HM&E Technologies for Future Naval Ships

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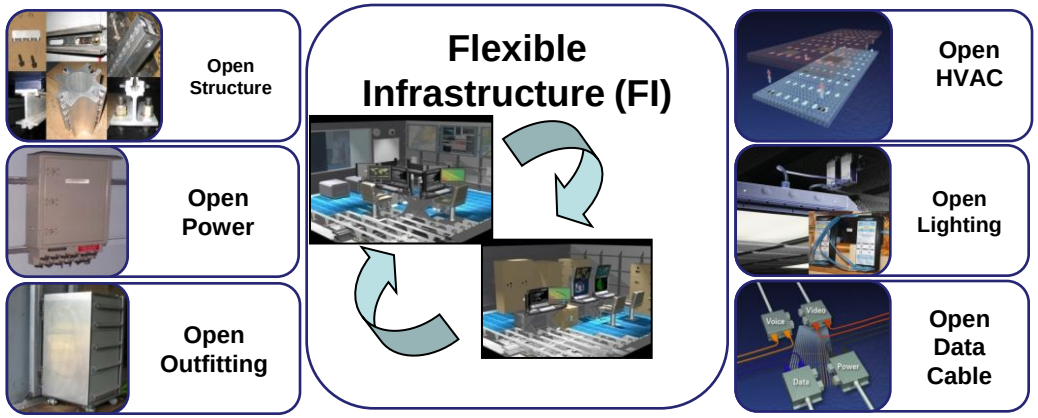
NAVSEA Corporate Goals

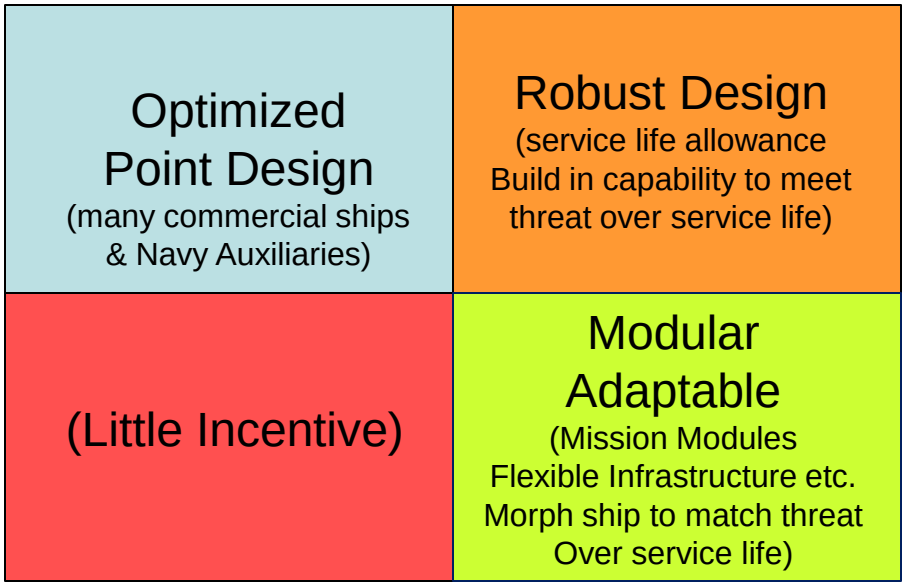
- Build an affordable future Fleet
- Sustain today's Fleet efficiently and effectively
- Enable our People

