Expanded Use of the Probability of Raid Annihilation (P_{RA}) Testbed

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Introduction

The P_{RA} testbed support to LPD-17 is complete, but the testbed itself is just maturing into a multi-use toolset . This toolset has possibilities of supporting other test events/systems outside of the confines of the current planned events. In order to realize and capitalize on the engineering research, development and subsequent refinements in the testbed it is well worth exploring all potential avenues for employing this federation of models.

Presentation Outline

- P_{RA} and the Enterprise

- Capitalization

- Areas for Expansion

- Fleet Tactics Development

- S/W Validation

- SSTAMDA vs AAW CRD

- Trade Studies

- Evolving Capabilities and Threats

- Predictive Analysis

- Conclusion

P$_{RA}$ and the ENTERPRISE

• Probability of Raid Annihilation (P$_{RA}$) Testbed forms one of the core elements of the Enterprise Approach to Anti-Air Warfare Ship Self Defense (AAW SSD).

• Proven capability to provide answers for LPD 17 AAW SSD MOE and other Enterprise platforms/systems.

• Capability exists to answer other questions, to further expand the use of the testbed.
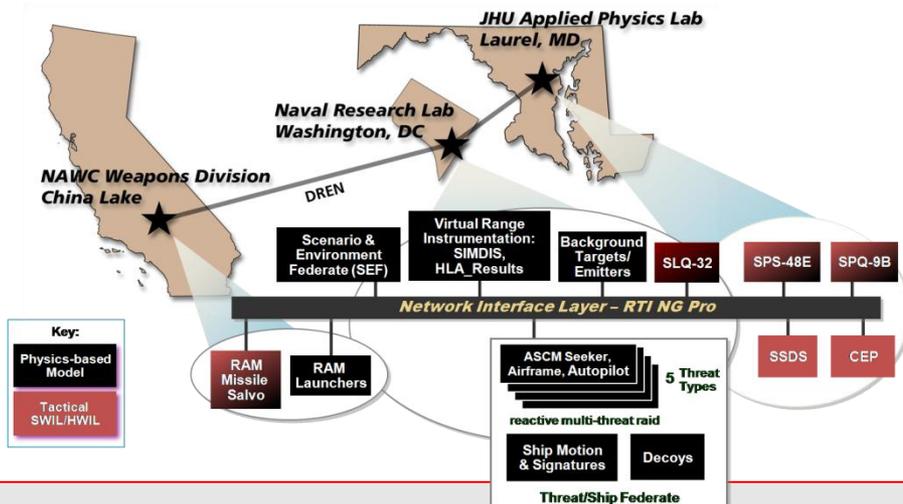
Future Upgrade/Expansion – Capitalize on today's foundation

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Capitalization

- Capitalize on engineering research & development completed to date:

  - Operationally relevant environments

  - Common/shared geographies, threats, and weapons

  - Sensor performance

  - Common Lethality Federate (CLF)*
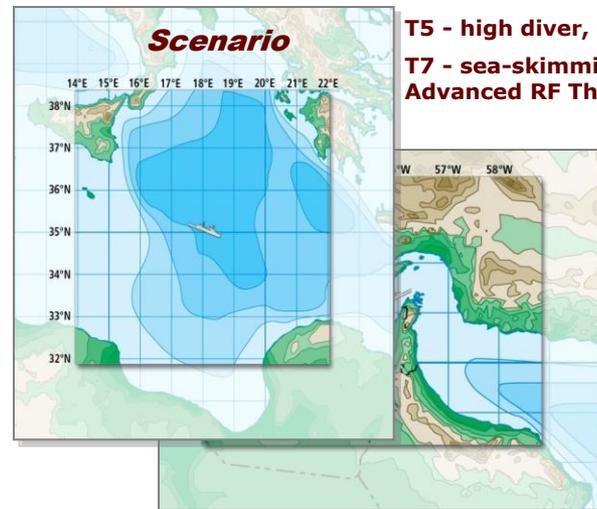
T1R1 - sea-skimming, subsonic RF threat

