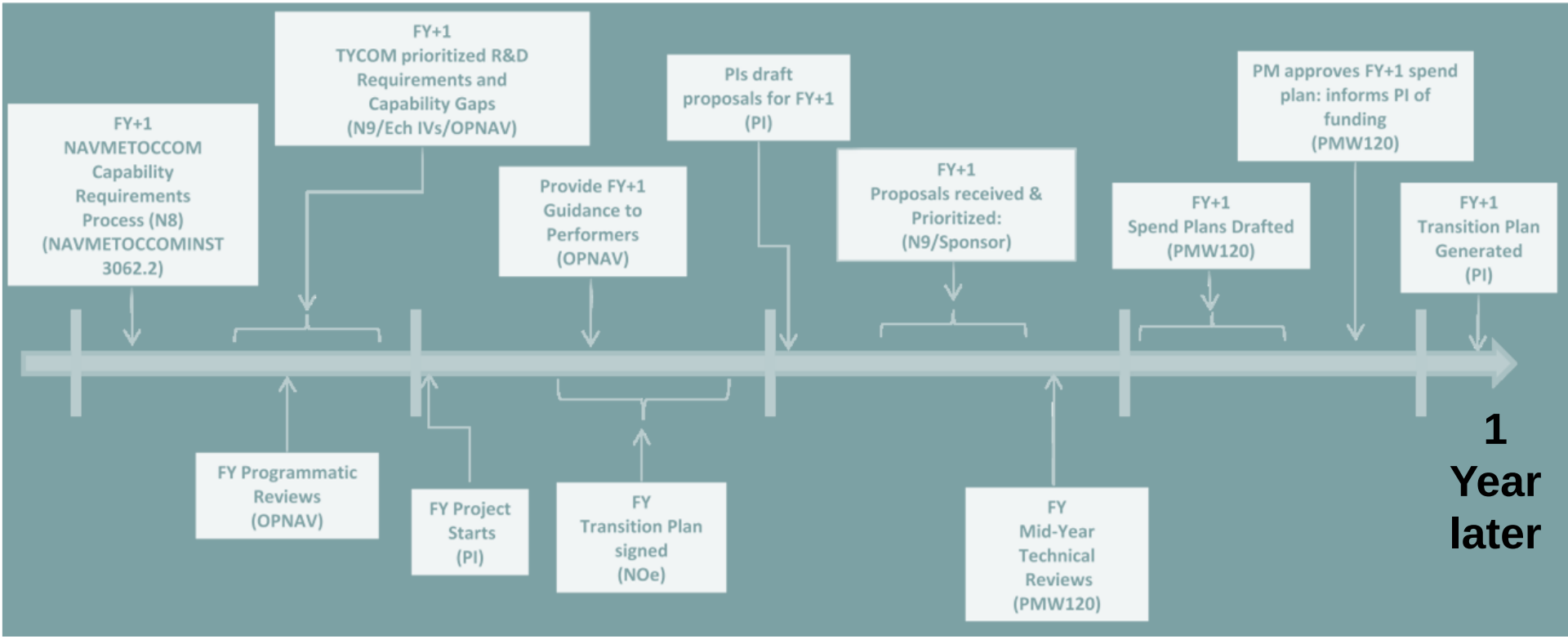
Operational Model Transitions: Examples in Integrated Systems

Charles E. Skupniewicz and Roger Stocker
Models Division, FNMOC, Monterey, CA.
charles.skupniewicz@navy.mil
roger.stocker@navy.mil

