The NWS Strategic Plan

Outline

• NOAA
• NSIP
• CSI
• WES
• NDFD
To Make it Work: A Slightly New NOAA Organization

- Under Secretary of Commerce for Oceans and Atmosphere/NOAA Administrator
  - Chief of Staff
  - Deputy Under Secretary for Oceans and Atmosphere
  - Assistant Secretary of Commerce for Oceans and Atmosphere
  - Deputy Assistant Secretary for International Affairs

- General Counsel
  - Legislative Affairs
  - Public, Constituent and Intergovernmental Affairs
  - Education and Sustainable Development

- NOAA Finance and Administration
  - • Program, Analysis, & Evaluation
  - NOAA Marine and Aviation Operations

- Office of the Federal Coordinator for Meteorology
  - Office of Military Affairs

- Office of Legislative Affairs
  - Legislative Affairs

- Office of Strategic Planning
  - Strategic Planning

- NOAA Marine and Aviation Operations

- NOAA Finance and Administration
  - Program, Analysis, & Evaluation

- NOAA Marine and Aviation Operations

- NOAA Finance and Administration

- NOAA Marine and Aviation Operations

- NOAA Finance and Administration

- NOAA Marine and Aviation Operations

- NOAA Finance and Administration
NOAA Planning Process

- New Process for FY 05 Budget Cycle
- Based on DOD Program Planning & Budgeting System (PPBS)
- Establishes 3 Key Phases
  - Planning, Programming & Budgeting
- More strategic and program oriented with key decisions points and objective analysis
- Relies on Goal Teams to Develop “Program Plans”
- NOAA Program Analysis and Evaluation (PA&E)
**PPBS**

**Master Planning Calendar**

### PLANNING
- Legal Mandates
- Mission
- Policy
- L/O Strategic Plans

### PROGRAMMING
- Mission Requirements
- Strategic Direction & Priorities
- Annual Strategic Guidance Memorandum (AGM)
- Program Plans
- PA&E REVIEW
- Program Decision Memorandum (PDM)

### BUDGETING
- BUDGET PREPARATION
- CONGRESS
- APPROPRIATION
- EXECUTE

### Timeline
- **March - September**
- **September - January**
- **February - December**
- **January - September**
- **October**
NOAA Strategic Plan

Four Mission Goals

• Serve Society’s Needs for Weather and Water Information

• Support the Nation’s Commerce with Information for Safe and Efficient Transportation

• Understand Climate Variability and Change to Enhance Society’s Ability to Plan and Respond

• Protect, Restore, and Manage the Use of Coastal and Ocean Resources through Ecosystem-based Management
NOAA Strategic Plan

Cross-cutting Priorities

- Integrated Global Environmental Observation and Data Management System
- Environmental Literacy, Outreach, and Extension
- Sound, Reliable State-of-the-Art Research
- International Cooperation and Collaboration
- Homeland Security
- Organizational Excellence: Facilities, Infrastructure, Security, Human Capital and Administrative Services
NOAA Strategic Plan

Key Outcomes

• Increased accuracy, lead time, and specificity of environmental forecasts and warnings.

• Increased use and effectiveness of environmental information for planning and decision making.

• Increased satisfaction with and benefits from NOAA environmental Information and warning services.
NOAA Strategic Plan

Common Strategies

Monitor and Observe
Assess and Predict
Engage, Advise, and Inform

Understand and Describe
Programming
Weather and Water Base Program

Summary

Key Activities

• Monitor and Observe
  – Global Observations: Satellite
  – Regional Observations: Satellite, Atmosphere, Surface, Ocean
  – Solar & Space Environment Observations: Satellite & Ground Based

• Assess and Predict
  – Data Assimilation and Modeling
  – Central Guidance
  – Local Forecasts and Warnings
  – Field Information Technology
**Programming**

*Weather and Water Base Program Summary, Key Activities, (cont.)*

- **Engage, Advise and Inform**
  - Warning Ingest and Dissemination
  - Bulk Environmental Information Delivery
  - Education and Outreach

- **Understand and Describe**
  - Global and Regional Observing
  - Global and Regional Modeling
  - Technology Prototyping
  - Social-Cultural and Economic Analyses
Defining S&T needs and strategies, objectives, and programs to meet these needs and keep the agency close to the cutting edge of S&T supporting its mission.

Purpose: Support NOAA and NWS Strategic Plans by:

Defining S&T needs and strategies, objectives, and programs to meet these needs and keep the agency close to the cutting edge of S&T supporting its mission.

