEP's Contribution to NOAA Strategic Planning Goals)

- Protect, Restore, and Manage the Use of Coastal and Ocean Resources through an Ecosystem Approach to Management

- Understand Climate Variability and Change to Enhance Society's Ability to Plan and Respond

- Serve Society's Needs for Weather and Water Information

- Support the Nation's Commerce with Information for Safe, Efficient, and Environmentally Sound Transportation

- Provide Critical Support to NOAA's Mission

1.1 Increase *user participation* in the planning, development, product evaluation and improvement of products and services

1.1.1 Provide opportunities through channels for users and partners to comment on potential product and service changes

1.1.2 Collaborate with partners and users to create new product development and delivery

1.1.3 Increase the emphasis on user training in product use and delivery

1.1.4 Provide targeted assessments of the validity of selected user requests for products

1.2 Be a leader in the transition of “Research to Operations” to accelerate improvements in NOAA products and services; involve other agencies, academia and NOAA Line Offices at every stage of the transition process and work to expand the product suite and accelerate enhancements for end users

1.2.1 Enhance cooperative partnerships between NOAA operational and research centers and the broader research community by providing operational test bed facilities

1.2.2 Deliver opportunities for goal-directed research using NOAA’s forecast systems, other forecast systems, and state of the art multi-model ensemble approaches to improving weather and climate prediction

1.2.3 Increase the range and scope of forecast applications, and the economic benefit of operational weather and climate forecasts for policy making and decision making by end users

1.3 Provide a *seamless suite* of environmental analysis, diagnostic and predictive services from the sun to the air, land, and sea

1.4 Ensure that all NCEP activities and proposals are incorporated within NOAA’s Planning, Programming, Budgeting and Execution System (PPBES) process and seek ways to apply NCEP capabilities to NOAA mission goals

1.5 Improve the user's decision-making capabilities by including *levels of forecast certainty* in products and services

1.6 Extend the *detail and accuracy* of guidance to support:

1.6.1 Improved weather prediction out to 7 days and beyond

1.6.2 Improved climate prediction from months to seasons in advance

1.6.3 Improved ocean prediction out to 5 days and beyond

1.6.4 Improved solar and space weather prediction out to 5 days and beyond

1.6.5 Improved hydro-meteorological prediction out to 7 days and beyond

1.6.6 Improved hazardous weather outlooks out to 7 days

1.6.7 Improved air quality prediction out to 4 days and beyond

1.7 Expand product suite to incorporate the National Digital Forecast Database and new mission requirements

1.7.1 <u>New Potential Users/Partners</u>
- Air Quality Users
- Public Health Industry
- Homeland Security
- Department of Defense
- Department of Transportation
- Surface Transportation Managers
- Coastal Resource Managers
- Marine Ecosystem Managers
- Space Weather Users
- Ocean Community
- Energy Community
- Fire Weather Community
- Communications Industry
- Environmental Modeling Community
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1.7.2 <u>Emerging Product Areas</u>
- Probabilistic Forecasts Based on Ensemble and Other Techniques
- Digital and Gridded Forecasts (in addition to Graphical Forecasts)
- Air Quality and Toxics
- Ecosystem Forecasts
- Water Quality

- Water Resources
- Energy
- Storm Scale Prediction
- Space Weather Analysis and Prediction
- Ocean Services
- Seasonal Outlooks of Extreme Events
- ENSO Alerts
- Climate Signals (NAO, MJO, etc.)
- Land Surface States
- Environmental Impacts

1.8 Expand application of the collaborative forecasting process across the spectrum of products and services in accordance with new NWS operation's philosophy

1.9 Continue reanalysis for calibrating and validating climate forecast system and synoptic climatology; apply on scales ranging from global to regional scales

1.10 Implement satellite data observing systems strategy in preparation for the NPOESS era and expanded GOES capabilities

2.0 <u>Capitalize on Scientific and Technological Advances</u>

Accelerate implementation of advances in science and technology for the analysis and prediction of atmosphere, ocean, land, space, water and ecosystem processes

2.1 Increase collaboration and cooperation with NOAA partners, the world's leading scientists and academic partners in the development of environmental products and services spanning the spectrum from local to global spatial scales and from minutes to decadal time scales

2.2 Develop and implement next generation unified numerical forecast system based on a *community model approach* (such as WRF and ESMF) that serve both the operational and applied research needs of NOAA, and the research

and application needs of the broader science community in accordance with the NOAA research strategy and related priorities

2.2.1 Conduct regular workshops to explore research needs and priorities

2.2.2 Couple community-based land-surface, hydrological and ocean forecast models within the operational weather, water, ocean and climate forecast systems

2.2.3 Improve the dynamic and fully coupled Climate Forecast System (CFS) to provide more accurate, ensemble based prediction system for Seasonal to Interannual (SI) forecasts; and apply to the prediction of extreme climate events (drought, heat waves, etc.)

