



COMOPTEVFOR
Perspectives
on
Modeling & Simulation
in
Operational Test & Evaluation
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Topics



- Current Trends in Navy Operational Test
 - Integration of Testing (DT/OT)
 - Enterprise Solutions
- Need for Modeling & Simulation
- Policy Considerations
- Challenges – Myths and Money
- The Way Ahead – again!



Current Trends

- Integration of Test and Evaluation
 - Fundamental concept is to minimize the duplication of effort by identifying common data requirements up front.
 - Re-structured MV-22 Program is an example
 - Ongoing effort, formalized in mid-2005 with the development of an Integrated Test Framework
 - Common test, shared data, independent analysis
 - Reduce cycle time and cost for testing while providing earlier operational input
 - Independent OPEVAL is retained to ensure statutory independence of the Operational Test Agency; however, the scope of the OPEVAL can be reduced to the extent that valid data are collected from integrated test.



Current Trends

- Enterprise Approaches to Test & Evaluation
 - Should really be titled Enterprise Approaches to Systems Engineering
- Logical consequence of Family of Systems development
 - Ship's Self-Defense System is proto-typical example
 - CVN-76/LPD-17/LHA-6/DD(X)/CVN-78
 - Metric for AAW assessment is Probability of Raid Annihilation
 - LHA-6 test program provided the forcing function
 - Individual testing of the full combat system by each platform would have been prohibitively expensive
 - No single program could bear the cost of a Self-Defense Test Ship

