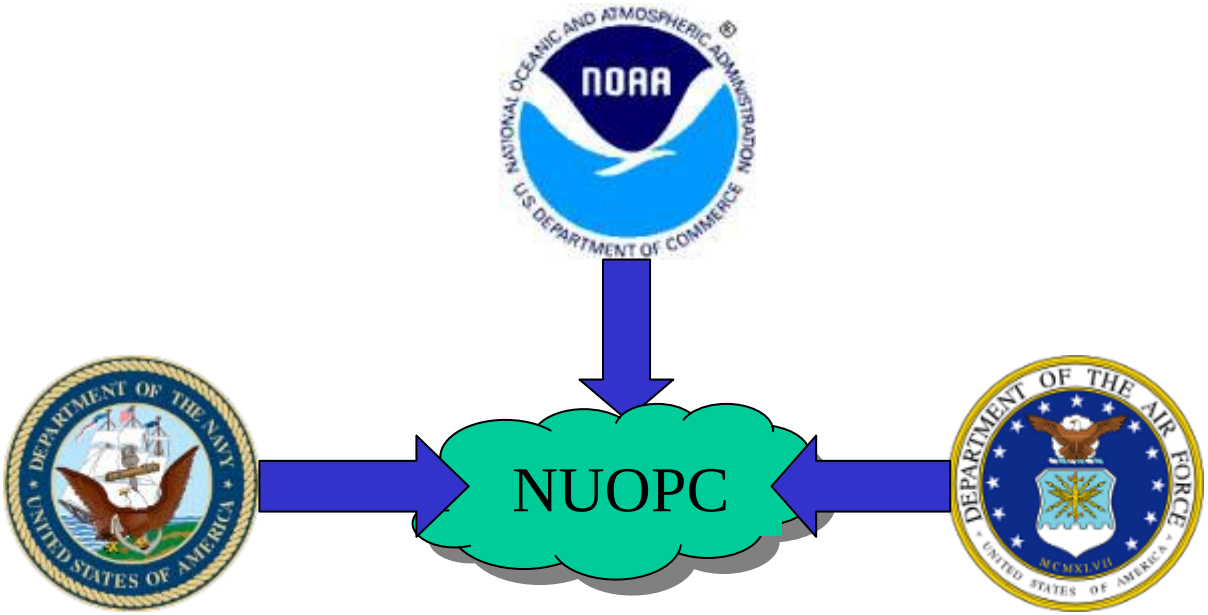
NCEP Production Suite Review

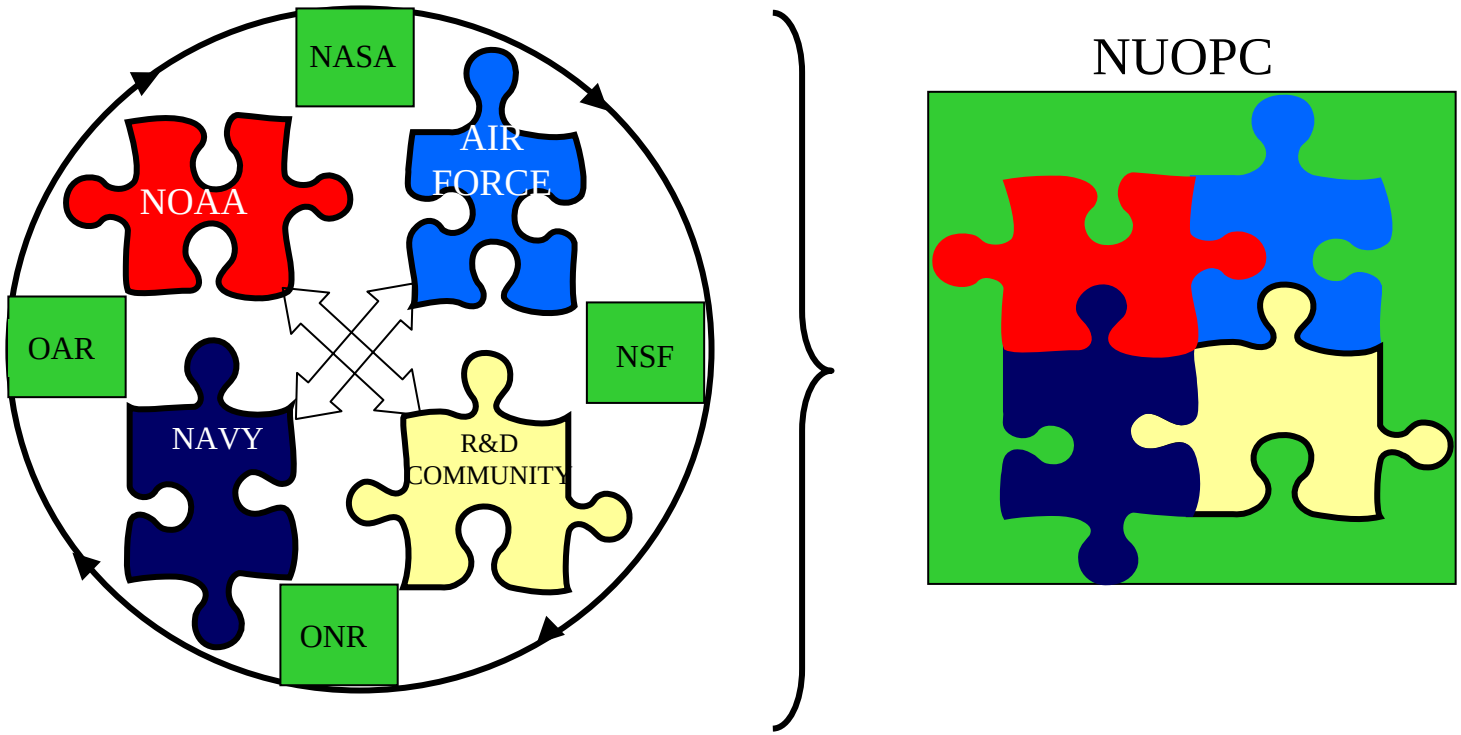
National Unified Operational Prediction Capability (NUOPC)



Fred Toepfer, EMC Deputy Director

December 11, 2007

The NUOPC Concept: A Cooperative Effort



Outline

- Purpose
- Background
- NUOPC Concept & Vision
- NUOPC Implementation Schedule
- NUOPC Phase I
- Community Role in Interim Committees
- Comments by Agency Representatives
- Questions

Purpose

- To announce a Navy, NOAA, and Air Force initiative to coordinate efforts to build a new National Global Ensemble Operational Predictive Capability
  - accelerating improvements in **operational performance**
  - creating opportunities for a more focused National research effort
  - leveraging scarce resources
- To provide information to the research community