Needs Link to NISIIP and other “Sub”- Strategic Plans
### Integrated Roadmaps

#### Planning Outcome

<table>
<thead>
<tr>
<th>Services</th>
<th>Aviation</th>
<th>Hydrology</th>
<th>Severe Wx.</th>
<th>Tropical</th>
<th>Marine</th>
<th>Winter Wx.</th>
<th>Climate</th>
<th>Fire Wx</th>
<th>Air Qual.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solutions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Observations

- Integrated Solutions Across Service/Science Areas

#### Numerical Prediction

- Forecast Applications
- Dissemination & Info. Access

#### IT Architecture

- ✓ Performance-Measure Based
- ✓ “End-to-End”
  - Research to operations
  - Observations to delivering information to users
- ✓ Reflective of reasonable budget expectations
e.g., Severe Weather Summary

R&D Needs
- Tornadogenesis
- R&D on severe weather
- Objective verification
- Cloud-scale models
- Situational awareness tools and training
- R&D on total lightning data and radar polarimetry data
- Predictability Limits
- Improved Understanding on Socioeconomic Impact

WSR88D Radar Upgrades
- TDWR integration
- WES/Training
- MDCRS

Implement WRF
- Deploy Advanced Ensemble Techniques
- Dual Polarization
- New Satellite Remote Sensing

Vision

Tornado Warning Lead Times
Beyond Tornadic Lifetimes
($\geq 30$ min) at 1-km resolution

On-going Training

2002 2007 2012 2020
Observations Summary

R&D Needs
- Boundary Layer Observations
- Improved RH & Cloud Observations
- Improved Adaptive Obs Strategies, Platforms, and Sensors
- Improved Vertical Profile Resolution

Vision
Observations When and Where Needed

Increasing Performance

2002 2007 2012 2020

Supporting NWS Service missions

- Mature WSR-88D ORPG, ORDA
- Rapid Expansion of Mesonets
- Expansion of Aircraft Obs
- Development of Testbed Strategies
- WSR-88D Upgrades (Dual Pol, Phased Array)
- Improved LEO and GEO Satellites; >> data volume!!!
- Expansion of Adaptive Obs
- Increasing Radiation Budget Observations
Numerical Prediction

Summary

Vision

Common Model Framework

For Climate/Weather/Water

R&D Needs

• Assimilation of Increasing Volume of Remote Sensed Data
• Small-scale Assimilation Techniques
• Improved Representation of Non-Hydrostatic Scale Physics
• Probabilistic Approaches
• Mesoscale Verification Techniques

Supporting NWS Service missions

• Common Climate/Global System
• More Realistic Cloud Physics
• Improve Use of Existing & New Observations
• WRF Framework

• Advanced Ensembling
• Cloud Analysis
• Adv. Small-scale Data Assimilation
• Adv. Physics/ Coupled AQ

Increasing Performance

2002 2007 2012 2020
NOAA SERVICE
IMPROVEMENT PLAN (NSIP)

– A NWS plan for climate, Water, and Weather Services for the short-term future which is available to all NWS staff, partners and customers in a formal integrated plan.

– This plan is aligned with the mission and strategic goals of the NWS and reflects the needs of our partners and customers.
NOAA SERVICE
IMPROVEMENT PLAN (NSIP)

– Web version of plan to be released by October 20, 2003.
– These improved services plans and milestones will guide the work of the NWS from our field offices, national centers and headquarters.
– A document for Service Improvements (changes) only, not repetitive of current services which are NOT changing!
Gauging Customer Satisfaction

  – Media
  – Emergency Managers
  – Aviation
  – Marine
• Each Survey Results in Customer Satisfaction Index
• NWS Results Compared to Other Federal Agencies
• Survey Results Suggest How to Maximize Customer Satisfaction
The #1 national economic indicator of customer satisfaction

Measures 30 industries, 180+ organizations covering 75% of the U.S. economy

- Over 70 U.S. Federal Government agencies have used ACSI to measure more than 120 programs/services

Advanced methodology quantifiably measures and links satisfaction levels to performance and prioritizes actions for improvement

Results from all surveys are published quarterly in The Wall Street Journal
Why Measure Customer Satisfaction?

Customers are our most important asset

• You can’t manage without measurement
• What you measure determines what you do (resource allocation)
• The quality of your measurement has a significant effect on financial performance and management effectiveness
• Customer satisfaction can be measured and managed
Customer Satisfaction Index (CSI) scores are based on three questions:

- Overall satisfaction with products and services
- Products and services compared to expectations
- Products and services compared to ideal

And the Survey Says.....