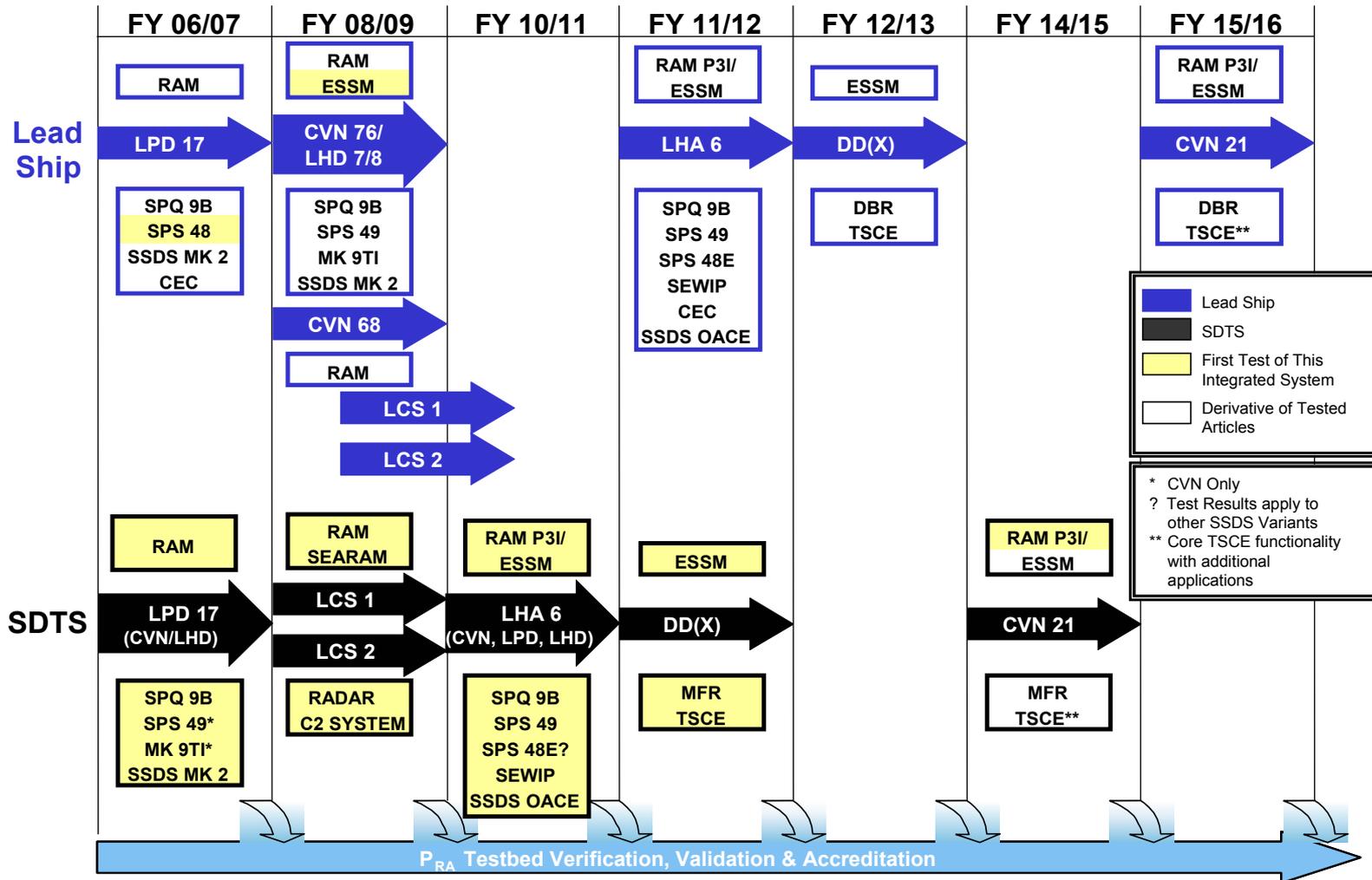


Current Trends

- Alternative approach – realigned development and testing program under PEO IWS
 - By combining test objectives across platforms, conservative estimate is a \$200M reduction in missile and target costs
 - Self-Defense Test Ship will allow the acquisition of data to populate the models needed to assess P_{RA} .
- Additional benefits anticipated from increased information sharing across participating platforms



An Enterprise Approach to AAW Self-Defense





Need for Modeling & Simulation in Operational Test and Evaluation



- 21st Century warfare systems are required to operate in complex environments that are difficult to assess
 - AAW performance assessment
 - Need to assess multiple hard and soft-kill systems working together
 - Electronic Warfare systems
 - Realistic pulse densities; unique threat emitters
 - Undersea Warfare systems
 - Multiple environmental conditions; realistic targets



Need for Modeling & Simulation in Operational Test and Evaluation



- Put another way, anything short of actual use in combat is to a greater or lesser extent a form of modeling or simulation.
- We have neither the time nor the money to build large numbers of threat replicators necessary to test the performance of a systems of systems in the diverse environmental conditions that may be encountered.
- The challenge is to find the right mix of M&S and live end-to-end testing to ensure that weapon systems will perform as predicted in actual combat.







Policy Considerations

- DODD 5000.1 – “The conduct of test and evaluation, integrated with modeling and simulation, shall facilitate learning, assess technology maturity and interoperability, facilitate integration into fielded forces, and confirm performance against documented capability needs and adversary capabilities...” (E1.11)
- DODI 5000.2 –
 - “The T&E strategy shall provide information about risk and risk mitigation, provide empirical data to validate models and simulations, evaluate technical performance and system maturity, and determine whether systems are operationally effective, suitable, and survivable against the threat in the System Threat Assessment.” (E5.1.1)
 - “Appropriate use of accredited models and simulation shall support DT&E, IOT&E, and LFT&E.” (E5.1.4.7)



Policy Considerations

- SECNAVINST 5000.2C – “...M&S may be used during T&E of an ACAT program to represent conceptual systems that do not exist and existing systems that cannot be subjected to actual environments because of safety requirements or the limitations of resources and facilities. M&S applications include hardware/software/operator-in-the-loop simulators, land-based test facilities, threat system simulators, C4I systems integration environments/facilities, and other simulations as needed. M&S shall not replace the need for OT&E and will not be the primary evaluation methodology. M&S shall not be the only method of meeting independent OT&E for beyond low rate initial production (BLRIP) decisions per USC 2399. M&S is a valid T&E tool...” (5.4.7.9)



Challenges – Myths and Money



- Perceptions
 - M&S is an inexpensive substitute for testing.
 - M&S is the natural extension of the computer gaming phenomenon.
 - M&S will revolutionize acquisition.
- Facts
 - M&S can provide information about system performance under a variety of conditions that can not be practically assessed with live testing.
 - Development of models is a complex engineering task. Models and simulations vary greatly based upon their purpose.
 - M&S is an essential component in evolutionary acquisition¹³



The Way Ahead – Again!

- There are few, if any, new ideas needed to make M&S a more effective tool.
 - In the last 8 years there have been a variety of studies, the need is not for study but implementation.
- M&S has played a critical role in the development and operational testing of EW systems for decades.
 - We need to learn from this experience and use the right type of M&S where it best fits.
 - Successful use requires a rigorous understanding what the particular form of M&S can bring to the program.



The Way Ahead – Again!

- M&S must be addressed in the T&E Strategy and the TEMP.
 - The integrated test team needs to determine where various M&S tools are best suited for use.
 - M&S needs to be understood as a tool set, with a variety of different tools, each suited for different applications.
- Program managers must make timely investments to develop the models and collect the data necessary for viable M&S tools.
 - Even when modeling is used, too many programs reach the completion of DT&E without completing the verification and validation of the models used.
- Enterprise solutions require Enterprise level investments in appropriate tools, such as the Self-Defense Test Ship.
 - Without an Enterprise approach, M&S tools are not likely to be available in time to support key acquisition decisions for “systems of systems”.



The Way Ahead – Again!



- Current policies clearly support the use of M&S throughout the entire test and evaluation.
- Rather than new policy, we need to enforce a disciplined systems engineering approach that holds developers accountable for using all available tools to best understand the capabilities and limitations of the weapon system being developed for the warfighter.



Questions?

