



Program Executive Office, Ships



DDG(X) Program

CAPT David Hart
DDG(X) Program Manager

12 Jan 2022



Large Surface Combatant Evolution



Program Executive Office, Ships

- The DDG 51 class is an outstanding success for the Navy and holds the record for the longest production run of any surface combatant in Navy history
 - Production started in 1985 and continuing beyond 2027
 - DDG 51 FLT III will provide the world's best Integrated Air and Missile Defense (IAMD) combat system elements for the near term fight
 - Likely to remain in the Fleet through the 2060s
 - Limited in the ability to incorporate future upgrades that consume additional space, weight or power requirements
- Naval planning for the 21st century requires upgrades for the future fight. DDG(X) will provide flexibility for:
 - Increased missile capacity
 - Sensor growth
 - Longer range offensive anti-surface and strike capabilities
 - High power Directed Energy weapons (e.g. lasers)
 - Increased survivability
 - Increased efficiency to reduce operational costs & demands
 - Supported by an efficient Integrated Power System (IPS) that provides operational flexibility as well as power efficiency
 - Reduced impact on Command Logistics Fleet and improved Distributed Maritime Operations

New Hull Form Required to Introduce Enhanced Capability to Fleet and Pace Threat



Large Surface Combatant Evolution



Program Executive Office, Ships

- DDG(X) will utilize successful evolutionary development approaches from Destroyers, Cruisers, Frigates, CG 47 to DDG 51 upgrades vice revolutionary approach
 - Lessons learned from previous shipbuilding programs used to inform requirements development, design strategy and execution plans
- DDG(X) will provide the flexibility and margins necessary to become the Navy's next enduring large surface combatant
 - Combine DDG 51 FLT III combat system elements with a new hull form
 - Resets SWAP-C margins
 - Minimize incorporation of new technologies
 - Include an efficient IPS
 - Provide greater endurance, reducing the Fleet logistics burden
- CNO approved Top Level Requirements (TLR) in December 2020 set clear path for DDG(X) execution
 - Draft Capability Development Document developed in Oct 2021
- DDG 51, Virginia, and Columbia program lessons learned demonstrated up front industry involvement is key enabler to program success
 - Columbia program Integrated Product and Process Development (IPPD) process used to help inform early relationship and industry involvement on DDG(X)