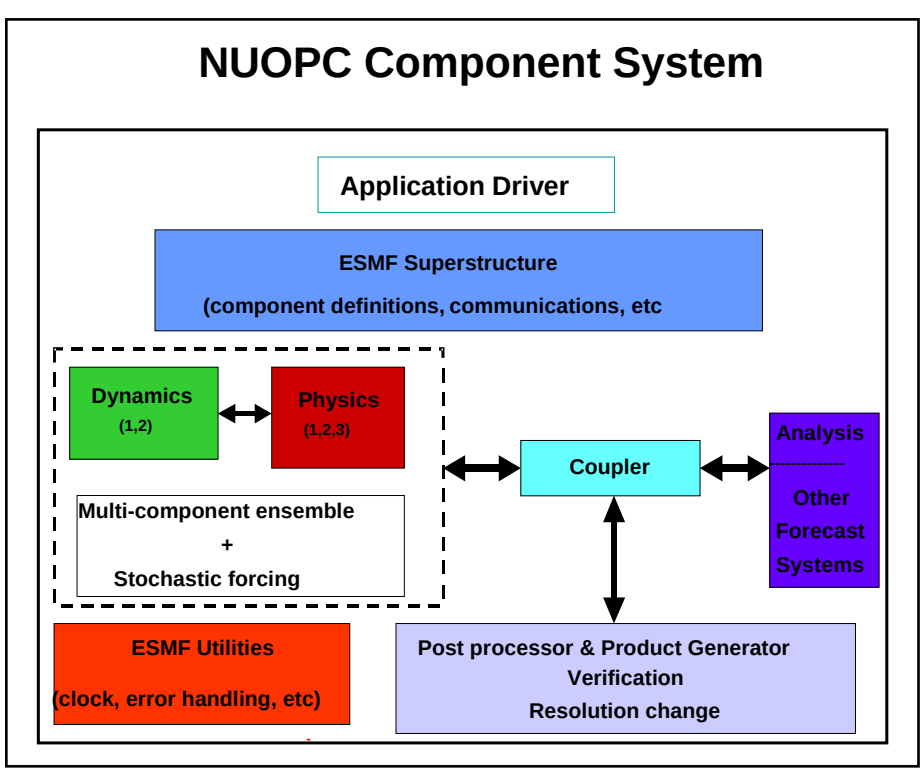
Background

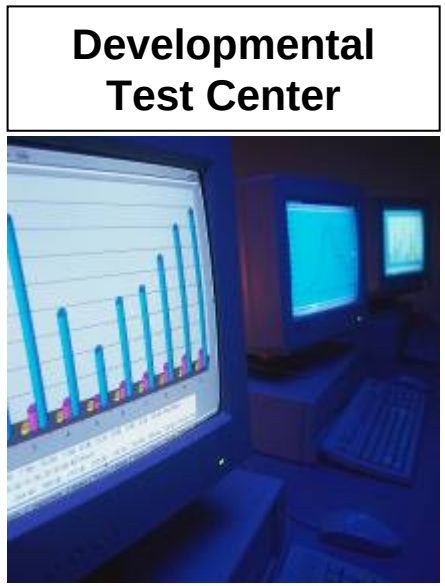
- **Oct 05**: Tri-Agency established a goal of complementary NWP
- **Feb 06**: Workshop investigated potential for increased collaboration
  - Recommended review of alternatives for NWP coordination
- **May 06**: Tri-Agency memo established TT to analyze alternatives for increased collaboration with the following goals:
  - Accelerating improvements in operational performance
  - Creating opportunities for a more focused National research effort
  - Leveraging scarce resources
- **Aug 06**: TT defined the alternatives
  - Focused on next-generation systems for global numerical weather prediction allowing for possible later expansion into other areas of numerical prediction.
- **Jan 07**: Tri-agency selected Alternative 2 -- "*Coordinated Research & Development with Coordinated Transition and Operations*"
- **Mar 07**: Initiated working groups to define Management Plan, Concept of Operations, Implementation Plan, ROM Costs for phased approach
- **Sep 07**: Review and approval of NUOPC documentation and approach.
- **Oct 9, 2007:** Tri-Agency Principals approved NUOPC Phase I.
- **Nov 16, 2007:** Fred Toepfer appointed interim Project Manager.

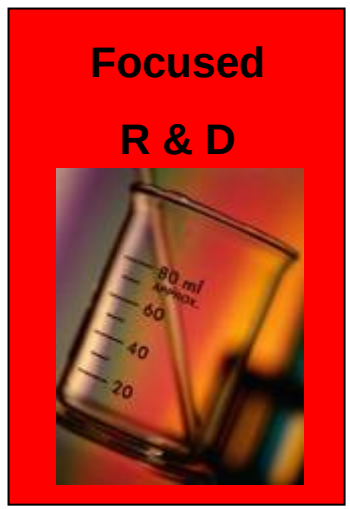
NUOPC Vision (2015)

- A National System with a Tri-Agency commitment to address common requirements
- Multi-component system with interoperable components built upon common standards and a framework such as the ESMF
- Managed ensemble diversity
  - significantly improve forecast accuracy
  - quantify, bound and reduce forecast uncertainty
- Joint ensemble
  - to produce most probable forecast e.g. high impact weather
  - Mission Specific ensemble products
    - Drive high-resolution regional/local predictions
    - Drive other down stream models
- Establish a national global NWP research agenda to accelerate development and transition

