

Modeling & Simulation for Enterprise Test and Evaluation



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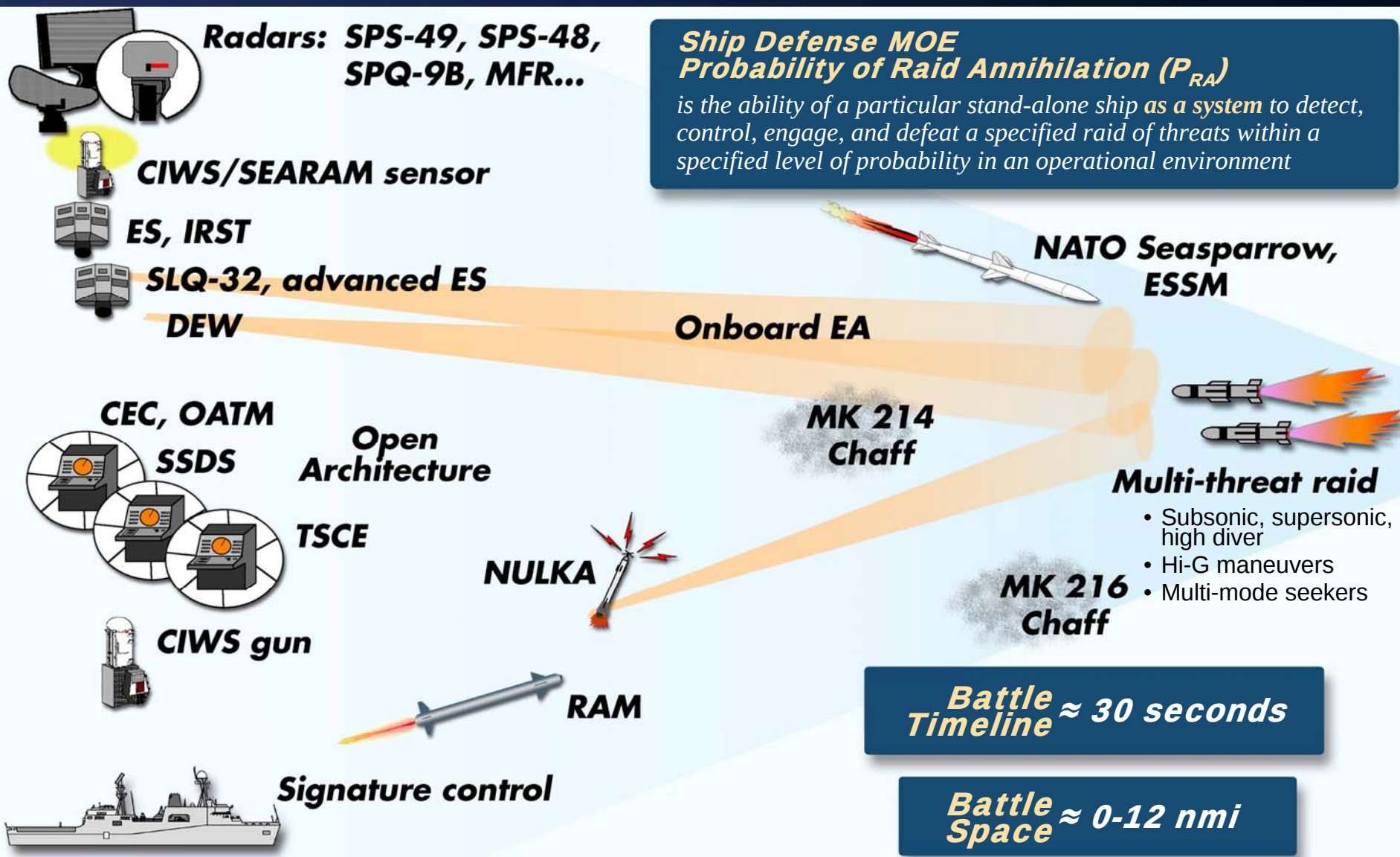
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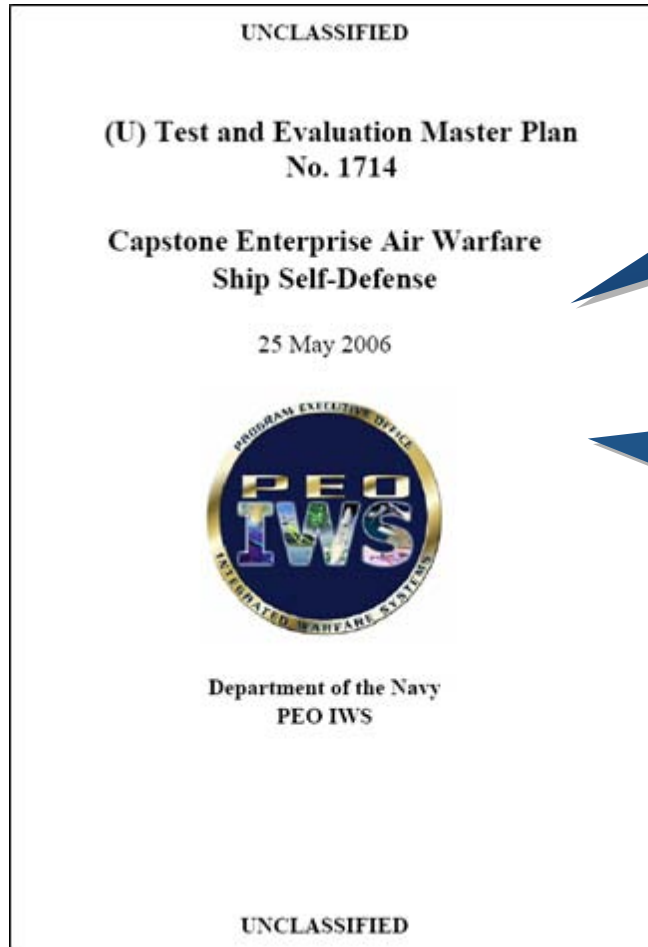


