

# Simulation Based Acquisition Revisited

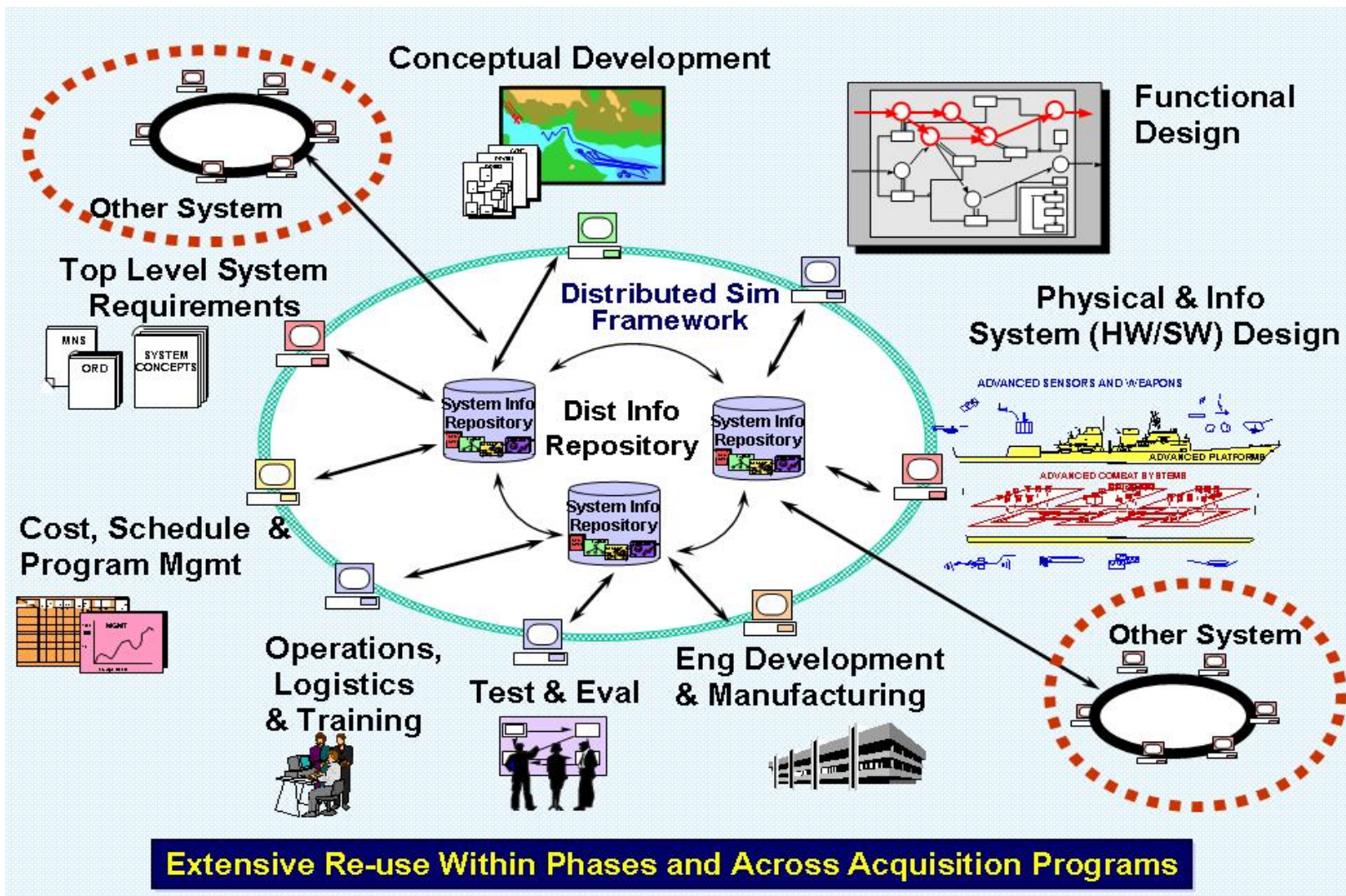
Dr. Michael McGrath

Deputy Assistant Secretary of the Navy  
(Research Development Test &  
Evaluation)