T2 - sea-skimming, subsonic Imaging IR threat

T5 - high diver, supersonic RF ARM threat

T7 - sea-skimming, maneuvering supersonic Advanced RF Threat

Scenario

"Clean" and "Dirty" Signatures

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Areas for Expansion

• Six Preliminary Areas for consideration in Testbed Expansion
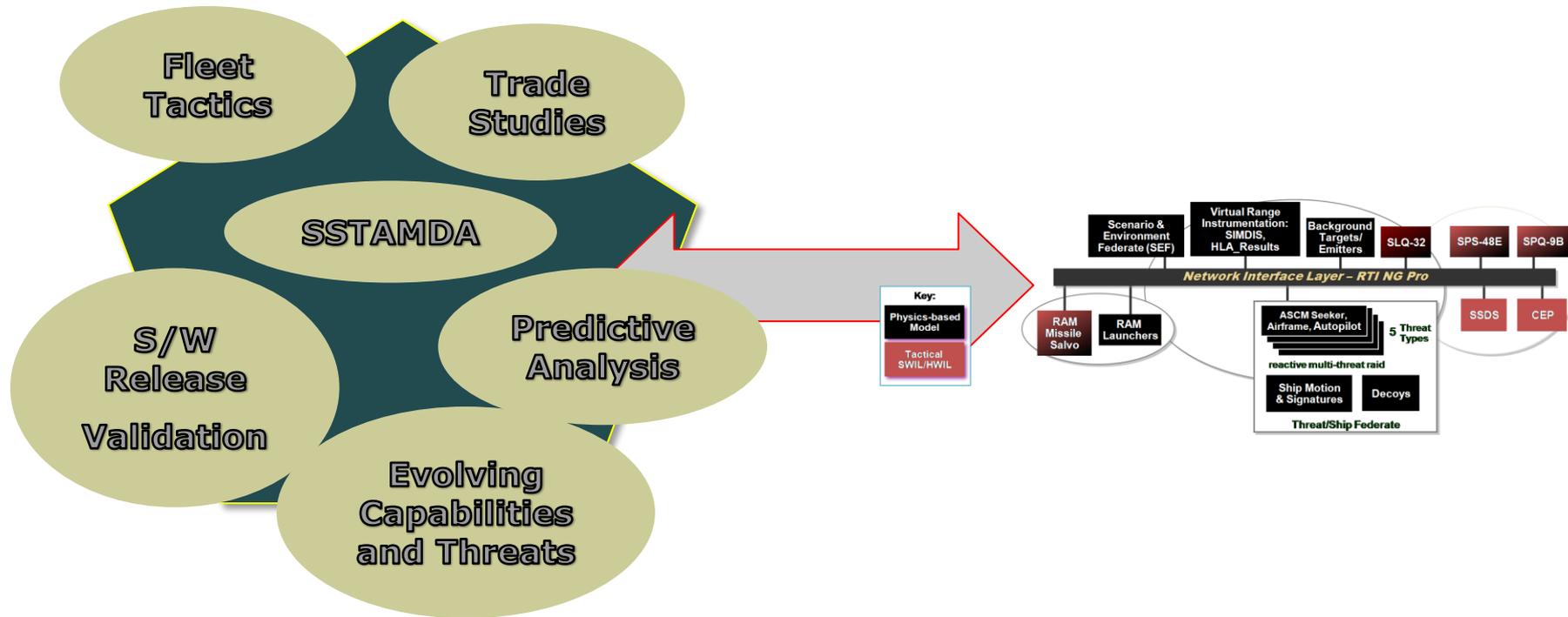
• These areas represent beginning possibilities.

• As other testbeds are developed, co-use opportunities arise – example is DDG 1000 MOE Testbed.

Fleet Tactics Development

- Fleet Tactics

  - Currently developed using intelligence, threat assessments, M&S, and tactician analysis validated by **limited, if any,** formal live end-to-end test events.

  - Testbed can used to verify interim and experimental tactics techniques and procedures against hi-fi representations of appropriate threats in end-to-end fashion.

  - Ability to develop and verify tactics via modeling and simulations (M&S) affords the opportunity to vary the tactical environment.