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



Design Strategies



Design Fixed

Design Flexible

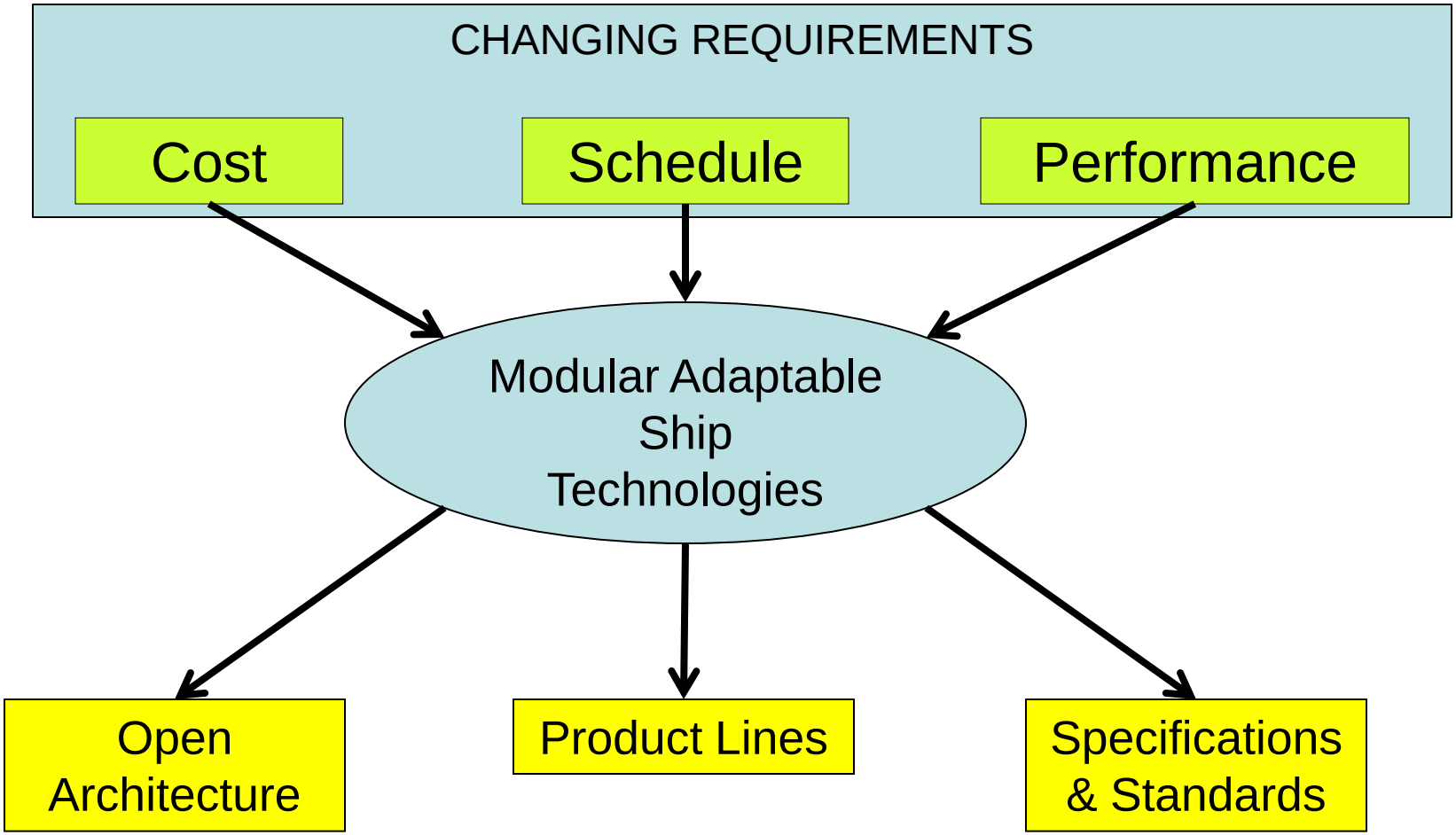
Requirements Fixed

Requirements Changing

Need to analyze "Requirements Risk"

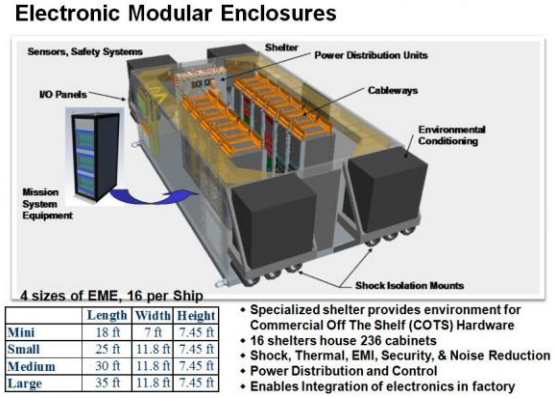
A combination of strategies is likely optimal

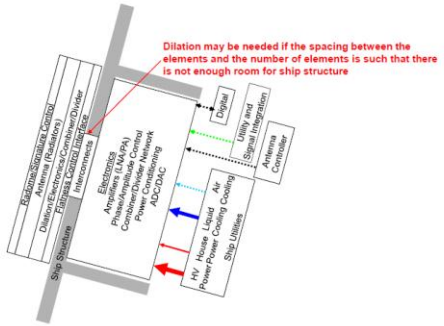
Affordability adapting to changing requirements