Vision: A National Global Modeling System







Coordinated Research and Development with Coordinated Transition and OPS

- Coordinated technology development for future systems
- Interoperable infrastructure (coding standards, file names, interfaces)
- Interoperable model architecture (e.g. ESMF) to allow for exchange of technology at the component level
- Developmental test structure with available tools, support and access to data, data assimilation and developmental models (DTC or VTC)
- Prioritization of common operational needs leading to common development requirements
- Aligned transition process
- Common ensemble system with managed diversity
  - Shares operational computing costs for next-generation ensemble system
  - Maintains capability of each agency to meet Agency unique operational requirements through driving downstream applications
  - Supports significant acceleration in operational performance
- Project Manager responsible to Tri-Agency steering group
  - Provides coordination, development of common requirements, oversight

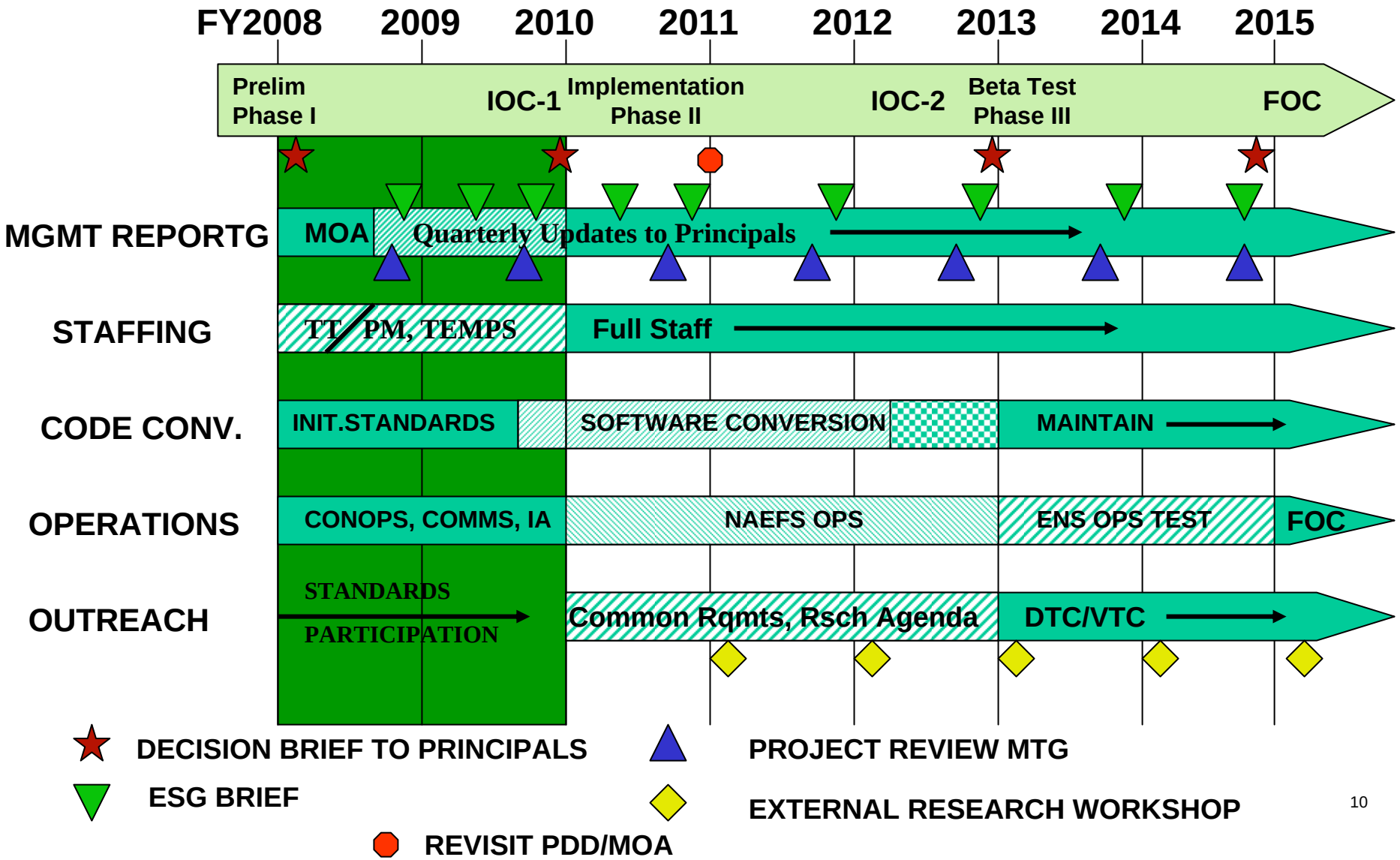
NUOPC DEFINED - 2015

The primary mission of the NUOPC is to ***enable*** a Tri-Agency ***global atmospheric ensemble system***, including the design standards, required research and development, operational implementation, dissemination and evaluation.