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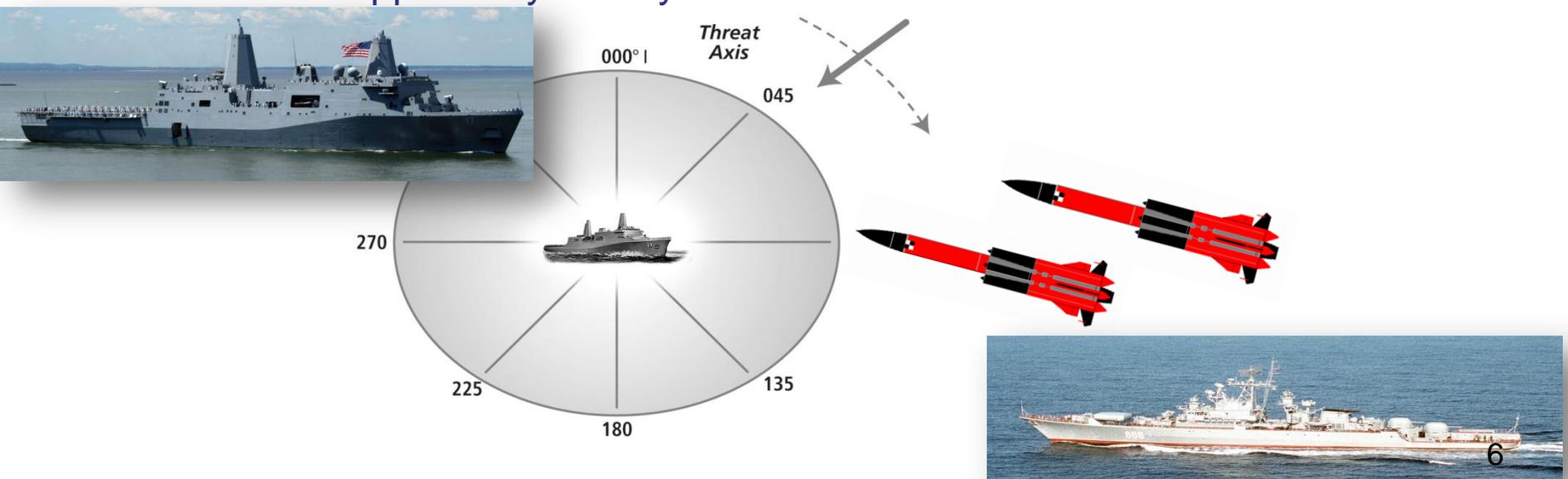
S/W Validation

- Validation of Software Releases

  - Testbed could be used to test and validate tactical software updates, thereby eliminating the need to test and retest on fleet units or test facilities.

    - Ties up fleet assets

    - Scarce test resources

  - An invaluable tool to mitigate time and costs

 - Saves test resource usage
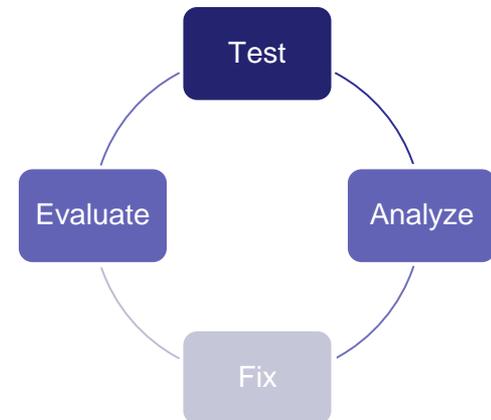
SSTAMDA VS AAW CRD

• SSTAMDA imposes P_{RA} requirements on future ship classes & and existing ships with significant combat system upgrades.

• Recommended P_{RA} for existing ship classes are different from AAW CRD.

• Future ship classes are required to demonstrate they meet the new P_{RA}.

• The Testbed easily adaptable to test virtual ship against the new requirements.
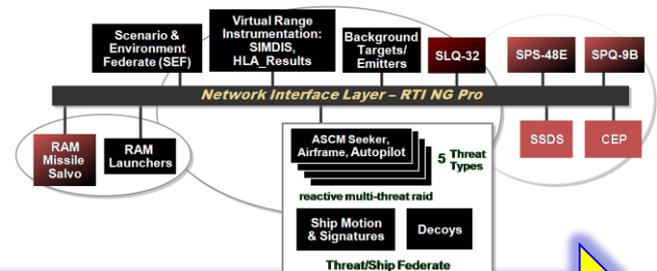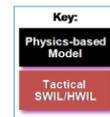
New Requirements tested in a Proven Fashion

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Trade Studies

- Use of the Enterprise Testbed to determine:

  - If a particular combat system configuration will perform successfully to meet P_{RA} requirements.

  - Efficacy of future ship class combat systems variations investigated to an increased degree of accuracy.

    - Prior to full funding commitment or design.

    - Cost saver.