May 17 2007

# Simulation Based Acquisition

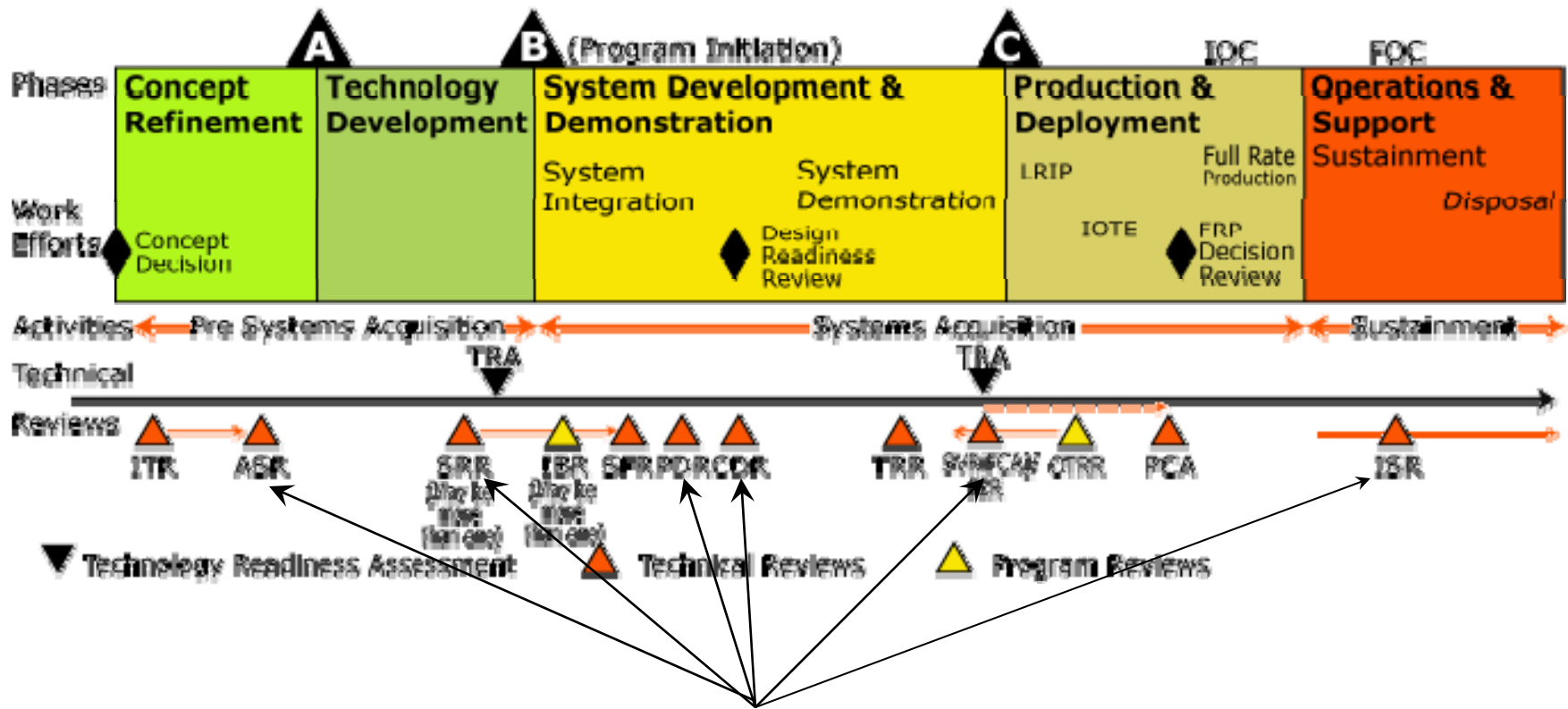
*A 1990s vision not yet realized ...*





# Acquisition Process

*Still calls for M&S throughout the phases*



**Key decision points that should be informed by M&S**



# Barriers to Implementation

## **Business**

- M&S Business Case for an Individual Acquisition Program
- Model and Data Ownership Rights
- M&S Maintenance

## **Technical**

- Validation, Verification, Accreditation (VV&A)
- Interoperability and Reuse -- Infrastructure/Standards
- M&S in a Service Oriented Architecture (e.g. GIG)

## **Cultural**

- Lack of understanding of M&S capabilities and limitations



# Phillip E. Coyle *(former DOT&E)*

- I came to the Pentagon from the Lawrence Livermore National Laboratory ... We never did a test without first trying to calculate - model, as you would say - in rather excruciating detail what would happen. It was literally unthinkable that you would spend millions of dollars on a test without making an equivalent effort first in M&S.
- For the most part, the DOD does not do that. It's quite common in the DOD to spend millions of dollars on a test without making any significant investment in M&S first. *(7 Mar 06 NDIA 22<sup>nd</sup> National T&E Conference)*