- ACSI Overall: 74
- Federal Gov't Aggregate: 70
- NWS Emergency Managers: 80
- NWS Aviation: 77
- NWS Media: 76
- U.S. Mint - Collectors: 84
- Bureau of the Census: 73
- Export - Import Bank: 70
- FDA: 67
- FAA: 64
- IRS: 62
Survey Responses

• Approximately 80% of detailed customer responses came from the following question:
• “How can the NWS improve its current services and/or add new services to help you achieve your mission?”
Survey Responses

• Survey’s highest rated response is positive:
  – Most common response is customer satisfaction with current procedures

• Recommendations resonating in multiple responses include:
  – Ensure future products can be used in decision assistance tools (e.g. GIS) and can be delivered to cell phone/pager/wireless systems used by first responders
  – Increase communication with various emergency managers and media to ensure product formats, headers, and dissemination processes are coordinated
  – Conduct more customer outreach
• **Emergency Managers specific needs:**
  
  – Prevent overload of data during severe weather events by addressing products in a clear, concise manner.
  
  – Clarify product wording. Common response to survey: “I don’t understand the jargon in your products”
  
  – Provide graphics along with text to facilitate customers’ understanding of products.
Feedback from Media:

- Public Zone Forecasts should be issued four scheduled times per day coinciding with news-release times (in areas not currently following this practice)
- Reduce errors in short-duration warnings (e.g. content or dissemination codes)
- Create Area Forecast Discussions using plain language and issue them more frequently
Survey Responses

• Strong need expressed to improve communication of hazards information
  • Government to government,
  • Government to business, and
  • Government to citizen interfaces
Survey Responses

• Need for more Radar Stations, and NOAA Weather Radio transmitter locations creating better coverage for remote areas.
WES Goals

• Improve NWS Products and Services
  – Provide an Operationally Representative Environment
    • Apply Science
    • Develop Decision Making Skills
  – “Train as You Fight”
Simulations Improve Job Performance

- Flight Simulators
  - Department of Defense
  - NASA
  - All Major Airlines
  - Flight Schools
Simulations Deliver Better Understanding and Retention

Source: NTL Institute for Applied Behavioral Science
What Is the WES?

- WES is a Data Pump
  - Hides & Reveals Data using Time/Data Stamp
  - Radar Base Data Revealed Using Simulated VCP

- Offline Linux Workstation
- Archived Case and Guide
- OB1 Linux AWIPS
- WES 1.2 Software
• Archive LINUX PC attached to AWIPS
  – Data saved on-site
  – Includes national and local data sets
  – Saved to CD-ROM or DVD
  – Transferred via non-routable network connection to WES
  – Overwritten every 4-7 days
Post Event Assessments

- Use WES to playback recent events
- Re-create actions to review real-time issues and overall system performance
- Uncover critical aspects of an event that should be:
  - Duplicated
  - Avoided
Research Using the WES

- Case study review mode to study applied science and technology issues
- Displaced real-time mode to research warning decision making processes
  - Event is controlled and predictable
  - Actions and outcomes can be compared and contrasted
Future WES Plans

• Incorporate simulations into curriculum
  – Advanced Warning Operations Course - 2004

• Additional Functionality
  – Scripting Language
  – Warning Applications
    • FFMP & SCAN

• Open WES - 2003
  – Informix Free
Benefits of Interactive Forecast Preparation (IFP)

– Provides more *forecast detail* in time and space
– Enables *more effective communication* with users (e.g., graphics)
– *Increases the usefulness* of NWS forecasts to customers and partners
– Maximizes *human contribution* to forecast process
How Does IFP Work?

– A 7-day digital forecast database is established at each WFO
– Forecasters continuously interactively modify the contents of the database using the latest observations and model guidance
– NWS text, tabular, voice, and graphic products are generated from the database
– The database itself is provided as an NWS product to customers and partners
**Digital Forecast Matrix**

**BUCHANAN VA—DICKENSON VA—MCDOWELL WV—WYOMING WV**
INCLUDING THE CITIES OF...CLINTWOOD VA...GRUNDY VA...PINEVILLE WV...
WELCH WV