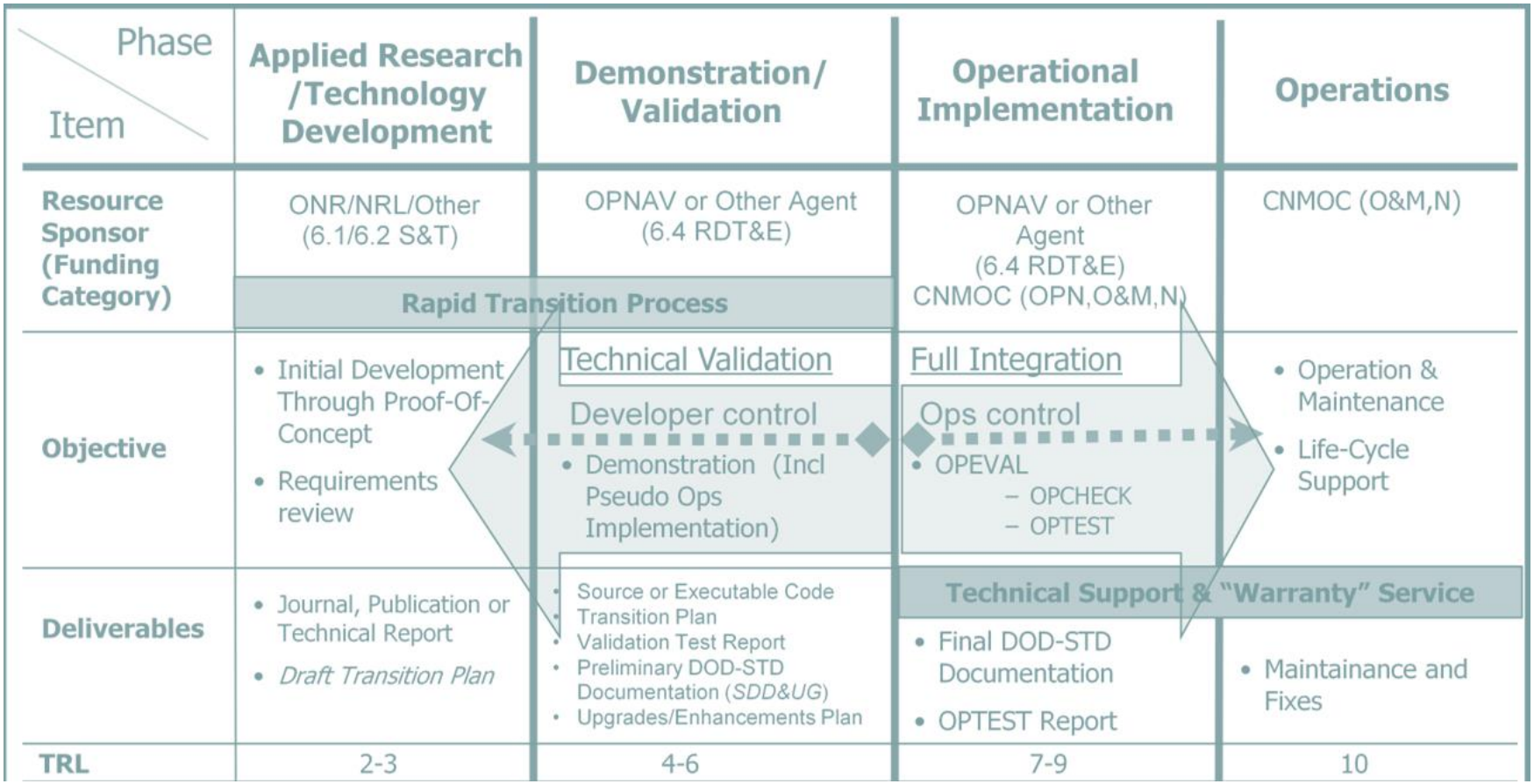
Navy METOC Requirements Management Process



Requirements start with Fleet operational users, but…

- Approval, funding, and reviews involve as many as 7 separate organizations
- Can lead to missing or poorly defined Key Performance Parameters in complex integrated systems.

Navy METOC Technology Transition Process



Follows the DoD acquisition procedures, but …

- Often must integrate into existing Programs of Records
- Schedule may need be compressed for operational or budgetary reasons

Accreditation

- Technical Accreditation
  - Milestone I
    - Journal Article, Publication, or Technical Report
    - Consistency of transition with concept of operations
  - Milestone II
    - Validation Test Report
      - Results of tests
      - Expected performance and limitations
  - Milestone III
    - OPTEST Report documents results
- Formal Accreditation
  - AMOP Review & Approval at each Milestone

Accreditation oversight depends on the nature of the capability

R&D Transition Challenges

- Complicated computational environment that encompasses
  - Data collection
  - Data assembly
  - Data assimilation
  - Forecasting
  - Post-processing
  - Dissemination
- Must comply with Information Assurance standards of Department of Defense

CASE 1
Implement NOAH LSM in COAMPS

The Problem: R&D retrospective validation tests clearly showed Land Surface Model (LSM) was superior, BUT IN REAL TIME, analysis fields are not available at model run time AND data assimilation "competes" with the initialization.