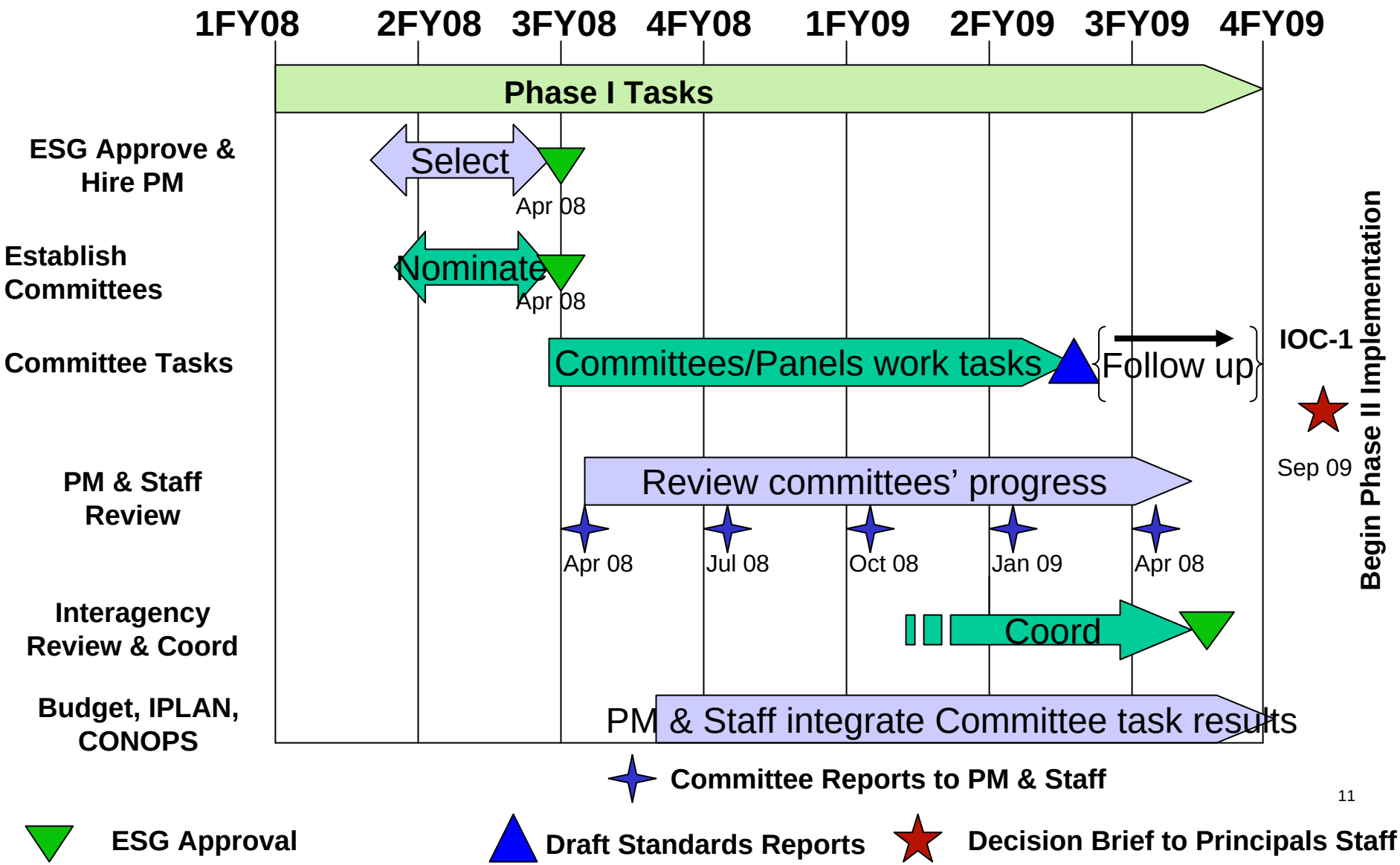
- NUOPC is an integration of ongoing efforts coordinated by a Tri-agency management organization leading to a unified global modeling system with:
  - Common modeling architecture, coding standards, metrics, transition processes – to the degree required to share technology and eliminate unnecessary duplication
  - Cooperation and coordination at the technology level
  - Common operational global ensemble and post processing by design
  - Coordinated research needs representing National global atmospheric modeling research requirements
  - Developmental test support and focused research seed money to accelerate transition of critical technology