Operational Context: Ship Self Defense





Enterprise Test & Evaluation Master Plan



The purpose of the Capstone Enterprise Air Warfare Ship Self Defense (AW SSD) Enterprise Test and Evaluation Master Plan (TEMP) is to consolidate all AW SSD at-sea testing and P_{RA} Testbed testing

The AW SSD T&E Enterprise Strategy is founded on a two-tiered process to assess AW SSD warfare systems performance:

- 1) Validate models with live testing
 - Operational Ship testing
 - Self Defense Test Ship (SDTS) testing
- 2) Assess performance with models

Test Events DT/OT-ET15 thru ET19 are formal P_{RA} Testbed events

Includes DDG 1000, LHA 6, LCS and CVN 21 ship classes



Enterprise P_{RA} Testbed System Engineering – Drivers for Centralized IWS Leadership

- **Systems performance for P_{RA} assessment spans different technical communities and multiple managing program offices**
- **P_{RA} will be assessed using a federation of interoperable simulations; it will not (cannot) be tested empirically**
 - Complex, multi-spectral, integrated HK/EW problem space
- **Many specific parameters, assumptions, and limitations are negotiated between the testing and acquisition communities**
- **The testing community is intent on consistent P_{RA} assessment across ship classes and warfare system configurations**
 - Different hulls, different configurations...same threat models, same virtual range conditions



Enterprise Test Planning & Execution

- **Non-traditional factors**
 - M&S events as formal test events
 - “Virtual Range” requirement
 - Expectation for formal, planned data flow from empirical testing to model validation
- **Organization and planning are combat-system-centric vice platform-centric**
 - Single Enterprise Test Team
 - Centralized management and resourcing of P_{RA} Testbed
 - Multiple ship classes provide testing data supporting P_{RA} Testbed component development and validation



Navy Ship Self Defense T&E Enterprise IPT Structure

SSD T&E Enterprise IPT

Chair: PEO IWS

Representatives:

- DOT&E
- COTF
- OSD (AT&L)
- SEA 06
- IWS WSEs
- Ship Class Reps
- IWS MPM Reps
- N7
- N43
- N091