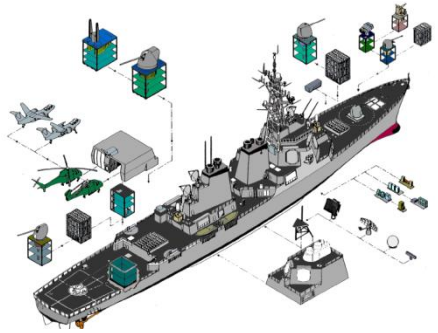


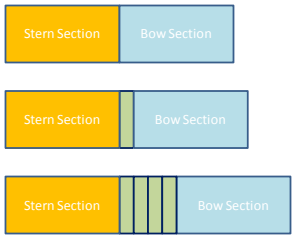
Modular Adaptable Ship Technology Examples

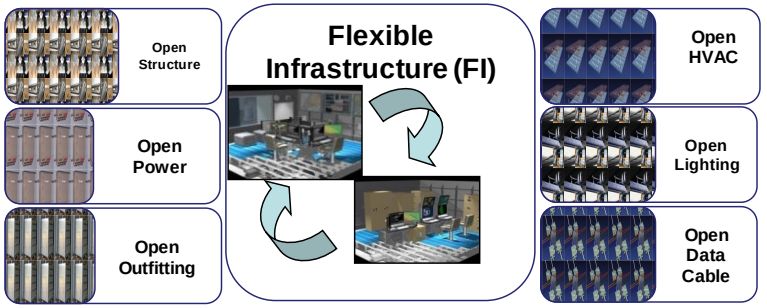
- "Modular Hull Ship" (bow, stern, variable Parallel Mid-Body)
- "Mission Bay" (like LCS)
- Container Stacks/Slots/Interfaces
- Weapon/Electronics Modules / zones
- Aperture Station
- Aircraft, boats, UUV, UAV, USV
- Electronic Modular Enclosures (EME)
- Flexible Infrastructure











Open Architecture

- Business practices
- Technical practices
  - Open standards
  - Published interfaces

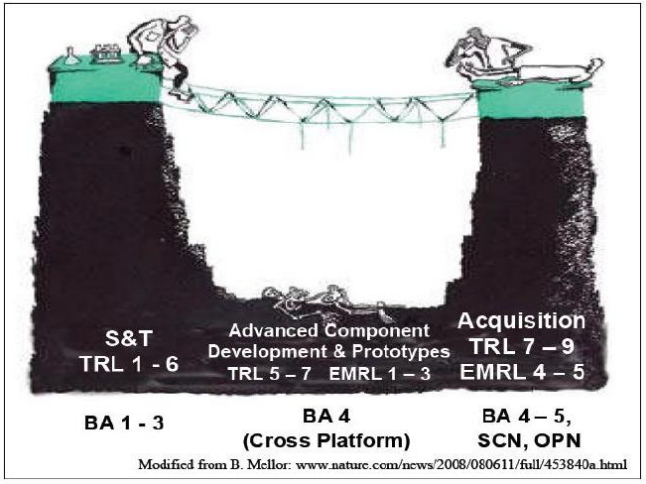
OA CORE PRINCIPLES

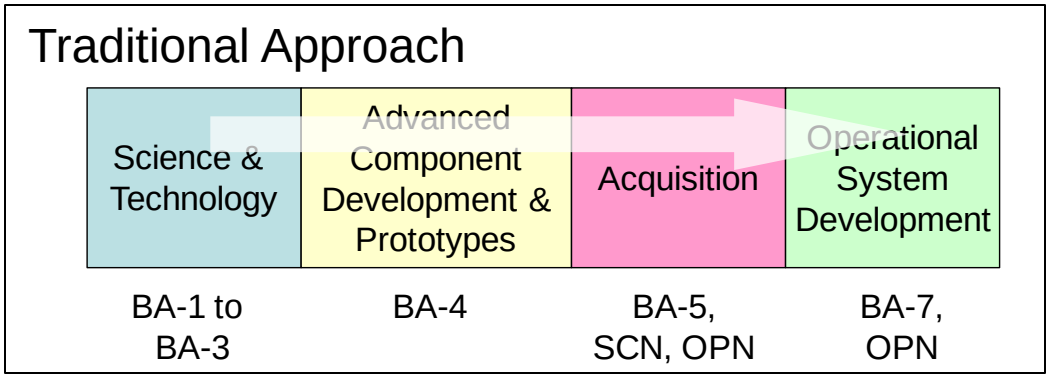
- *Modular, Loose Coupling, High Cohesion*
- *Design Disclosure and Data Rights*
- *Enterprise TOC Reduction and Reuse*
- *Transparency and Peer Reviews*
- *Competition and collaboration*
- *ROI and Strategic Investments*