- NUOPC is not:
  - An R&D or acquisition program
  - A unified management system for operations or acquisition
  - A unification of agency missions

NUOPC Implementation Schedule



Launching NUOPC Phase I

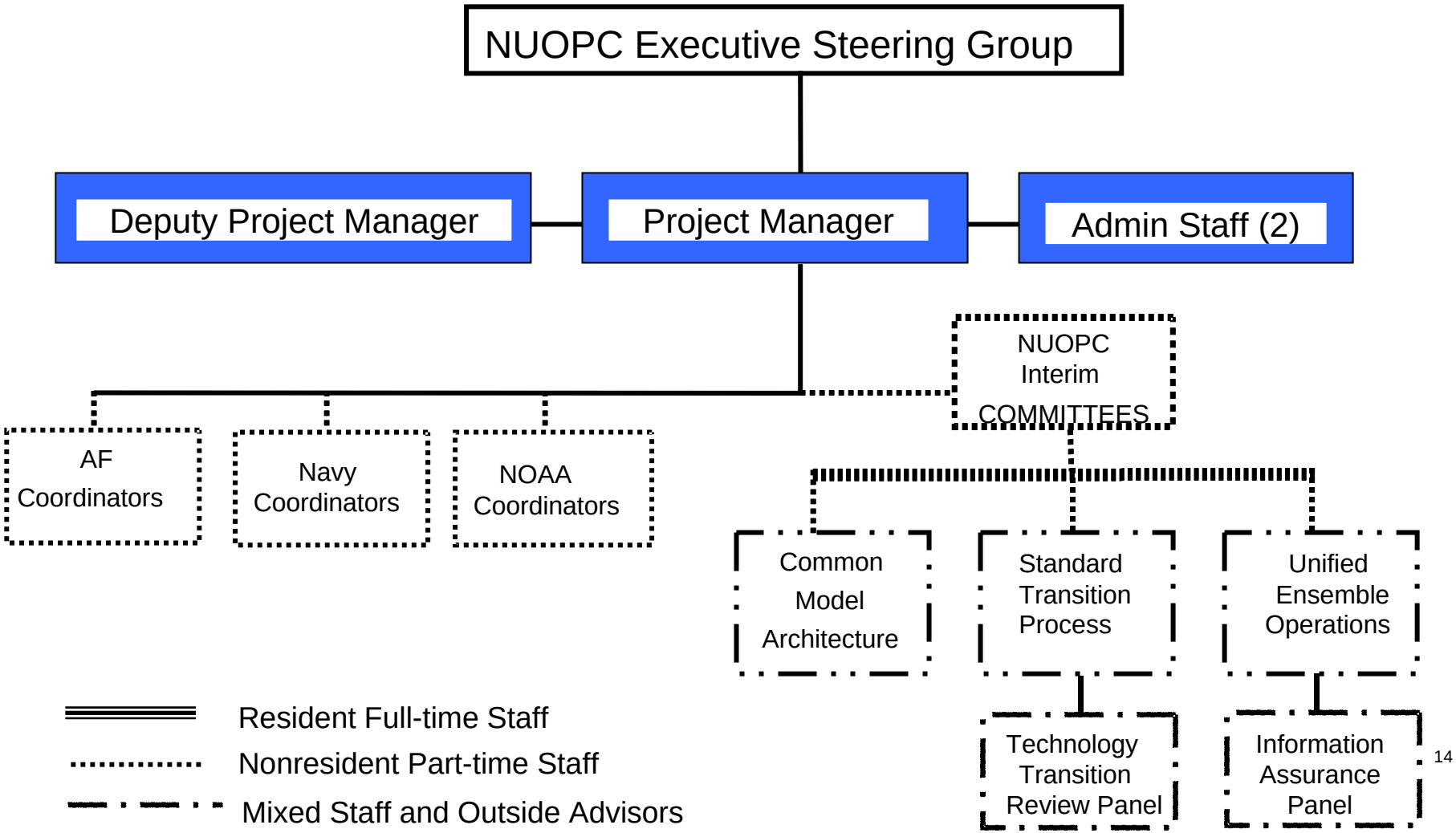


Where We Are Today

- Phase I approval by Agency Principals
- Funding approved for Phase I
- Committee process approved
- Requesting nominations for interim committees:
  - Agency representatives (Operations & R&D)
  - Other Federal agency members (FAA, NASA, …)
  - User community representatives (business, etc.)
  - Academic/research community representatives
- Scheduling second outreach meeting with other Federal agencies (FAA, NASA, NSF, etc.) to provide update and reaffirm support

Backup Slides

NUOPC Phase I Management Structure



Interim Committees

- Goals:
  - Minimize operational center disruption
  - Achieve common modeling architecture objectives while sustaining developmental headway
  - Achieve full stakeholder support
  - Develop well-defined standards that will focus research community participation and accelerate development
- Membership
  - Operational center/primary developer lead
  - Include representatives from operational centers and other stakeholders
  - Include broader research and development community
  - By invitation and nomination
- Next steps:
  - Request nominations
  - Promulgate detailed committee procedures
  - Finalize charter and agenda for committees
  - ESG approve nominations

Common Model Architecture Committee

Task: Develop common architecture and coding standards as necessary to accelerate transition of research and avoid unnecessary duplication of effort.

- Required standards include (but are not limited to) the following:
  - Standard model metadata
  - Standard ensemble prediction infrastructure
  - Standard model structure (i,j,k, etc.)
  - Standard coupling (Air-Ocean-Land)
  - Standard dynamics/physics coupling
  - Unified coding standards
  - Standard I/O interfaces
  - Shared software repository
  - Standard compilation (MAKE) process
  - Standard code directories
  - Standard execution scripts
  - Standard binary formats
