The NCEP Role in the Transition From Research to Operations

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“Where America’s Climate, Weather and Ocean Services Begin”
Overview

• Example of bridging the gap between research and operations: The USWRP & NCEP’s Role

• Applying the “Funnel” to the Transition Process

• NCEP’s role in the model transition process

• Implications for computer allocation and applications
Bridging the Gap Between Research and Operations: An Example

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<th>Transition</th>
<th>Operations</th>
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<tr>
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<td>NOAA/OAR</td>
<td>NOAA/NWS</td>
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<td>NSF</td>
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<td>NOAA</td>
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<td>ONR</td>
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USWRP
Hurricane at Landfall
“Success Story”

- Accelerated rate of improving track forecast
- Extended forecast period to Day 5

All R2O transition successes involved NCEP Centers
Applying the “Funnel” to the Transition Process

1. Large “volume” of R&D, funded through AOs, Agency Labs…
2. Smaller set of R&D products suitable for operations.
3. Systematic transition steps.
4. New products can serve diverse and expanding user community.
5. Delivery to diverse USER community

NCEP is uniquely positioned to provide an operational infrastructure for the transition process.
NCEP is uniquely positioned to provide robust operational infrastructure and technical support for an “End to End” process from observations, to analyses/data assimilation, to numerical forecasts, to product delivery.

- EMC and NCO are transition agents for NOAA and other Agencies.
- The transition process is driven by a “Concept of Operations” and service requirements.
- Specific criteria are applied at decision points in transition process.
  - Scientific Validity
  - Analyses and Forecast Benefits
  - Code Efficiency and Potential for New Capabilities
  - IT Compatibility and Sustainability

- Test Beds positioned between R&D community and NCEP Centers: e.g. JCSDA, CTB, WRF DTC to facilitate and accelerate the transition process.
NCEP’s Role in the Model Transition Process

EMC and NCO have critical roles in the transition from NOAA R&D to operations

Transition from Research to Operations

Launch List – Model Implementation Process

Concept of Operations

Requirements

Criteria

Observation System

Effort

NOAA Research

Other Agencies & International

R&D

Test Beds

JCSDA

CTB

WRF DTC

EMC

NCO

Service Centers

Field Offices

OPS

Life cycle Support

Service Centers

User

Operations Delivery
NCEP’s (Modeling) Transition to Operations:
Focus on EMC and NCO

1. Identified for Selection
2. Code/Algorithm Assessment and/or Development
3. Interface with Operational Codes
4. Level I: Preliminary Testing (Lower Resolution)
5. Level II: Preliminary Testing (DA/Higher Resolution)
6. EMC Pre-Implementation Testing (Packaging and Calibration)
7. NCO Pre-Implementation Testing
8. Implementation Delivery

Launch List – Model Implementation Process

1 2 3 4 5 6 7 8  
R&D

Observation System

OPS Life cycle Support Service Centers User

Concept of Operations

Requirements

Criteria
Transition Steps (Modeling)

1. Identification for Selection
2. Code/Algorithm Assessment and/or Development
3. Interface with Operational Codes
4. Level I: Preliminary Testing (Lower Resolution)
5. Level II: Preliminary Testing (DA/Higher Resolution)
6. EMC Pre-Implementation Testing (Packaging/Calibration)
7. NCO Pre-Implementation Testing
8. Implementation/Delivery
Launch List

Model Implementation Process

• A generic set of milestones for any implementation.

• Milestones are defined by an agreed-upon implementation plan between NCO, EMC, NCEP service centers and NWS regional offices.

• Tailored for each implementation.

• EMC hands off final code to NCO.

• NCO conducts testing with operational configuration, certifies timely and reliable product delivery capability.

• Service centers provide subjective evaluations.

• NWS regional office evaluations are coordinated with OCWWS.

• Technical and scientific results are evaluated, briefed and approved by EMC, NCO, and NCEP director prior to implementation.

• NCO implements changes into NCEP’s operational production suite.
NCEP’s (Modeling) Transition to Operations: EMC/NCO/Computer Resources

EMC Resources: Transition - $5.7M (33.7 FTE)
Life Cycle Support: Sustain/Enhance - $2.3M (13.3 FTE)

NCO Resources: Launch List/Life Cycle Support - $4.1M (22.5 FTE)

Computer Resources: ½ Central Computer System or $13.0M

Existing Gaps: To Be Identified in FY08 PPBES Process
How Does This Impact Computers?

• Need to articulate needs for R&D, operations and “Transition” (and related Test Beds!) w.r.t. NOAA computer allocation.

• Determine “Transition” requirements for operational and R&D computers.

• Configure computing and management structure for R&D, operational, transition needs, and resource allocation(s).
  
  • Budget requirements
  • Reliability needed
  • Location specifics
Computing Considerations

• Need for balance between research and operations computing – Don’t load top of funnel with too many things that cannot be supported operationally.

• Need for flexibility – Cooperatively shift research-oriented computational resources to “Best” opportunities; regardless of NOAA research location.
  – Requires adaptable computing architecture to allow the needed resources (Boulder, Princeton, Gaithersburg) to be made available to those researchers who need them
  – Requires agency level HPC resource management capability
  – NOAA HPC Board addressing both of these areas

• Address security requirements of operational computing environment which are more stringent than research environment.
  – Affects how computers are used and more specifically by whom
Summary

NCEP is uniquely positioned to provide an operational infrastructure for the forecast process:

– **Observations (Collection/Processing)**
– **Analyses (Data Assimilation)**
– **Forecast (Global/Regional Models/Ensembles/Atmosphere/Ocean/Land/Cryosphere)**
– **Delivery/Applications for diverse USER community**

An infrastructure that can also be used to perform operationally-relevant R&D, and support transition steps into operations:

- NCEP’s EMC & NCO represent key transition “Agents” for all of NOAA, and both are positioned to provide support from observations, to model prediction, to delivery/application for a diverse user community.
- The transition steps defined by NCEP can be used to determine computer requirements and related resource allocations.