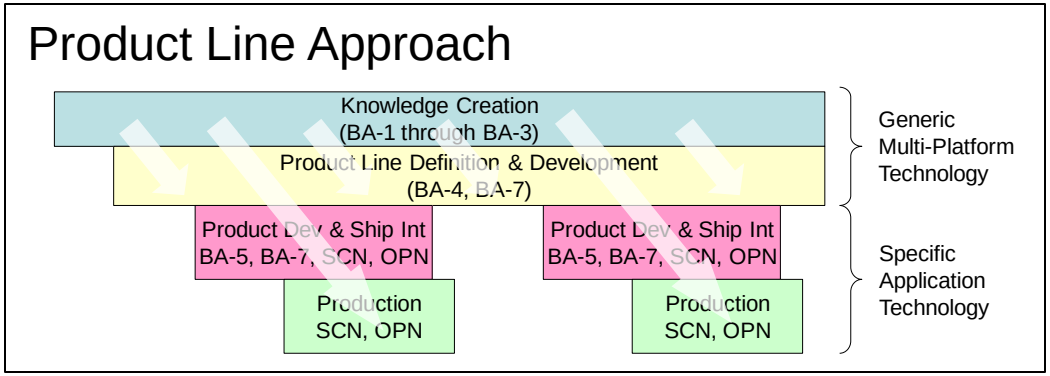
Can a qualified third party add, modify, replace, remove, or provide support for a component of a system, based only on openly published and available technical and functional specification of the component of that system?

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"



