



# Future Navy Product Design and Materials Technology Challenges

PDMT Panel Meeting  
September 22, 2005  
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# Agenda

- Current Developments
- Future Program of Work

# Current Developments

- Memos
- Guidance

# CNO Guidance and Memorandums

- CNOG 2005 – Aligned with Sea Power 21
  - Alternate Fuels
  - Alternate Propulsion Systems
- CNO Memorandums – 25 July 2005
  - Alternative Shipbuilding Plans
  - Ashore Readiness
  - Alignment of OPNAV Staff (SCB)
  - Current and Future Operational Readiness
  - Human Capital
  - Navy Health Care Costs
  - Single Provider Command
- GWO Terrorism
- *Riverine*



# OSD Shipbuilding Study 2005

- Findings

- Use of best practices improving

- Technology gap between US and Foreign shipbuilders is closing
- Significantly trail foreign shipyards
- US design have more complexity for similar type products

- Recommendations

- DoD should seek funding in FY07 of Shipbuilding Industrial Base Investment Fund

- Greatest Leverage is Design, Engineering, and Production Engineering
- Some Congressional Interest Expressed in FY06
- Shipbuilding enterprise must act now with seven new ship designs transitioning into production between now and 2020
- Remove bureaucratic red tape (Tech, Reg. and Admin Requirements)



# Interim Report to Congress on Annual Long-Range Plan for Construction of Naval Vessels

**Table 1.**

**Force-Structure Profiles for 260- and 325-Ship Fleets,  
Selected Years, 2006 to 2035**

	260-Ship Fleet										
	2006	2007	2008	2009	2010	2011	2014	2019	2024	2029	2035
AircraftCarriers	11	11	11	11	11	11	11	11	11	11	10
Surface Combatants <sup>a</sup>	102	106	109	113	117	125	126	145	156	148	130
Attack Submarines <sup>b</sup>	58	57	58	59	58	58	57	53	49	43	41
Ballistic Missile Submarines	14	14	14	14	14	14	14	14	14	14	14
Amphibious Ships	35	35	35	35	35	35	32	31	31	27	17
Combat Logistics Force	34	36	38	37	34	30	30	32	25	25	24
Sea-Basing Ships	0	0	0	0	0	1	5	17	19	19	19
Mine-Warfare Ships	17	16	14	14	14	14	14	10	1	0	0
Support Forces	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>16</u>	<u>10</u>	<u>8</u>	<u>5</u>	<u>5</u>
<b>Total</b>	<b>289</b>	<b>293</b>	<b>297</b>	<b>301</b>	<b>301</b>	<b>308</b>	<b>305</b>	<b>323</b>	<b>314</b>	<b>292</b>	<b>260</b>
<b>Memorandum:</b>											
Littoral Combat Ships	0	1	2	4	7	12	27	52	61	63	63
	325-Ship Fleet										
	2006	2007	2008	2009	2010	2011	2014	2019	2024	2029	2035
AircraftCarriers	11	11	11	11	11	11	11	11	11	11	11
Surface Combatants <sup>a</sup>	102	106	109	113	117	125	126	145	176	176	174
Attack Submarines <sup>b</sup>	58	57	58	59	58	58	57	53	49	43	45
Ballistic Missile Submarines	14	14	14	14	14	14	14	14	14	14	14
AmphibiousShips	35	35	35	35	35	35	32	31	31	27	24
Combat Logistics Force	34	36	38	37	34	30	30	32	26	26	26
Sea-BasingShips	0	0	0	0	0	1	5	17	25	25	25
Mine-WarfareShips	17	16	14	14	14	14	14	10	1	0	0
Support Forces	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>16</u>	<u>10</u>	<u>9</u>	<u>6</u>	<u>6</u>
<b>Total</b>	<b>289</b>	<b>293</b>	<b>297</b>	<b>301</b>	<b>301</b>	<b>308</b>	<b>305</b>	<b>323</b>	<b>342</b>	<b>328</b>	<b>325</b>
<b>Memorandum:</b>											
Littoral Combat Ships	0	1	2	4	7	12	27	52	75	77	82

Source: Congressional Budget Office based on Department of the Navy, *An Interim Report to Congress on Annual Long-Range Plan for the Construction of Naval Vessels for FY 2006* (March 23, 2005).  
 Note: The inventories of the 260-ship and 325-ship fleets are identical through 2019.  
 a. Includes littoral combat ships.  
 b. Includes four guided missile submarines (SSGNs).

# Future Programs

- New Design Opportunities
  - CG(X)
  - Joint Programs
    - JHSV
    - RSLs ??
  - LHAR Flight 1
  - MPF (F) Sea Basing Decision
  - New Assault Connector??