324 PM EST SAT JAN 12 2002

<table>
<thead>
<tr>
<th></th>
<th>SUN 01/13/02</th>
<th>MON 01/14/02</th>
</tr>
</thead>
<tbody>
<tr>
<td>EST</td>
<td>15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12 15 18 21 00 03 06</td>
<td></td>
</tr>
<tr>
<td>POP 12HR</td>
<td>40 20 10 30</td>
<td>40 30 30 30</td>
</tr>
<tr>
<td>QPF 12HR</td>
<td>.01-.10 0 0</td>
<td>.01-.10 .01-.10</td>
</tr>
<tr>
<td>MAX QPF</td>
<td>.01-.10 0 0</td>
<td>0 .01-.10</td>
</tr>
<tr>
<td>SNOW 12HR</td>
<td>00-00 00-00</td>
<td>00-00</td>
</tr>
<tr>
<td>MN/MX</td>
<td>27 31 32 36 40 42 22 28 30 36 40 41 30 32 34</td>
<td></td>
</tr>
<tr>
<td>TEMP</td>
<td>45 41 37 32 33 36 39 39 36 33 30 28 30 34 38 39</td>
<td></td>
</tr>
<tr>
<td>DEWPT</td>
<td>31 31 30 30 29 29 28 28 26 26 26 25 25 26 28 30</td>
<td></td>
</tr>
<tr>
<td>RH</td>
<td>58 67 76 92 85 75 64 64 67 75 85 88 81 72 67 70</td>
<td></td>
</tr>
<tr>
<td>WIND DIR</td>
<td>SW W W W NW NW NW NW W W W SW S S SW SW</td>
<td></td>
</tr>
<tr>
<td>WIND SPD</td>
<td>10 12 15 15 15 15 15 12 10 8 8 8 12 15 15 10 10 10 5 5</td>
<td></td>
</tr>
<tr>
<td>RAIN</td>
<td>C C C C</td>
<td></td>
</tr>
<tr>
<td>SNOW</td>
<td>C C C C C C</td>
<td></td>
</tr>
<tr>
<td>WIND CHILL</td>
<td>26 18 11 13 17 21 24 23 23 19 17 12 14 19 27</td>
<td></td>
</tr>
</tbody>
</table>
Experimenta
I Web
Product
NDFD Forecast Elements

- The NDFD will contain:
- Weather, water, and climate forecasts from WFOs, RFCs, and NCEP Service Centers
- Elements that support generation of current WFO products
- Digital watch, warning, and advisory information
- Elements that would attract user development of graphics and decision tools
- The official NWS forecast for each element
Current NDFD
Experimental Elements

- *Daytime maximum and nighttime minimum temperature*
- *Probability of Precipitation (12 hour)*
- *Significant weather*
- *Sky cover*
- *Temperature*
- *Dewpoint temperature*
- *Wind direction and speed*
- *Precipitation amount (QPF)*
- *Snow amount*
- *Wave height*
NDFD Resolution

- **Spatial resolution:**
  - 5 km grids for now
  - 2.5 km grids when AWIPS upgraded
- **Temporal resolution:**
  - 3 hourly for days 1-3
  - 6 hourly for days 4-7
  - as available from CPC beyond day 7
- **Update frequency:** every hour
IFP ORD Success Criteria

- **Timeliness:** New Day 7 grids are available by 1800 UTC each day 95 percent of the time.
- **Availability:** Grids available 95 percent of the time.
- **Consistency:** Meteorological consistency of all transmitted grids along WFO boundaries within prescribed thresholds 90 percent of the time.
- **Quality:** Point verification for maximum and minimum temperature and PoP within natural variability bounds as compared with past years for same dates.
IFP/NDFD ORD
Verification

Max Temperature
* = 208 AVP Sites, **=1279 METAR sites

Mean Absolute Error (Deg. F)

<table>
<thead>
<tr>
<th>Period</th>
<th>LCL*</th>
<th>NDFD*</th>
<th>AVN MOS*</th>
<th>NDFD**</th>
<th>AVN MOS**</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Probability of Precipitation (PoP)

* = 208 AVP Sites, ** = 1279 METAR Sites

Brier Score

- LCL*
- NDFD*
- AVN MOS*
- NDFD**
- AVN MOS**

Forecast Period

period 1  period 2  period 3  period 4
NDFD Technical workshop

• Key Participant Recommendations:
  – Explore providing Grids in NetCDF format
  – Provide grid product update information
  – Provide “change only” access
  – Ensure conformity with digital data standards
  – Expand NDFD domain to aviation and oceans
  – Continue efforts to add probabilistic information
  – Find a way to get expanded NDFD information out to partners/users