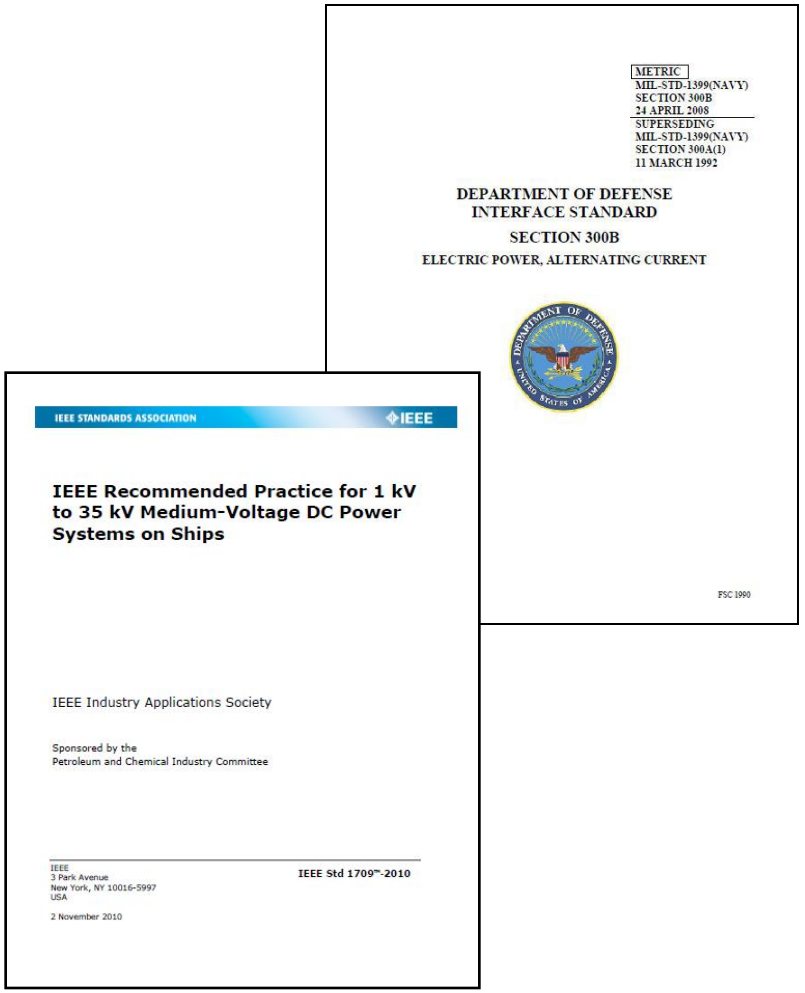




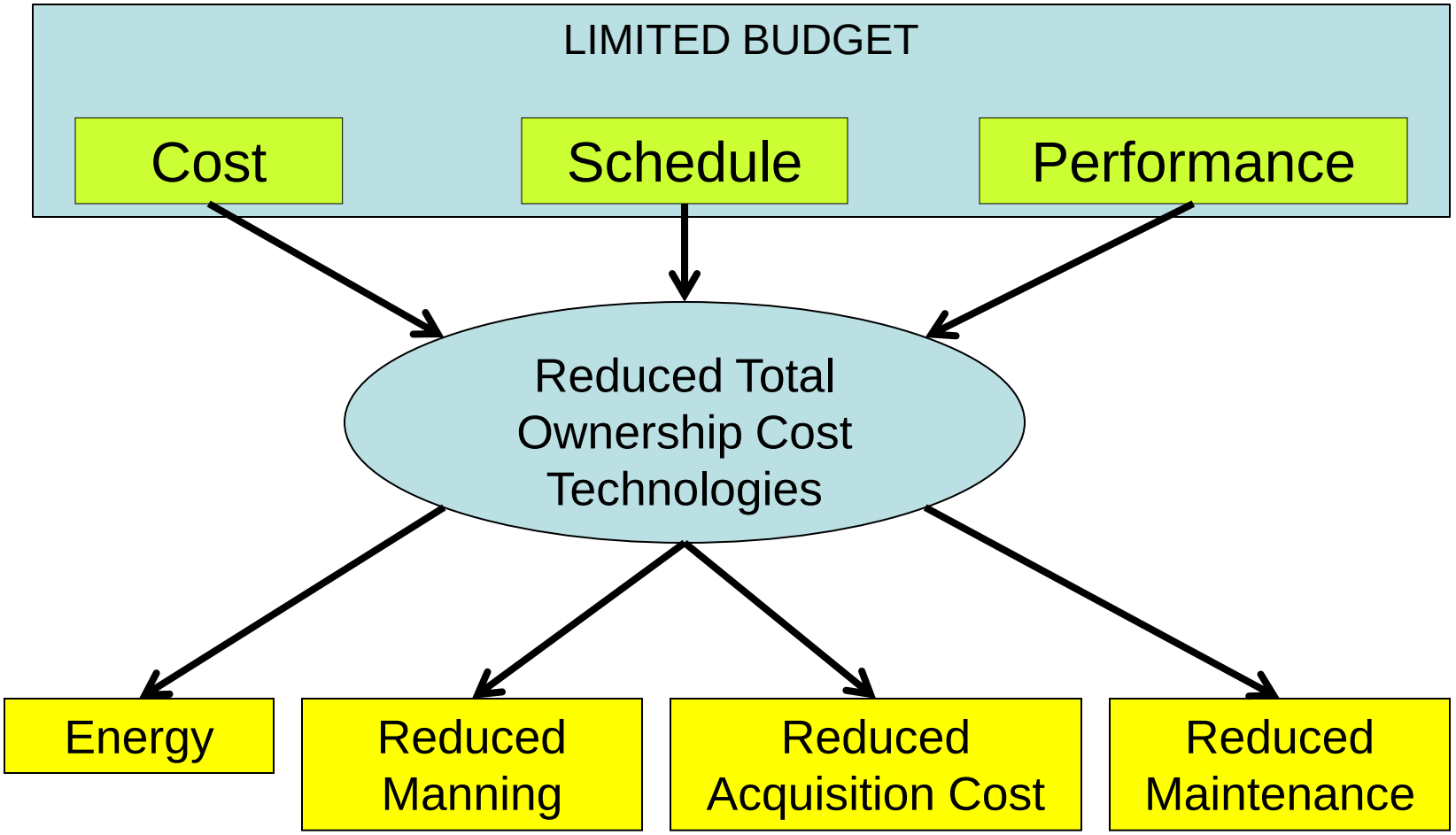
Product Lines enable manufacturers to quickly and affordably respond to specific solicitations with solutions that largely have already been pre-engineered and de-risked.