2.2.4 Make models and related model output easily available to meet users and partners' needs and enhance testing and feedback from the research community

2.2.5 Accelerate ensemble technique development for new applications

2.2.6 Enhance two-way flow of scientific technology between NCEP and the external science community

2.2.7 Continue to explore evolving model advancements, including hybrid coordinates and new physical parameterization schemes

2.2.8 Working with NOS, OAR and the larger research community, advance ocean modeling and related applications within all scales, from global to local

2.3 Advance *data assimilation* techniques and rapid assessment of new data (especially satellite and radar data) for environmental forecast applications

2.3.1 Evaluate optimal mix of observing systems through national and international field programs (such as the North American Monsoon Experiment (NAME), THe Observing System Research Program and Experiment (THORpex), the U. S. Weather Research Program (USWRP), Joint Center for

Satellite Data Assimilation (JCSDA), and the Global Earth Observations System of System (GEOSS))

2.4 Develop integrated information technology strategies

2.4.1 Work through NOAA High Performance Computing (HPC) Board initiative to establish a NOAA standard for operational and research computer systems to facilitate a rapid infusion of research results from NOAA into NCEP's suite of operational models

2.4.2 Promote the implementation of the internet and web-based technologies as a prototype to provide and deliver operational products and services

2.4.3 Foster the use of advanced information processing techniques and the full use of computer model output in the forecast process, especially through *workstation-based* product development and a coordinated technology strategy and architectures across all Service Centers

2.4.3.1 Integrate local forecast systems with the core forecast system at the Service Centers

2.4.3.2 Apply interoperability, adaptability and securability as primary design criteria

2.4.4 Increase the *"power at the desktop"* for all NCEP employees to improve productivity, service delivery and personal satisfaction

2.4.5 Enhance NOAA's supercomputing capability and capacity and associated delivery system

2.4.6 Institutionalize a process to ensure the rate of technology/science infusion aligns with implementation abilities in accordance with the NWS Science and Technology Infusion Plan (STIP)

2.5 Provide for cyclic replacement of information technology (IT) infrastructure at NCEP in order to enable the effective use of increasing volumes of model guidance, imagery and observational data and to comply with IT security requirements and related challenges which are projected to increase

2.6 Enhance the availability of NCEP operational and developmental products through the use of innovative communications technologies

2.7 Ensure *continuous improvement* in product and service development and delivery, including comprehensive verification of all products

2.8 Advance the transfer of new research and technology into operations through *operational and developmental* testbeds relevant to all National Centers in accordance with NOAA research and service improvement strategies

2.9 Support NOAA's digital archives to retain NCEP products

3.0 Exercise Global Leadership

Serve as a catalyst to improve weather, ocean, climate, water, land surface and space weather prediction services worldwide through applied research, training, technology transfer and common modeling infrastructure

3.1 Coordinate and issue operational analysis, forecast products and watches/warnings for weather, ocean, climate, aviation, and space weather prediction for the international community

3.2 Cooperate and collaborate in *global and regional modeling* activities, including transfers of NCEP modeling technologies with other nations, the full utilization of probabilistic ensemble model runs and pooling of resources to improve worldwide services

3.3 Increase the *reliability, accuracy and impact* of forecasting around the globe in ways consistent with World Meteorological Organization Programs, such as the World Weather Watch, the International Space Environment Service, the World Weather and Climate Research

Programs and coordinate with our international and Department of Defense operational partners

3.3.1 Expand NCEP's international training programs, building upon the successful international training desks for Africa, South America and Central America

3.3.2 Share advanced weather forecasting techniques and support international response to climate and weather disasters

3.2.3 Increase participation in international programs, working groups, committees, and experiments

3.2.4 Continue forecaster exchange programs with the Meteorological Services of Canada

3.4 Participate in and lead international programs such as the North American Monsoon Experiment (NAME), the North American Ensemble Forecast System (NAEFS), The Hemispheric Observing System Research and Predictability Experiment (THORPex), the Global Earth Observations System of Systems (GEOSS), and Annual Caribbean Hurricane Awareness Tours

3.5 Promote and support international data standards for effective data exchange

3.6 Improve model forecasts through interactive and *collaborative data and product assessments* involving other NOAA scientists and the larger international community

3.7 Promote shared responsibility in forecasting to meet international requirements for seamless products

3.8 Conduct assessments with the international community of satellites and other global observing systems

4.0 Focus the NCEP Organizational Culture

Promote an organizational culture that embraces change, values service and promotes teamwork with

users, partners, and each other and actively participate in NOAA's matrix managed approach to planning, goal-setting, program execution and mission

4.1 Expand *outreach and education* to increase awareness and understanding of how NCEP's forecasts are made, what value they provide to users, sustaining NCEP's supportive role for climate and weather forecasts through the U.S. and beyond

4.1.1 Actively support NOAA's public affairs in advocating NOAA products and services and disseminating news and information about significant weather, water, and climate events and its impacts

4.2 Ensure cross-flow of *new ideas and talent* by enlarging and strengthening educational relationships including student mentoring, faculty-level instruction by NCEP staff, internships, visiting scientists and exchange programs