Top Level Requirements Overview



Program Executive Office, Ships

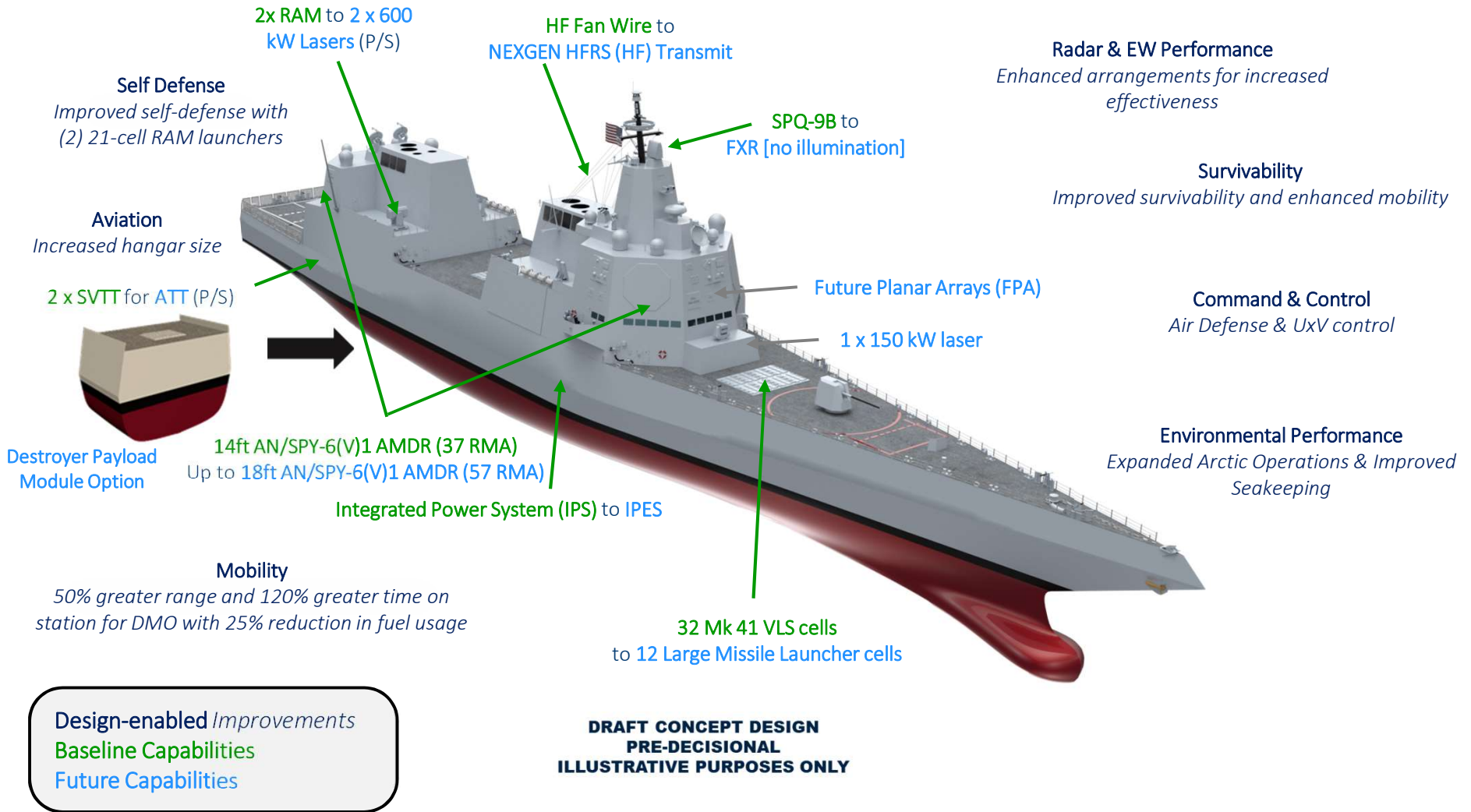
Key Metrics/ TLR Areas	DDG(X)
Flexibility	<ul style="list-style-type: none">• Reestablish new construction SWAP-C margins - Arrangeable area margin of 5% beyond reservations; Weight margin of 10%; modern naval architecture requirement for KG of .4m; Power margin of 20% + debitable power from propulsion via IPS; Cooling at 20% upgradeable to 40%;• Space reservations for future upgrades - AMDR and C4I growth, high power directed energy, Large Missile cells in place of 32 VLS cells; IPS for power flexibility; pre-planned growth for additional VLS, Large Missile cells, or future capabilities
Vulnerability	<ul style="list-style-type: none">• Improved over FLT III in maintaining mobility & IAMD after damage;• Acoustic, IR and UEM signatures all improved by >50%
Mobility	<ul style="list-style-type: none">• Current design objectives: Range >50% increase; Time on station >120% increase; Efficiency >25% increase
Capability	<ul style="list-style-type: none">• Utilize FLT III Combat System elements + two 21-cell RAM launchers. Supports increase in VLS cells, Large Missile Launcher cells, sensor growth, Directed Energy weapons, C4I