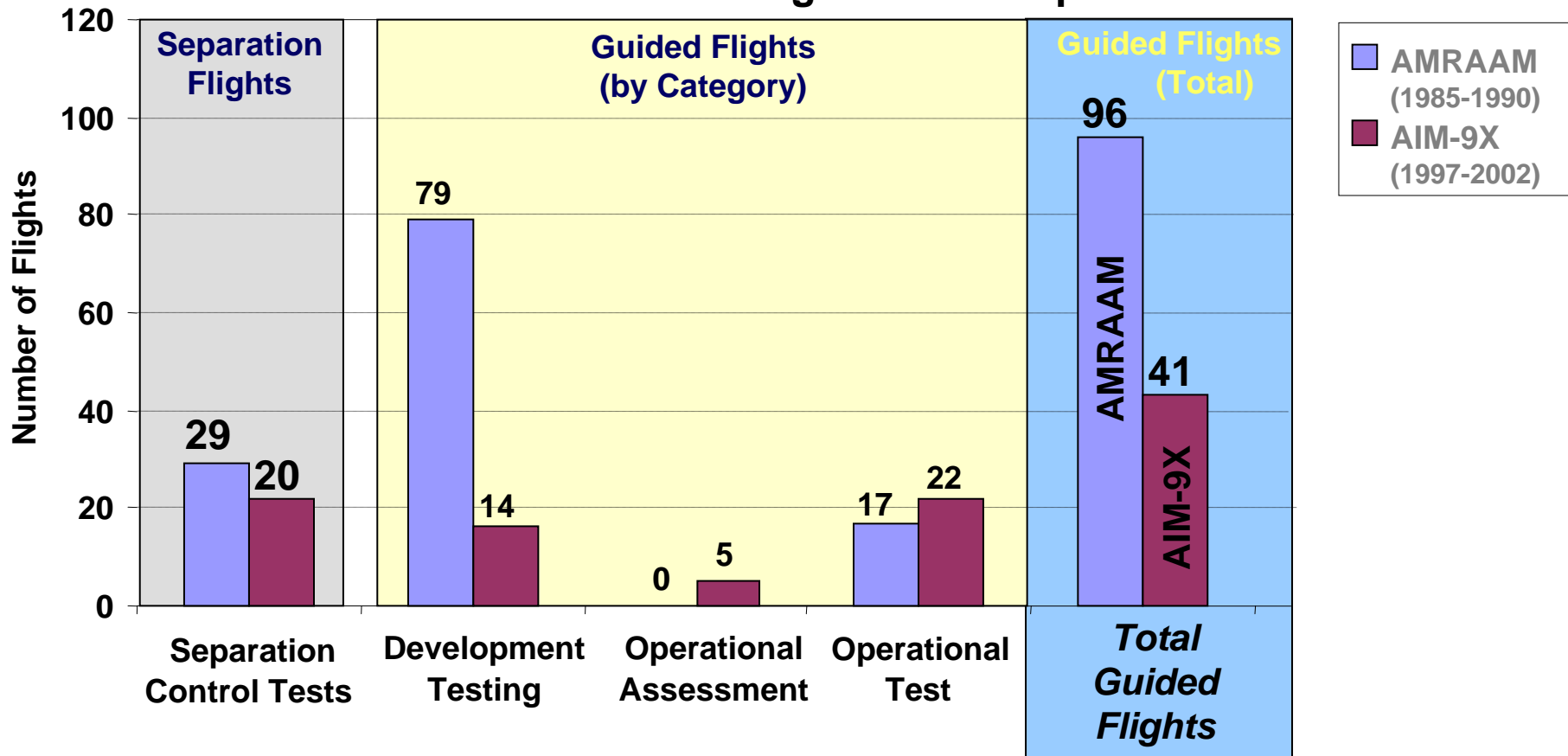
# So Where Does Simulation Based Acquisition Make Sense?