- Estimate cost and time to implement

Standard Transition Process Committee

Task: Develop a common transition process to streamline certification of new technology and reduce duplicative recertification among the Tri-Agencies:

- Define common operational needs and translate to common requirements
- Develop a common research agenda and direction
- Develop the VTC/DTC/VSP CONOPS
  - Funding
  - Administrative and systems support
  - Infrastructure
  - Security
  - Access to models and data
- Develop a common process to transition new technology to operations

Technical Transition Sub-Panel

Task: Develop a common transition process and configuration control to streamline certification of new technology and reduce duplicative recertification among the Tri-Agencies:

- Define common technical and operational performance metrics
- Define unified documentation standards
- Develop common configuration control procedures

Unified Ensemble Operations Committee

Task: Develop a unified ensemble operational concept (CONOPS) to allow reliable production and exchange of ensemble products:

- Identify unified ensemble operations requirements with particular attention to the following operational attributes:
  - Standard output fields in standard format and exchange parameters
  - Ensemble configuration including output intervals and forecast length, membership, approximate spatial resolution
  - Product delivery schedule
  - Process for assembly and dissemination
  - Common post processing, if appropriate
  - Procedures to monitor ensemble network security
  - Coordinated software update cycle such that all partners are aware of changes
  - Data archival processes (who, what, where, how)
  - Communications, bandwidth and hardware acquisition
- Estimate cost and time to implement

Information Assurance Sub-Panel

Task: Define NUOPC information assurance standards and processes that meet current and anticipated DoD and NOAA requirements:

- These standards and processes will include:
  - Software
  - Hardware
  - Infrastructure
  - Communications
  - Documentation
  - Performance
- Estimate cost and time to implement