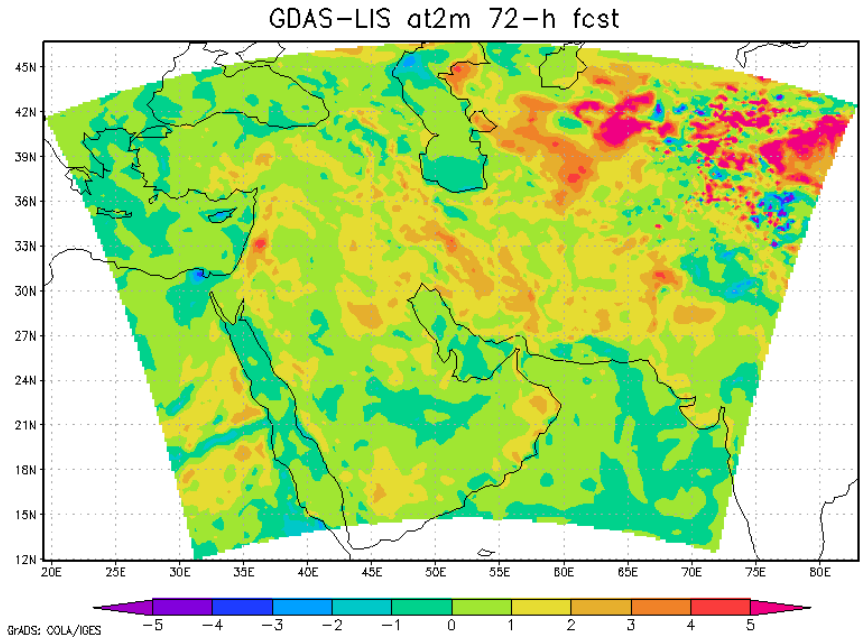
Two Analysis Options

- NCEP Global Data Acquisition System (GDAS)
- AFWA Land Information System (LIS)

Six Runtime Options

- different levels of complexity
- different levels of skill

How do we decide?



Trade Offs: Science vs Complexity

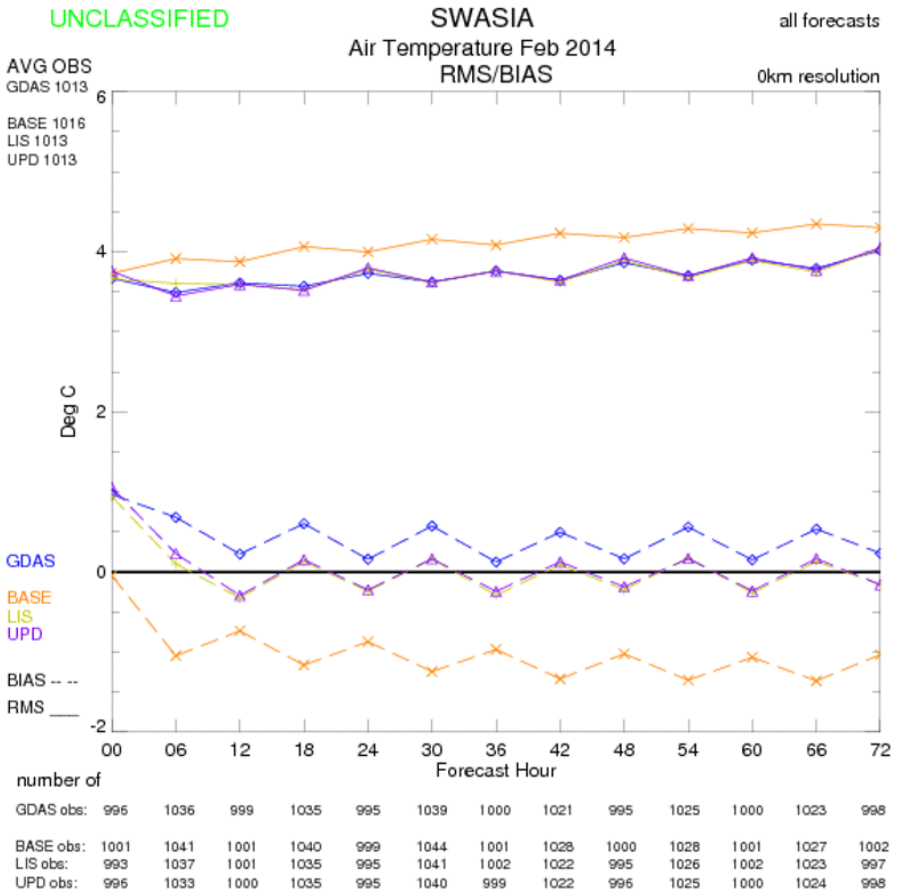
1) Science Panel / Operations Panel

2) Each Panel ranked each option:
   Science=skill
   Operations=complexity

3) Three highest ranking options were chosen for Optest

4) Optest: 3 regions/metrics scorecard

AREA	GDAS	LIS	UPD*
SOCAL	+5	0	-1
SWASIA	+6	+5	+5
WATL	0	0	0



…and the winner is GDAS!