- When the investment pays for itself in one program
  - *Example: AIM-9X*
- When reuse enables multiple programs to benefit
  - *Example: Ship Anti-Air Warfare M&S*
- When M&S is more informative than physical test
  - *Example: Full ship shock trials*
- When there is no other practical way to verify effectiveness and suitability
  - *Example: Distributed System of Systems, net-ready KPP*

# Raytheon Used M&S Successfully on AIM-9X

*Simulation Based Acquisition (SBA) Led To Dramatic Reductions In Weapon System Testing*

**AMRAAM vs. AIM-9X: E&MD Flight Test Comparison**





# Full Ship Shock Trials

*Need more knowledge at less cost*

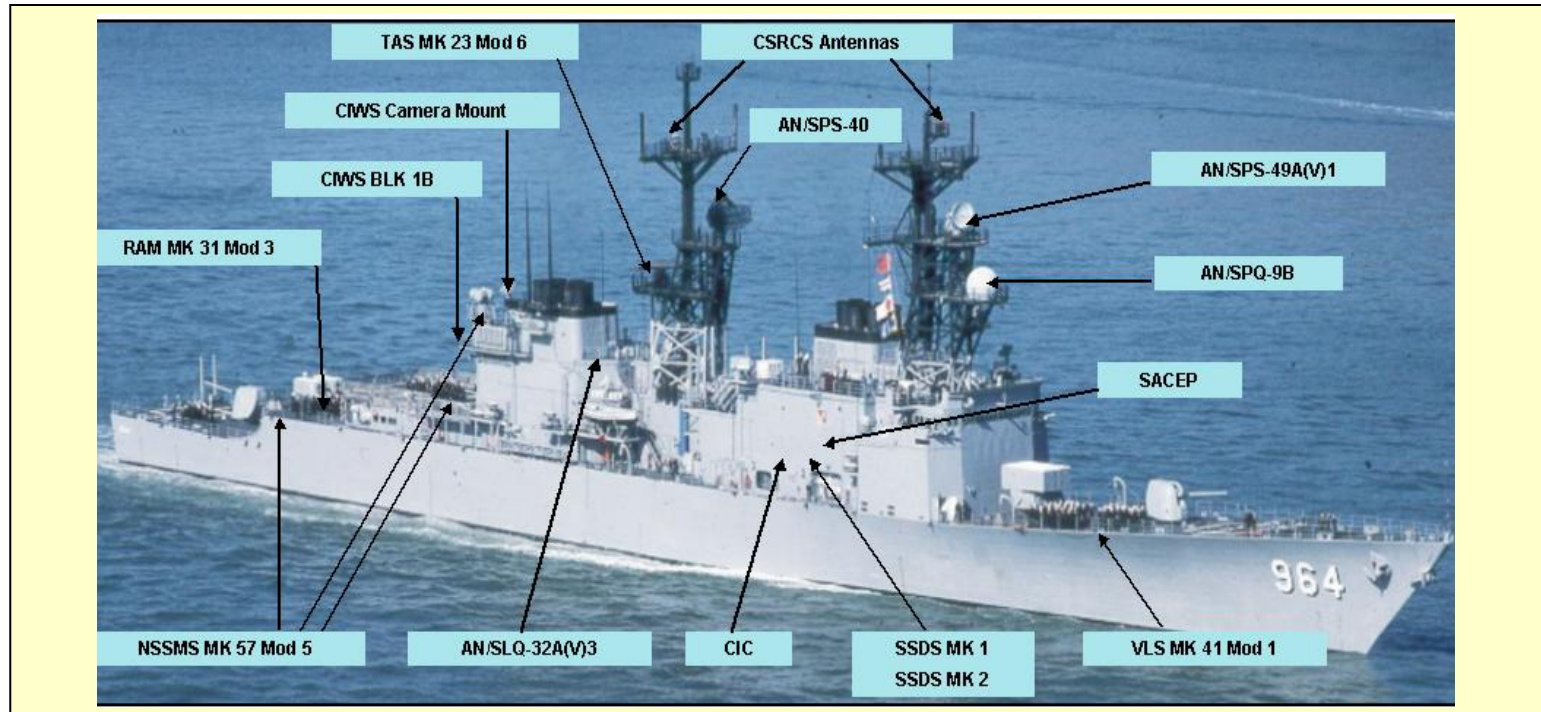


**The Navy is going broke doing the right thing using traditional methods.**



# Ship Self Defense AAW

## PEO(IWS)

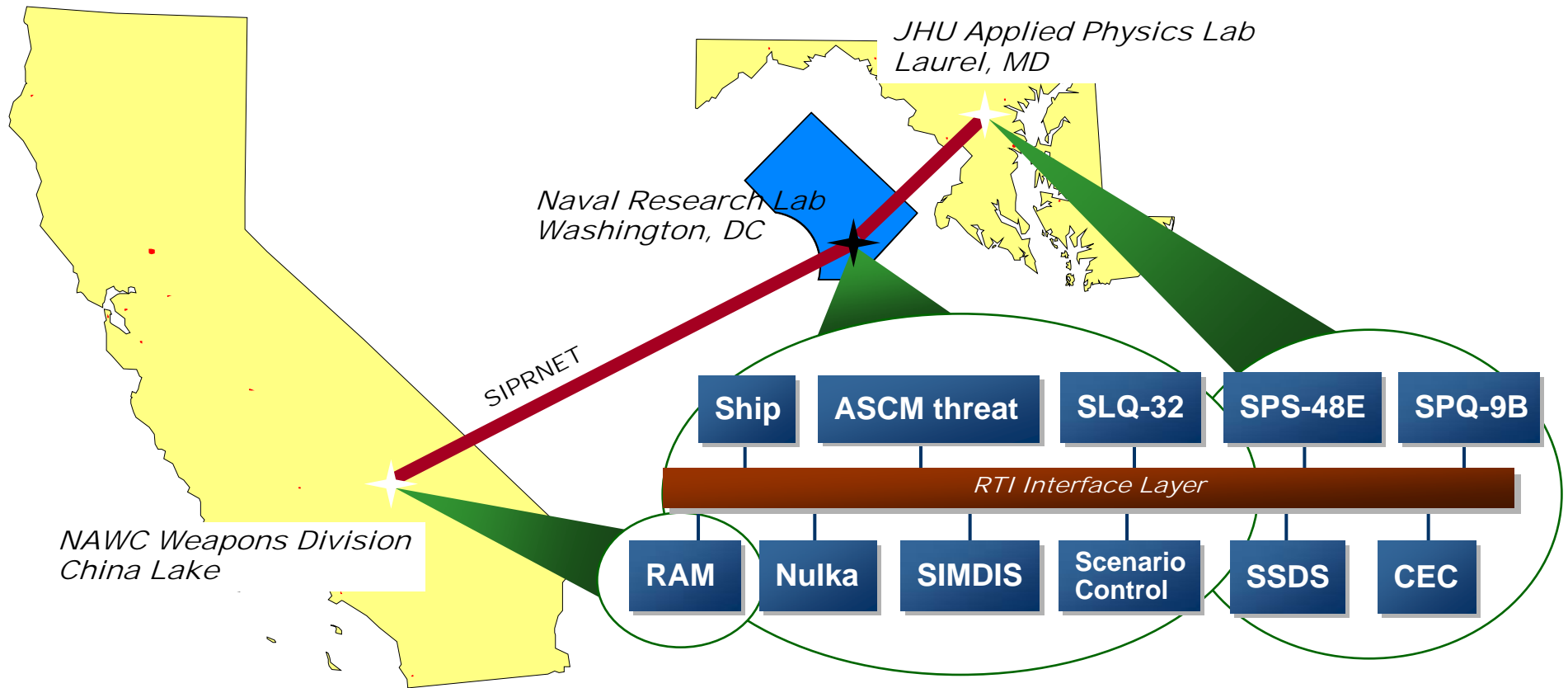


- High degree of commonality in combat systems
  - LPD 17, LHA6, LCS, DDG 1000, CVN 21
- All must demonstrate Probability of Raid Annihilation ( $P_{RA}$ )
- Opportunity for savings through common T&E and simulation