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

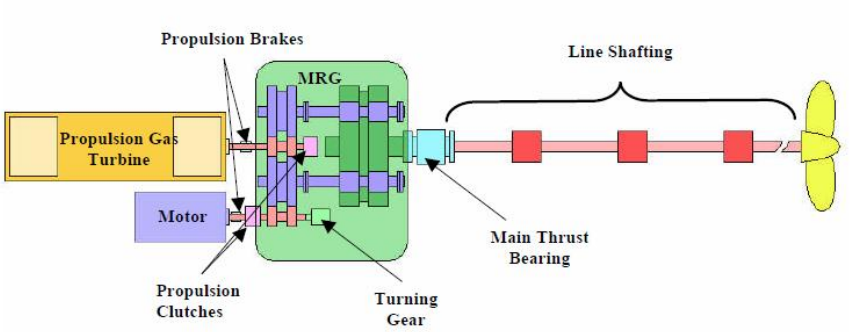


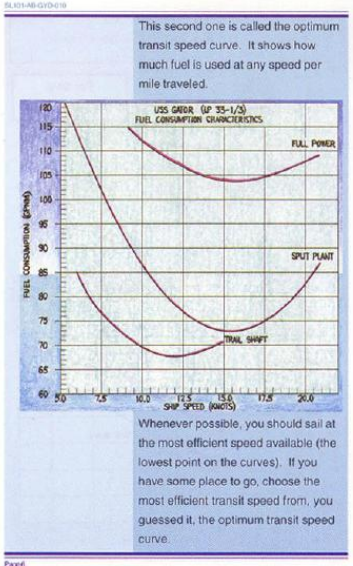
Fleet Affordability: Today and Tomorrow



Energy

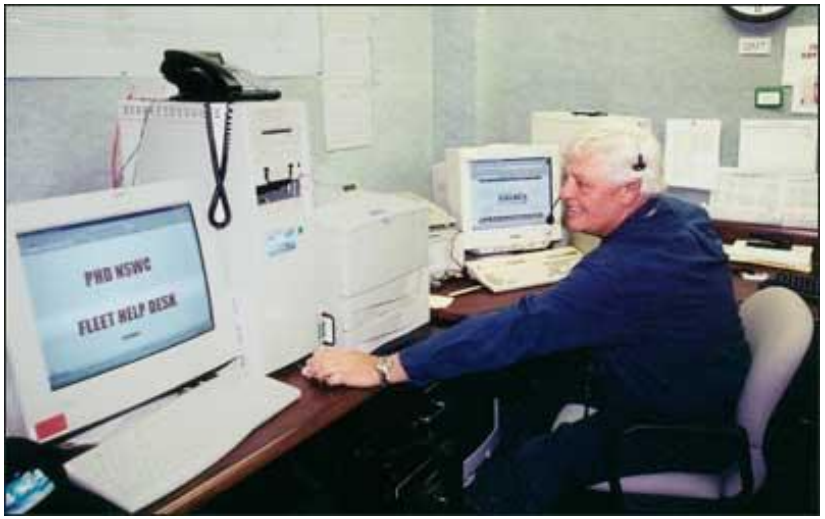
- Alternate Fuels
- Improved Prime Mover efficiency
- Reduced Propulsion Power Demand
- Reduced Mission Systems and Ship Systems Power
- Modifying CONOPS