Chair
NAVSEA PH

**SDTS Configuration
Working Group**

Chair IWS 1TE

**Test Planning &
Execution
Working Group**

**Threat
Representation
Working Group**

Chair N091

Sub-group chairs: N43 for targets, IWS 7D for models

Chair
IWS 7D

**P_{RA} Testbed
Configuration
Working Group**

Co-chairs:
IWS 7D
Ship Class rep

**Testbed Ship
Class Baseline**

**Testbed Ship
Class Baseline**

**Testbed Ship
Class Baseline**

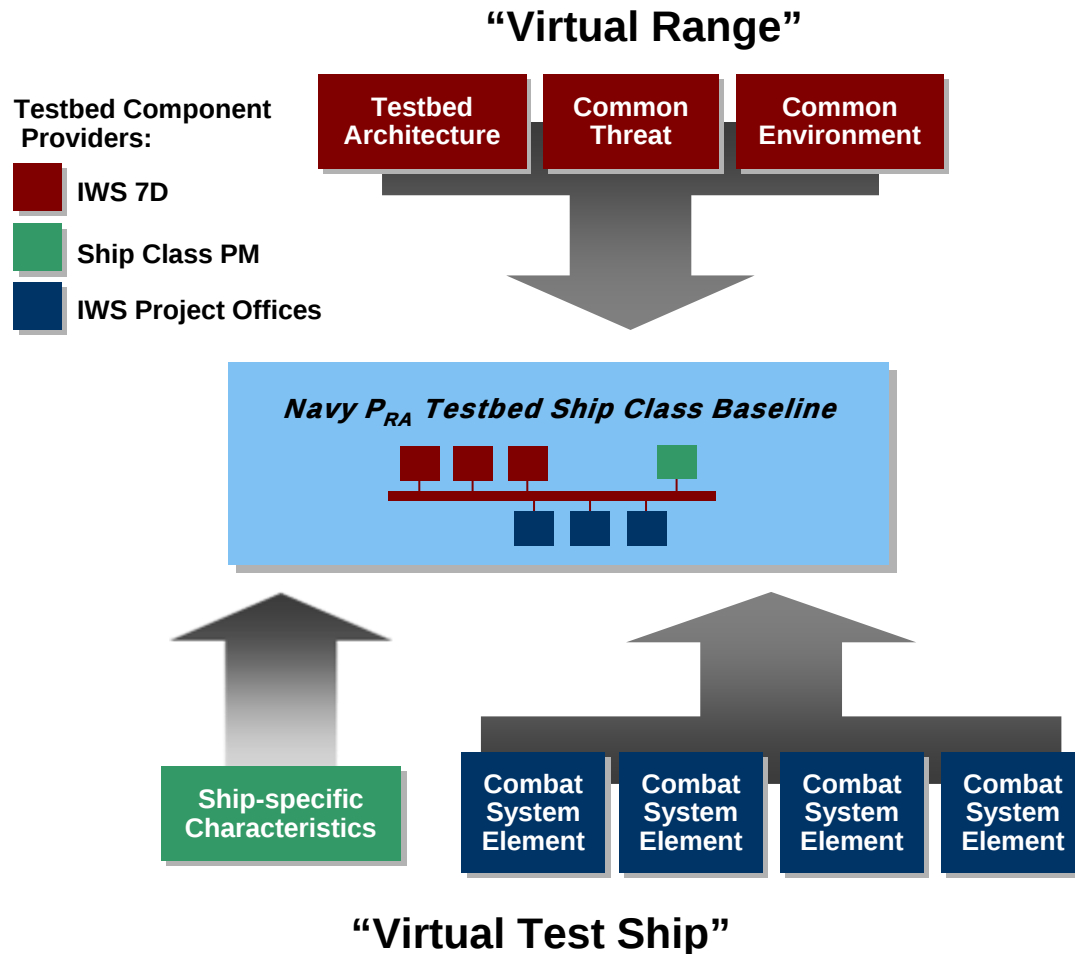


Enterprise P_{RA} Testbed System Engineering

- **Engineering one Enterprise Testbed, which is instantiated in several unique configuration baselines**
 - Formally accredited Baselines are correlated to Enterprise test events and ship class OPEVALs
 - Element Project Offices are vendors to Enterprise not individual ship classes
- **One master set of requirements for the Testbed**
 - Fed by both Enterprise SE and Baseline IPTs
 - Allocated and adjudicated according to Enterprise deliveries
- **A single Enterprise delivery may provide capability to more than one Testbed Baseline**
 - A single set of SE artifacts is maintained at the Enterprise level
- **Testbed-based Enterprise test events will be treated as empirical events**
 - E.g., test readiness reviews, test objectives



Enterprise P_{RA} Testbed Components



“Virtual Range” (Infrastructure)

- Testbed Architecture: network interface layer, interface standards, functional allocation standards
- Common Threat Models: seeker, airframe/autopilot, signatures, vulnerability
- Common Environment Models: tailored authoritative databases, runtime environment data services

“Virtual Test Ship”(specific to ship class)

- **Ship Characteristics**
 - Signature, motion, launcher placements, etc.
- **Combat System Representation**
 - Authoritative, “T&E quality” models of combat system elements