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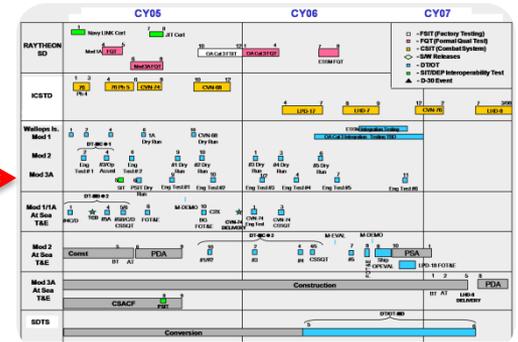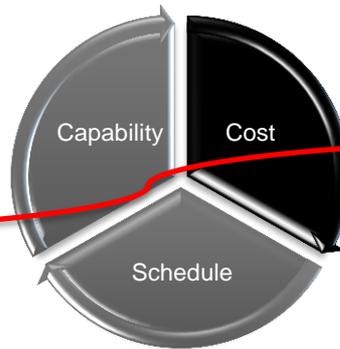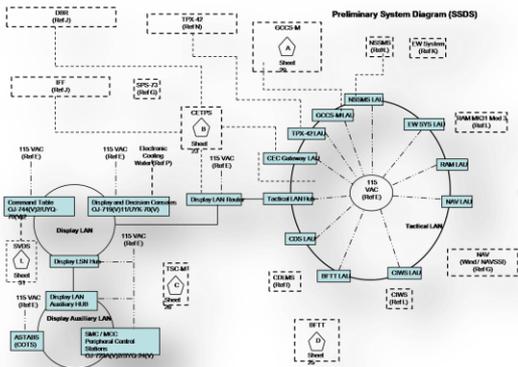
Evolving Capabilities and Threats

- Testing combat systems against evolving threats:

    - With low probability of intercept radars.

    - With coherent radars.

    - With low observable technologies.

- Navy's advancement with (SEWIP) Block II AN/SLQ-32 B, will require:

    - Higher fidelity emissions from threat surrogates (targets) and threat models.

- Use of the Testbed would realize cost savings and fill shortcomings imposed by a lack of capable targets.

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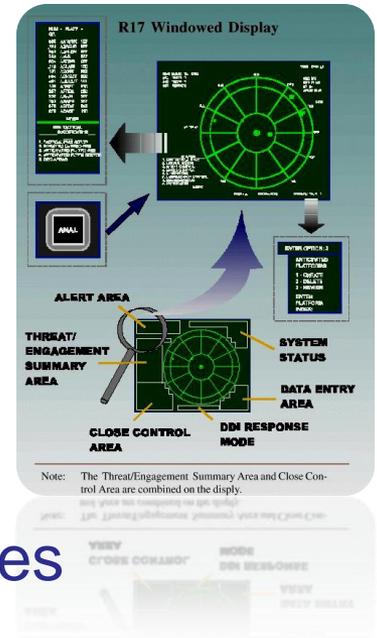
Predictive Analysis

• Changes/updates to the appropriate model(s) in the Testbed would facilitate a sufficient number of Monte-Carlo'ed scenarios for pre-flight prediction.

• Provides ability to craft and run a number of scenarios to find the heart of & limits of the test envelope.

• Combine with Design of Experiments to define the test space and number of live events to achieve statistically significant results.

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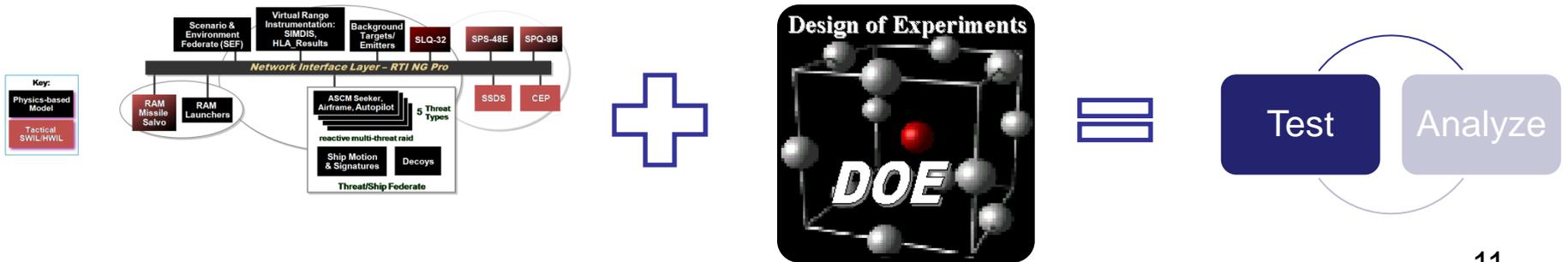
Expanded Use of the Probability of Raid Annihilation (P_{RA}) Testbed Conclusion

• Capability exists to answer other questions, to expand the use of the testbed.

• The initial development is complete and proven through the LPD 17 P_{RA} effort.

• A variety of efforts would benefit from a complementary M&S input:

• Fleet TTP

• Software validation

• SSTAMDA

• Trade Studies

• Evolving Capabilities and Threats

• Predictive Analysis

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