# Navy Evolution

*60's – 80's*

*Maritime Strategy*

*Cold War*

*Blue Water Ops*

*Task Group Focus*

*90's*

*Forward ... From the Sea*

*Varied Threats*

*Littoral Ops*

*CVBG / CWC*

*21st Century*

**Sea Power 21**

*Sea Strike, Sea Shield  
Sea Base, FORCEnet*

*Varied and Asymmetric  
Threats*

*Assured Access*

*In Littoral*

*Integrated, Joint Ops,  
GWOT, Riverine*

**The Requirement to Transform is NOW!**



# Challenges:

- Navy affordability
- Force architecture
- The 2040 fleet

Naval Transformation Hinges on Industrial Innovations

# Future Analyses

## CNO Memorandum on Alternate Shipbuilding Plans – 25 July 2005

- Fencing Total Obligation Authority to stabilize the industrial base
- Improved force architecture
- Manage requirements via Ship Capabilities Board
- Identify statutory or regulatory barriers that impede efficiencies in shipbuilding
- Discuss how we might reduce the number of ship classes
- More modular and multipurpose ship designs

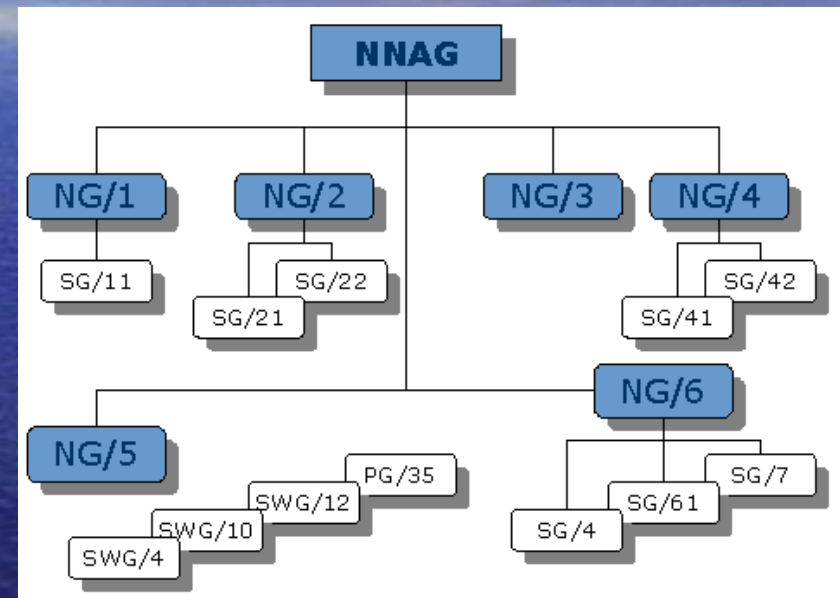
# 2004 -NRAC Report on Modularity

- “Navy should perform system engineering and set procurement guidelines to effectively implement modularity horizontally; the Navy should not abdicate the system engineering responsibility”
- “Navy S&T community should support the introduction of modular systems into Navy programs by developing capabilities to decompose complex systems, experimenting with modular concepts to support acquisition spirals, and developing Modeling and Simulation tools to enable system of systems engineering analysis.”

# NATO Naval Group 6

## *On Ship Design / Mobility Capabilities*

- Total Ship Systems Engineering
- Virtual Prototyping
- Ship Safety Code
- Mobility
- Survivability / Recoverability
- Standard NATO Agreements / ANEP's
  - Adopted by Technical Warrant Holders
  - New
    - All electric ships
    - Topside design



### Subordinate Groups

**SG/4** Electrical Power, Generation, Control, Distribution and Utilization

**SG/7** Ship Combat Survivability

**SG/61** Virtual Ship

### Specialist Teams

Small Ship Design - Chair US

Naval Ship Maneuverability - Chair SW

# Potential PDMT Future Program of Work

- Key to meeting the challenges:
  - Tools
  - Technology
  - Standards
  - Processes
  - People

# Tools

- Development focus on customer decisions
  - Pre-contract system trades
  - Design approval
  - Certification
  - Acceptance
- Industry modeling of developmental technologies, manufacturing and production issues key to supporting system and sub-systems architecting, and engineering
- Interfaces defined by sub-system architectures cost, schedule, and technical risk effector variables driving developmental tool fidelity
- NAVSEA investment in LEAPS architecture

# Technology Insertion

## Key Element to Meeting Next Navy Challenges

- Modular insertion of key ship system technology to pace emergent threats
  - Planned points in production
- Do not disrupt production or increase cost
- Spiral development
  - Exponentially increase capability
  - Periodic upgrades
  - Rapid prototype to production
- Control cost while decrease “turning circle”
  - Open architectures
  - Interface standards
  - Commercial processors

**Simultaneous Acceleration of Requirements and Acquisition  
Processes**

**Program and Budget Development Changes**

# Future Standards

- Technology stressors: what are the standards
  - The future navy with fewer ship classes
  - Modularity & Open Standards
- NSRP PDMT 2004 Proposal on “Mission Tailored Regulatory Environment”
  - Reduced Acquisition Costs
  - Eliminate redundancy
  - Clarify Overlaps
- Mil Specs & Standards – Health
- NATO STANAG’s and ANEP’s – How useful
- ABS Naval Vessel Rules
  - How should they evolve
- Ship Certification
  - Technical Feasibility
  - Design Approval
  - Delivery and In-Service
  - Commercial model

# People

- Human Capital Strategy
- CNO, NAVSEA, Academia, and Industry
- NNR-NE
- Training and competency
- What is missing

# Processes

## Naval / Industrial Linkage

- Complexity Management
- Do we have the right processes?
- Improved contractual language – Opportunity to standardize?
- Lean Approach??
- Major area for analysis for a future program

# Tomorrow's Navy... Tomorrow's Industry

- CNO Alternative Shipbuilding Plans Memo
- Navy Shipbuilding strategy must provide for systematic recapitalization and the rapid insertion of technology
  - Capability vs Cost
  - Ship Classes and Modularity
- Navy transformation hinges upon industrial innovation

**Requires Navy and Industry Commitment  
to Define and Stay the Course**

# QUESTIONS