DDG(X) Design-Enabled Warfighting Improvements



Program Executive Office, Ships



Design-enabled Improvements
 Baseline Capabilities
 Future Capabilities

**DRAFT CONCEPT DESIGN
 PRE-DECISIONAL
 ILLUSTRATIVE PURPOSES ONLY**

DDG(X) – Designed Lethal, Affordable, Upgradable & Sustainable



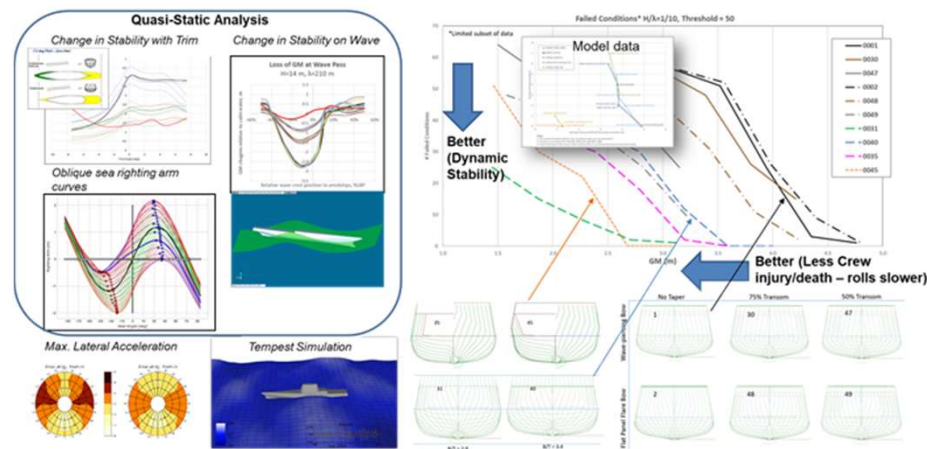
Technology Maturation and Risk Reduction



Program Executive Office, Ships

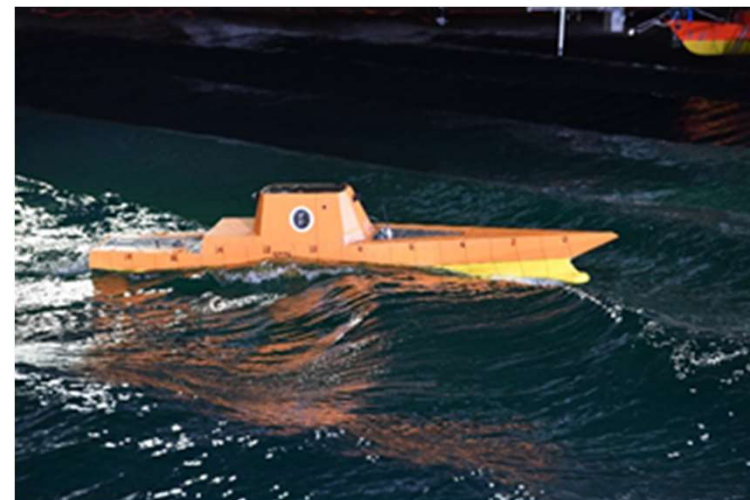
- **Deliberate Technology Maturation and Risk Reduction**

- Non developmental ship systems - land based testing to reduce critical risks prior to Detail Design and minimize risks prior to ship activation
- Developing early and robust Model Based Systems Engineering (MBSE), Modeling and Simulation (M&S), Controller Hardware in the Loop (CHIL), and Power Hardware in the Loop (PHIL) plans to help inform early design decisions



- **Critical Risks Identified**

- DDG(X) Land Based Testing for hull form and IPS will be executed at NSWC Carderock and NSWC Philadelphia planned
- IPS testing supports component level-prototyping, system integration testing, and full-scale demonstration
- Retires risk early by completing critical systems testing prior to Milestone B approval





DDG(X) Program Status



Program Executive Office, Ships

- Preliminary through Detail Design for DDG(X) will be accomplished through a collaborative, multi-disciplinary Navy-industry effort composed of the surface combatant shipbuilders, suppliers, ship design agents and other subject matter experts
 - Collaborative design team promotes preservation of skilled / experienced Large Surface Combatant design workforce
 - Shipbuilders integrated into the team in March 2021 to help inform early decision process
 - ❑ Design decisions informed by producibility and program affordability
- Program currently in Concept Formulation with plans to enter Preliminary Design in FY22
- CNO approved Top Level Requirements (TLR) in Dec 2020 informed draft CDD development
- Acquisition Strategy in development, informed by:
 - Columbia IPPD process
 - DDG 51 Flt III to DDG(X) production transition
 - ❑ Developing thoughtful transition plan to help manage Large Surface Combatant skilled workforce and workload