4.3 Improve *cooperation and collaboration* among Centers to support the seamless suite of NOAA/NWS products

4.4 Embrace internal NWS partners in all aspects of planning and execution of all program elements:

- Weather Forecast Offices
- River Forecast Centers
- Center Weather Service Units
- NWS Regions and Headquarters
- National Data Buoy Center
- Space Flight Meteorology Center
- National Operational Hydrologic Remote Sensing Center
- Radar Operations Center
- NWS Service Training Center
- NWS Group at FAA Academy
- NWS Group at National Interagency Fire Center
- NWS Employees Organization
- Office of International Activities

4.5 Embrace NOAA partners:
- Research laboratories and academic communities
- Other service components
- CIO and related activities

4.6 Expand external partnerships:
- Universities
- National and international research centers
- Diverse user communities

4.7 Increase under-represented groups throughout NCEP

4.8 Enhance *job satisfaction* through compensation, recognition, rewards, family-friendly practices, alternative work schedules and professional development for all NCEP employees in the spirit of *Quality Through Partnerships*

4.9 Furnish a first-rate *working environment* based on world-class research and operational *facilities* with solid linkages to the University and Research communities

4.9.1 Effect the relocation of NCEP/Camp Springs to the new NOAA Weather and Climate Prediction Center in College Park, MD, and the Storm Prediction Center to the new National Weather Center in Norman, OK

4.10 Infuse the value of societal impact into our workforces' understanding of NCEP products and services

5.0 Effectively Manage NCEP Resources

Marshal, prioritize, reallocate and leverage resources to enable NCEP to best meet the evolving NOAA mission more efficiently

People

5.1 Exploit opportunities to optimize our human resource mission contributions and performance

5.1.1 Explore expansion of secure telecommuting

5.1.2 Enhance training for workforce

5.1.3 Provide flexible and alternative work schedules

5.2 Respond to changing user needs and technology advances with a *highly trained and adaptable* workforce

5.3 Pursue a performance based system of compensation, evaluation and rewards

Technology

5.4 Improve the *delivery (availability)* and quality of the seamless product suite with timely on-request access to products and services at any place and any time

5.5 Ensure product accuracy by using scale appropriate verification methods to produce meaningful performance metrics

5.6 Incorporate backup systems for the Continuity of Operations Plan (COOP) and ensure high quality and uninterrupted service

5.7 Provide a strong foundation for excellence in products and services with *NOAA mission-appropriate Information Technology* capabilities and support systems

5.8 Promote excellence in Information *Technology Infrastructure* through *enterprise architecture*, programmatic and budgetary priorities for acquisition and mission-appropriate technologies

5.8.1 Engage in forward-looking technology survey and trend analysis to guide architecture

5.9 Strengthen *links with technology vendors* to implement the world's best systems for operational forecasting

5.10 Keep pace with IT industry advances

Benefits

5.11 Describe and quantify the economic impacts and value of NCEP's activities, products and services

Process

5.12 Align NCEP business practices with the NOAA business model

5.13 Improve NCEP's business practices

5.13.1.1 Continually improve the Annual Operating Plan (AOP) and NCEP's Technical Operating Plan (NTOP) which map all resources and allocations to NCEP operational and research deliverables and milestones

5.13.1.2 Ensure that NCEP's AOP and NTOP are completely integrated within NOAA's PPBES planning and resource tracking processes, systems, and policies

5.13.1.2.1 Matrix Management

5.13.1.2.2 PPBES

5.13.1.2.3 Program Planning and Integration

5.13.1.3 Streamline NCEP planning, acquisition, budget (financial and management accounting) processes

5.13.1.4 Work in the framework of NWS HQ processes including the Science and Technology Infusion Plan and Office of Climate Weather and Water Services process to ensure the rapid transfer of research breakthroughs to service improvements that serve society's needs

5.13.1.5 Ensure the scientific and technological advances influence acquisition decisions

5.13.1.6 Improve decision-making capabilities by applying advanced risk management techniques to all NCEP products

5.13.1.7 Develop cooperative alliances with external partners

5.13.1.8 Plan for and place decision and budget authority at the lowest and most effective levels

5.14 Provide common management practices and tools to standardize and strengthen our planning to execution capabilities

5.15 Continue to review programs for effectiveness and progress on deliverables and make any necessary adjustments

National Centers for Environmental Prediction

Louis W. Uccellini
Director, NCEP
www.ncep.noaa.gov

Kevin Cooley
Director, NCEP Central Operations
www.nco.ncep.noaa.gov

Stephen Lord
Director, Environmental Modeling Center
www.emc.ncep.noaa.gov

Jack May
Director, Aviation Weather Center
www.aviationweather.gov

Jim Laver
Director, Climate Prediction Center
www.cpc.ncep.noaa.gov

James Hoke
Director, Hydrometeorological Prediction Center
Director, Ocean Prediction Center
www.hpc.ncep.noaa.gov and www.opc.ncep.noaa.gov

Ernest Hildner
Director, Space Environment Center
www.sec.noaa.gov

Joseph Schaefer
Director, Storm Prediction Center
www.spc.ncep.noaa.gov

Max Mayfield
Director, Tropical Prediction Center
www.nhc.noaa.gov