HM&E Technologies for Future Naval Ships

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NAVSEA Corporate Goals

- Build an affordable future Fleet
- Sustain today’s Fleet efficiently and effectively
- Enable our People
Building an Affordable Future Fleet in an Evolving World

- Face uncertain times
  - The threat is evolving
  - Our technology is evolving
  - Lean times ahead

- Ships and their systems must be robust, flexible and adaptable
  - Shouldn’t optimize a point design to a fixed set of requirements
  - HM&E Systems must support changing requirements

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A combination of strategies is likely optimal

- **Fixed** Requirements
  - **Optimized Point Design**
    - Many commercial ships & Navy Auxiliaries
  - **Robust Design**
    - Service life allowance
    - Build in capability to meet threat over service life

- **Changing** Requirements
  - **Modular Adaptable**
    - Mission Modules
    - Flexible Infrastructure etc.
    - Morph ship to match threat over service life

- **Need to analyze “Requirements Risk”**

- **Design**
  - **Fixed**
  - **Flexible**

- **Little Incentive**
Affordability adapting to changing requirements

CHANGING REQUIREMENTS

Cost  Schedule  Performance

Modular Adaptable Ship Technologies

Open Architecture  Product Lines  Specifications & Standards
Modular Adaptable Ship Technology Examples

- “Modular Hull Ship” (bow, stern, variable Parallel Mid-Body)
- “Mission Bay” (like LCS)
- Container Stacks/Slots/Interfaces
- Weapon/Electronics Modules / zones
- Aperture Station
- Aircraft, boats, UUV, UAV, USV
- Electronic Modular Enclosures (EME)
- Flexible Infrastructure
Can a qualified third party add, modify, replace, remove, or provide support for a component of a system, based only on openly published and available technical and functional specification of the component of that system?

OA CORE PRINCIPLES

- Modular, Loose Coupling, High Cohesion
- Design Disclosure and Data Rights
- Enterprise TOC Reduction and Reuse
- Transparency and Peer Reviews
- Competition and collaboration
- ROI and Strategic Investments
Product Lines

- Specific requirements seldom known when developing technology
- Traditional Approach
  - Anticipates specific requirements, but usually “misses”
  - Experiences difficulty matching S&T completion and Acquisition: “R&D Valley of Death”
- Product line Approach
  - Enables affordably and quickly providing products meeting specific requirements once those requirements are known
  - Bridges the “R&D Valley of Death”

Product Lines enable manufacturers to quickly and affordably respond to specific solicitations with solutions that largely have already been pre-engineered and de-risked.
Specifications and Standards

• Specifications
  – List the requirements for buying an item

• Standards
  – Define interfaces, design criteria, test methods, practices, and manufacturing processes

• Key to open architectures and product lines
  – Developed in partnership with industry

• Standard Ownership
  – Industry standards
  – Military standards
Fleet Affordability: Today and Tomorrow

LIMITED BUDGET

Cost  Schedule  Performance

Reduced Total Ownership Cost
Technologies

Energy  Reduced Manning  Reduced Acquisition Cost  Reduced Maintenance
Energy

- Alternate Fuels
- Improved Prime Mover efficiency
- Reduced Propulsion Power Demand
- Reduced Mission Systems and Ship Systems Power
- Modifying CONOPS
Reduced Manning

- Reduced Workload
- Distance Support
- Automation and Control
Reduced Acquisition Cost

- Update specifications and standards
  - Use commercial specifications and standards where consistent with naval environment.
  - Modify existing or create new military specifications and standards to reduce cost impact of successfully operating in a naval environment.
- Update architectures
  - Electrical Power Systems
  - HVAC
  - Machinery Control Systems

Many naval products cannot be purchased directly from commercial specifications
- Naval Environment
- Combat Survivability
- Logistics
Reduced Maintenance

- Condition Based Maintenance
- Improved Materials
- Improved Reliability
- Longer “service life”
- Improved architectures
Summary

• Affordably Adapting to a Changing Requirements
• Fleet Affordability: Today and Tomorrow