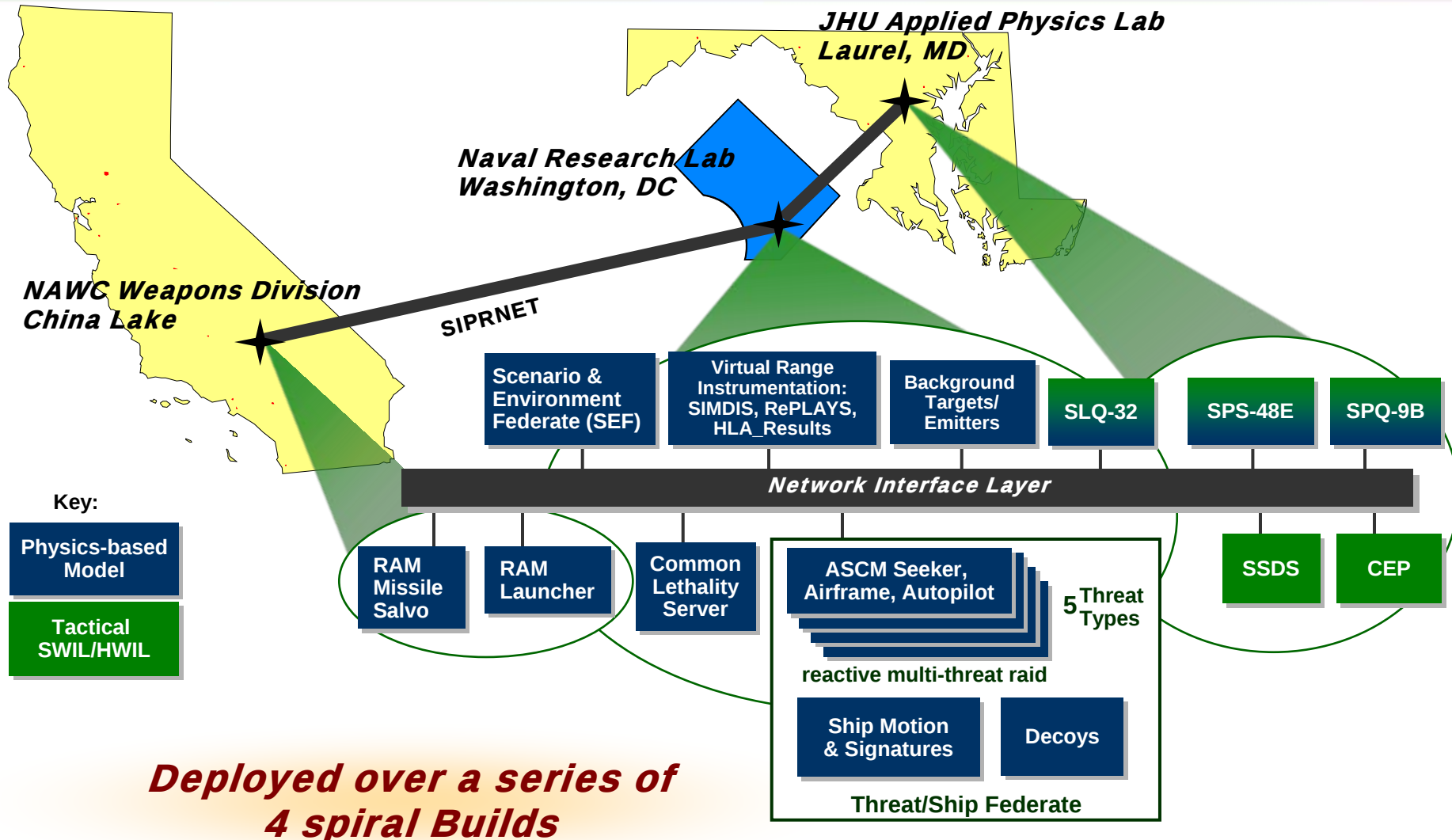


Current Simulation Framework Characteristics

- **HLA federation implementation**
 - All system representations execute simultaneously for each ship defense engagement
- **Geographically distributed**
- **Constructive simulation, conservative time management**
- **System representations are a mix of digital models and tactical software**
 - Most representations are a hybrid of tactical SWIL and digital model
 - Most tactical SW re-hosted to general purpose computers



P_{RA} Testbed Deployment LPD 17 Baseline





Enterprise P_{RA} Testbed Status

- **P_{RA} Testbed Configuration Working Group established under Ship Self Defense T&E Enterprise**
 - Testbed baseline IPTs established for current Enterprise ship classes: LHA 6, DDG 1000, CVN 21, and LCS
 - Enterprise Testbed Master Requirements initiated
- **LPD 17 Testbed Baseline nearing completion support of Ship Class OT&E**
 - CSSQT validation runs completed Dec 07; further V&V ongoing, leading to COTF accreditation
 - LPD 17 assessment planned for completion Dec 08