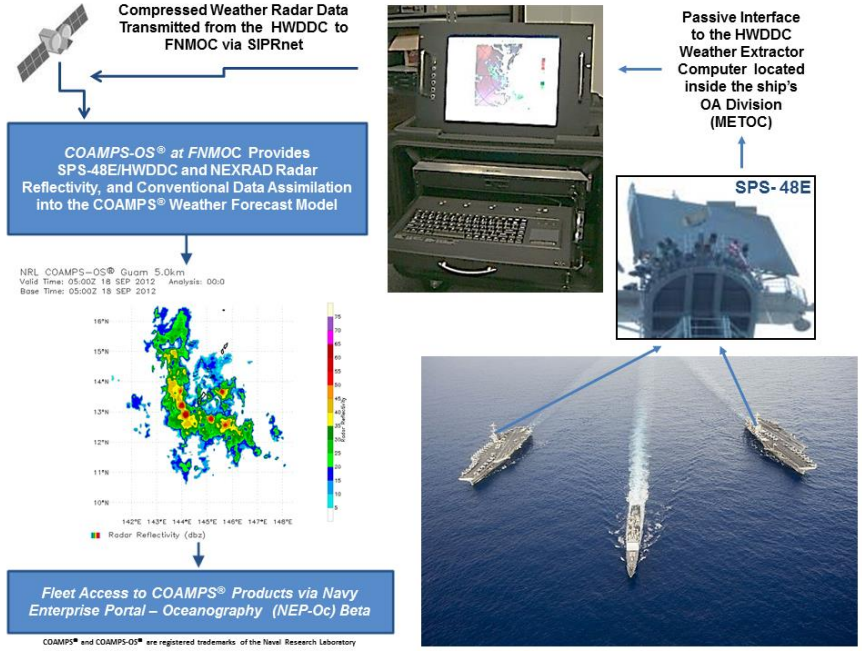
* UPD=LIS w/ update run

CASE 2
Radar DA / REA

The Problem: R&D provided case studies and limited development tests that showed radar data assimilation (DA) improves forecast skill, BUT only in the 1st six hours of the forecast, requiring a new "rapid environmental assessment" (REA) technology.

Two Radar Sources
- -NEXRAD (unclassified)
- -Navy ship radar (classified)

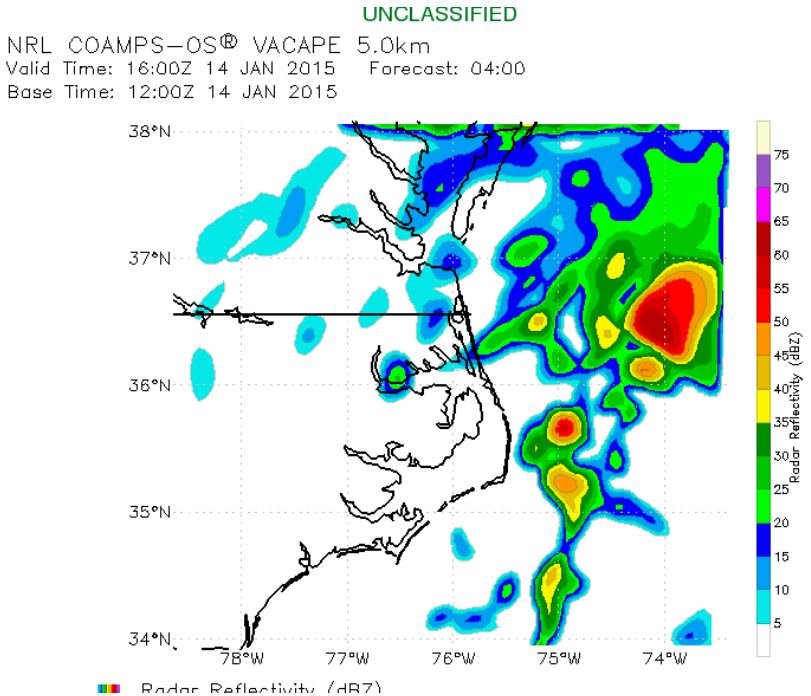
Operational Issues
- - insertion of REA into the Navy METOC forecast process
- - ships move!
- - sea clutter = false positives (bad!)



How do we deploy the new capability?

Developers+Operations+Forecasters = Deployment

1) Developers: added sea clutter filters, posted hardware deployment schedules
2) Operations: added web pages to monitor ship/radar activity, conducted real-time tests: east/west coast US, Persian Gulf
3) Forecasters: provided evaluation of products during the Optest, received training and briefings from Operations



…and the decision is

- deploy NEXRAD for Norfolk and San Diego

- delay ship radar

- fund ship following model nests for ocean transits

Summary: Best Practices

- Responsibility for each transition clearly assigned
- Testing of changes takes place in parallel to operations
  - Operations should not be disrupted
  - Testing on systems configured similar to the targeted environment
- Continuous, strong interaction between R&D and operations
  - Most important aspect of FNMOC transitions

Providing R&D access to FNMOC systems shortens schedule and reduces costs.

Summary: More Best Practices

- Feasibility must be demonstrated through the entire operational process. Considerations include:
  - Networks, Routers, and Communications circuits
  - Database Servers
  - Reliability and Operational protocols
  - Disc, I/O, and CPU resources
  - Load Leveling
- Strong interface with customers to inform considerations for dissemination, use, & impact of new products

Operational Model Transitions: Examples in Integrated Systems

Questions?