# Navy Enterprise Testbed for P<sub>RA</sub>

## Virtual Test Ship, Virtual Range





# Interoperability and Reuse

*Key to a viable business case across programs*

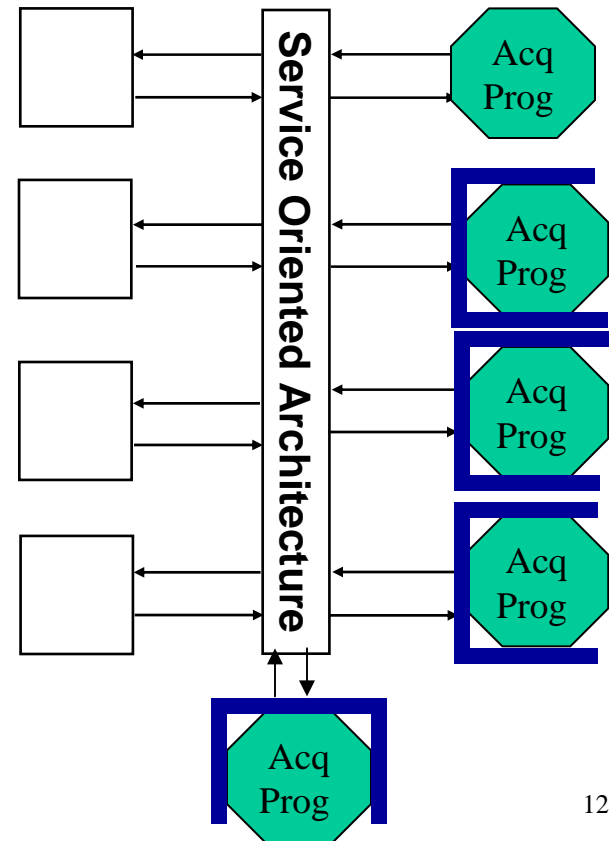
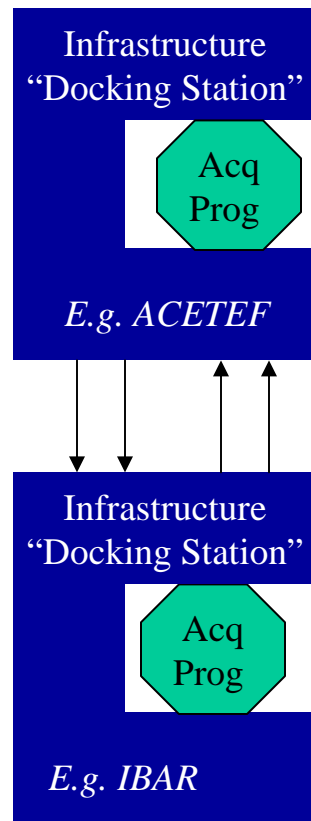
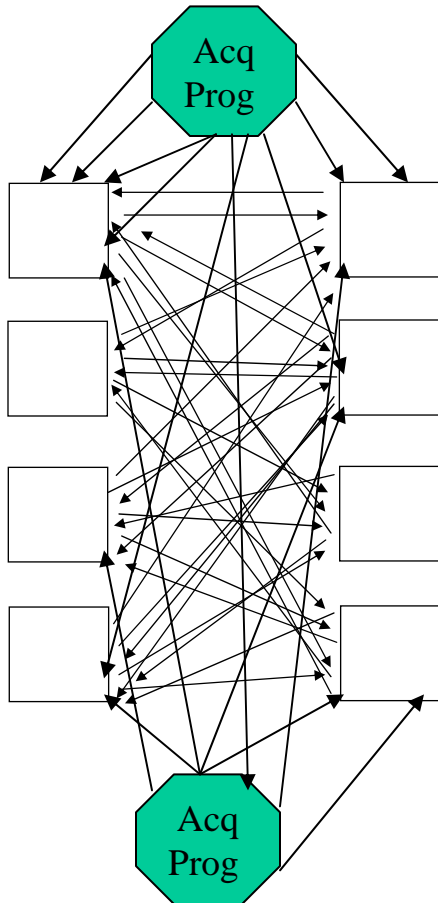
## ***DoD and Navy Programs:***

- Processes and Methodology
  - *JTEM*
- Infrastructure
  - *JMETC*
  - *Navy ACETEF, IBAR, DEP, PRA Testbed, ...*
- Standards
  - *DIS, TENA, HLA, XML, SEDRIS, ...*
- Lead Programs
  - *Navy CVN-21, MMA, JSF*