Enterprise P_{RA} Testbed Evolution

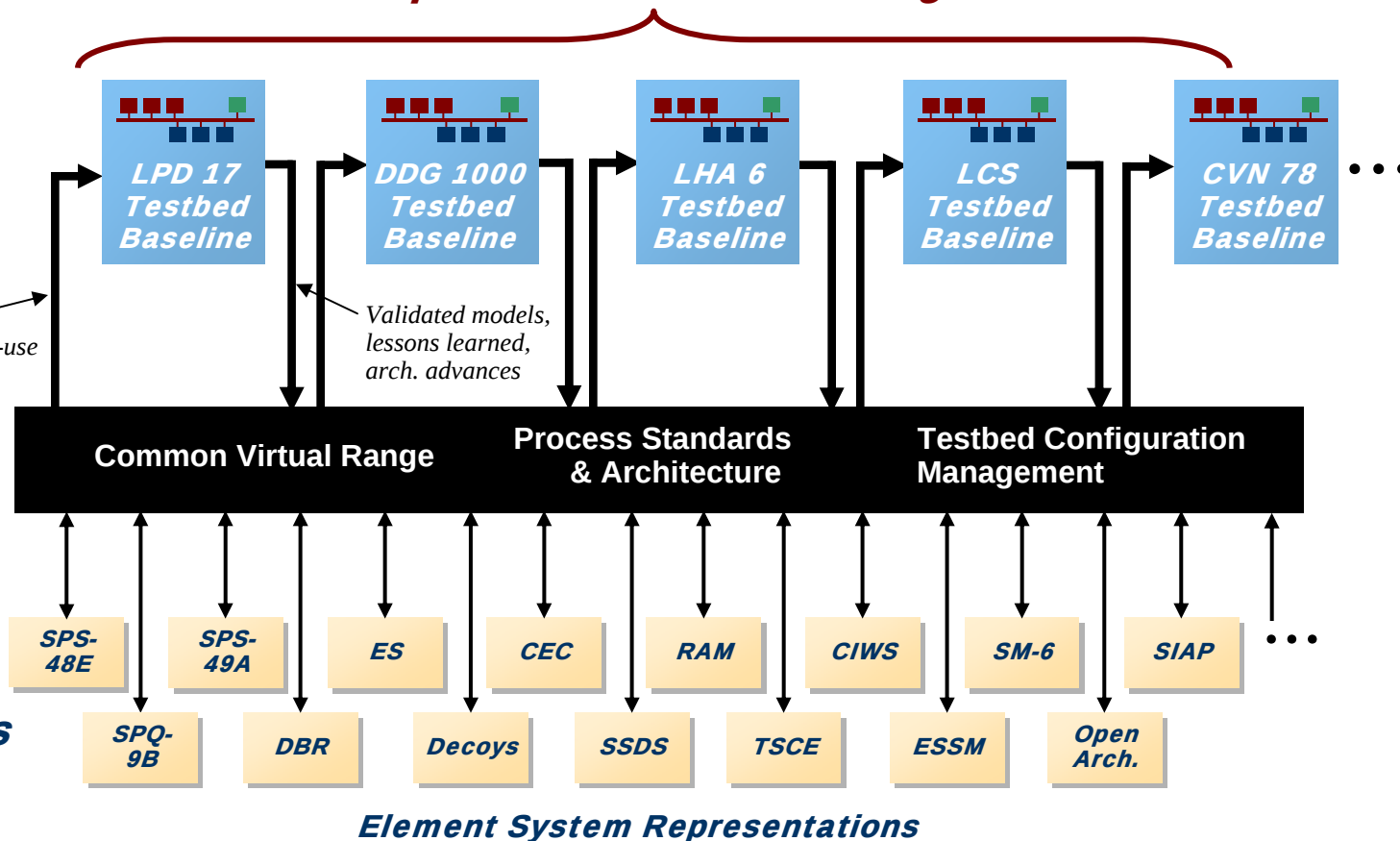
*Consistent Testbed development
across ship classes and CS configurations*

Enterprise P_{RA} Testbed Baselines

Common architecture,
common threats &
environment, model re-use

PEO IWS 7D Leadership

PEO IWS Project Offices



*Significant cost avoidance through
re-use of models, virtual range, & architecture*



Challenges Ahead

- **Feedback of knowledge and capabilities to early phase acquisition systems engineering**
- **Improved mechanisms for injecting data needs into planning of empirical tests**
- **Relationship of P_{RA} Testbed simulations to other M&S supporting system development and T&E**
- **M&S capabilities development to support Family-of-Systems development**



Questions?