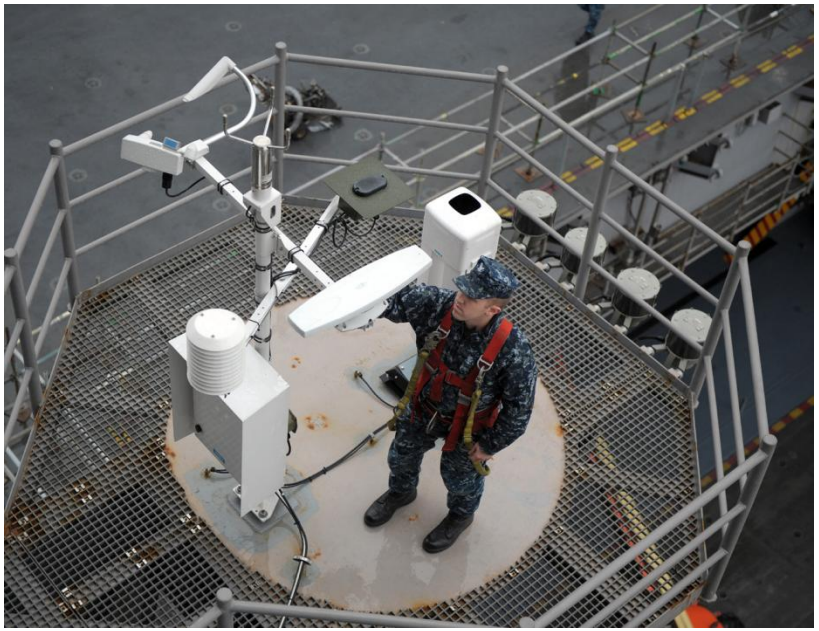




Reduced Manning

- Reduced Workload
- Distance Support
- Automation and Control





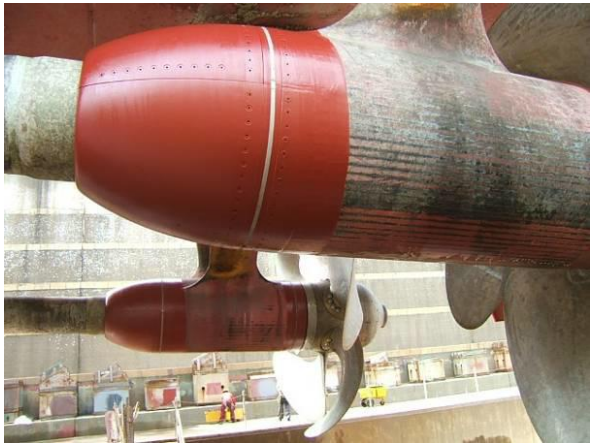
Reduced Acquisition Cost

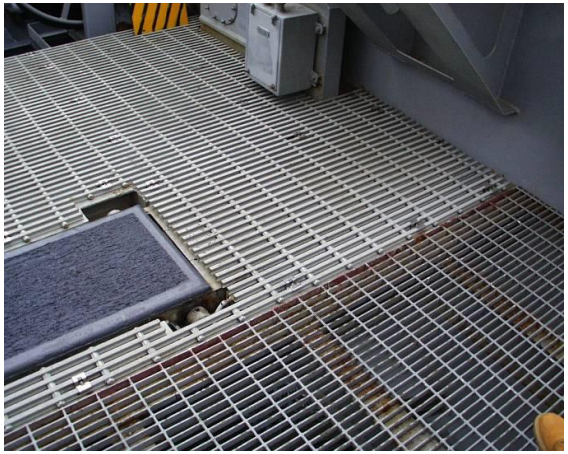
- Update specifications and standards
  - Use commercial specifications and standards where consistent with naval environment.
  - Modify existing or create new military specifications and standards to reduce cost impact of successfully operating in a naval environment.
- Update architectures
  - Electrical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

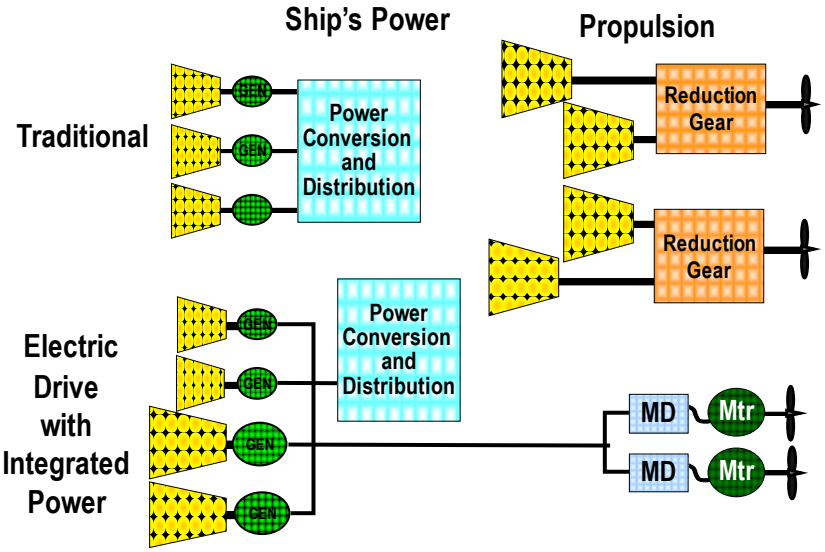
Many naval products cannot be purchased directly from commercial specifications
- Naval Environment
- Combat Survivability
- Logistics

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