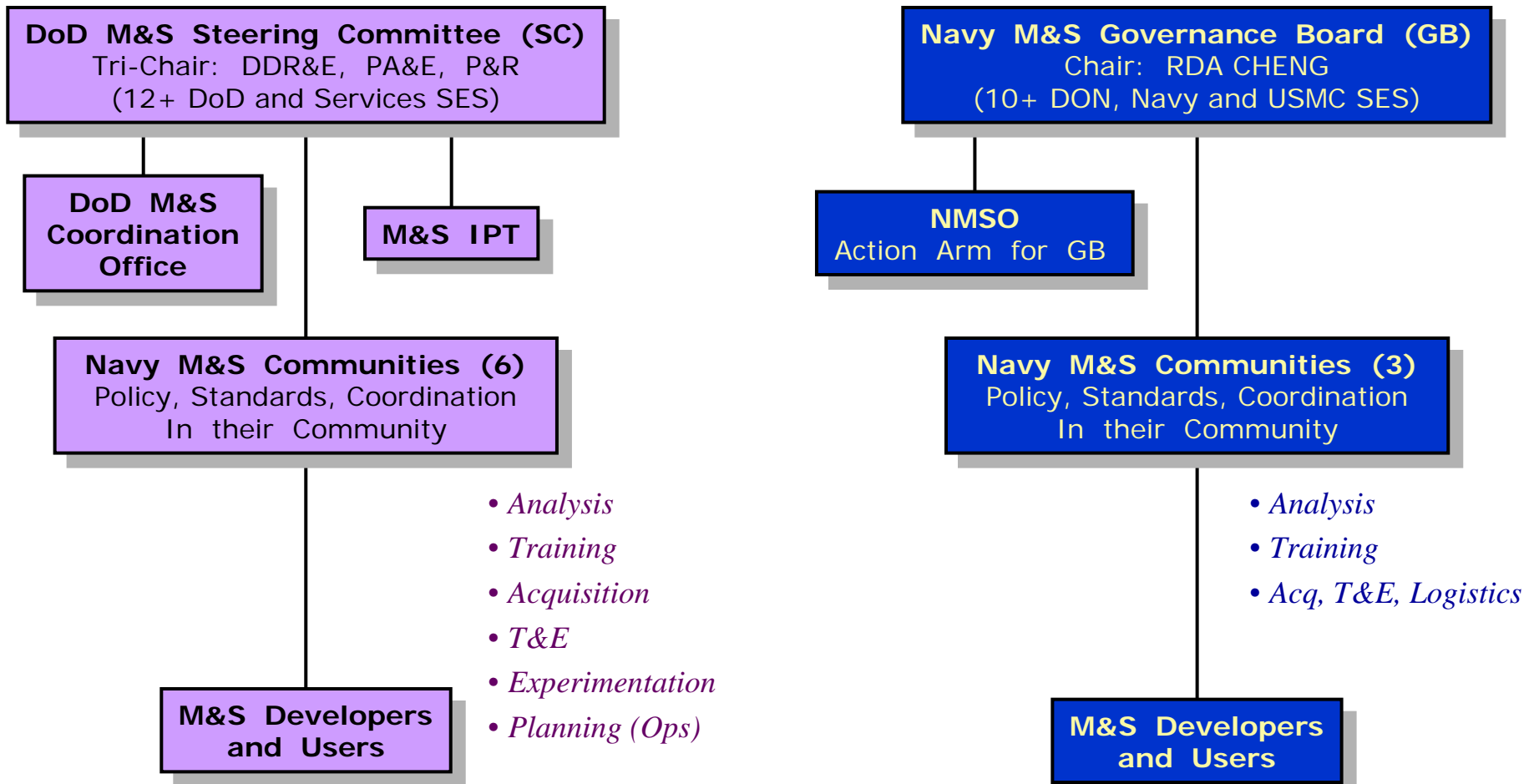
# Evolution in Interoperability and Reuse

*Moving toward "Train like we fight ... Test like we fight"*





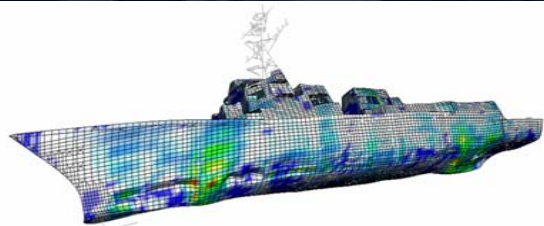
# DoD & Navy M&S Governance





# Challenges for Acquisition Research

- Making the business case for M&S
- Increasing the government role in Systems Engineering, with M&S providing insight at key decision points
- Contract deliverables and intellectual property rights in M&S
- Understanding commonalities and differences across domains
  - Analysis, Training, Systems Engineering, T&E, Logistics
- Model Driven Architecture (MDA) for software acquisition
  - Leveraging unambiguous, executable functional specs



Questions?