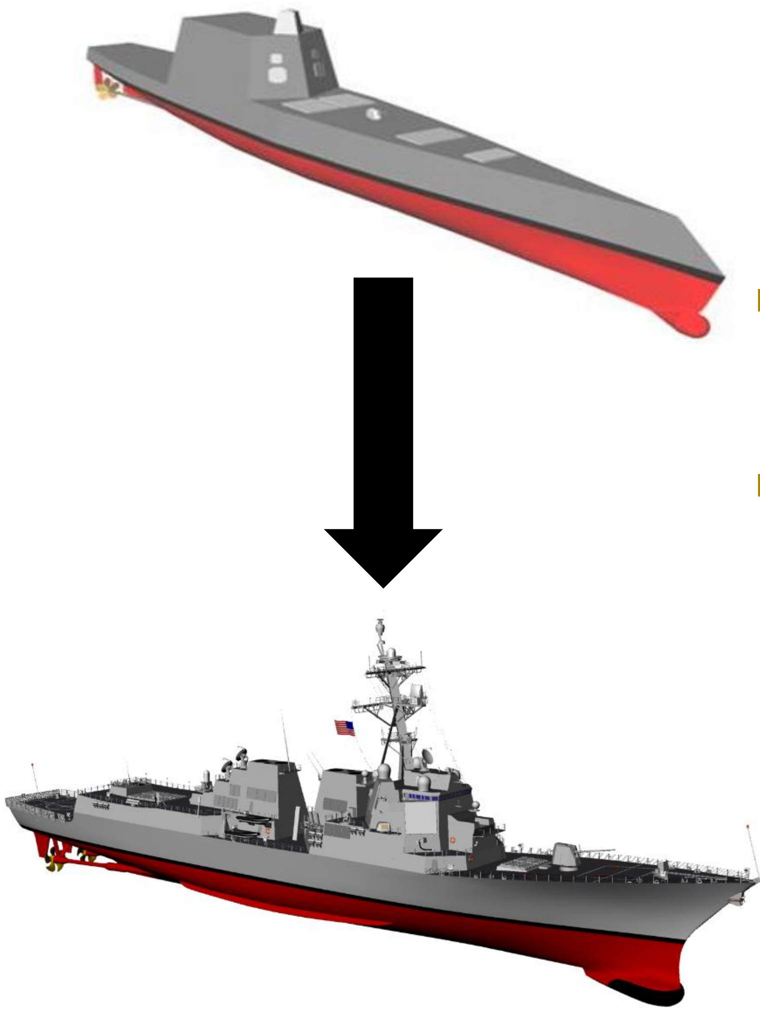
Air and Missile Defense Radar (AMDR)

"Sea Power to the Hands of Our Sailors"

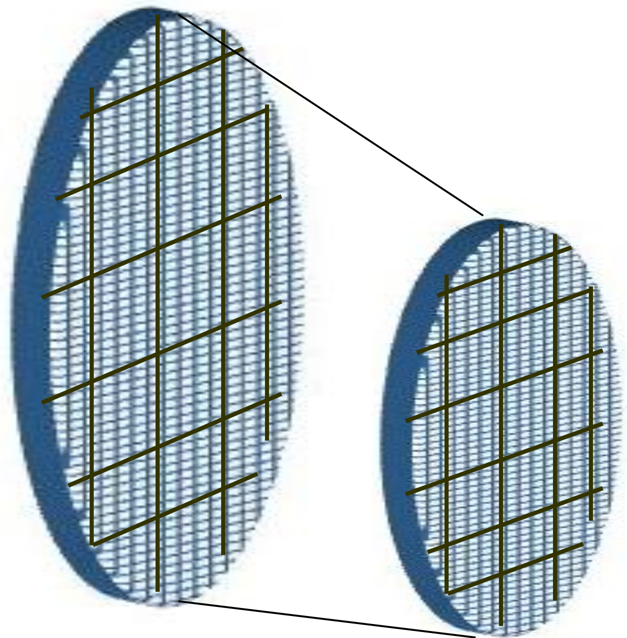
Presented by:
CAPT Seiko Okano
Major Program Manager (MPM)
PEO IWS 2.0 Above Water Sensors

AMDR Background



- Maritime Air and Missile Defense Joint Forces (MAMDJF) Analysis of Alternatives (AoA) results:
  - very large phased array radar (SPY +30dB) to be paired with a newly constructed combatant to meet the stressing BMD and cruise missile threats
- The Next-Generation Cruiser Program (CG(X)) was the planned combatant for AMDR,
- 2009 - a Radar/Hull Study was conducted
  - smaller AMDR could be paired with the DDG 51 hull and still meet these IAMD requirements
- USN canceled the CG(X) program, and restarted the DDG 51 shipbuilding program.
- New DDG 51 configuration with AMDR became known as DDG 51 Flight III

AMDR Challenges
Hardware Systems Engineering



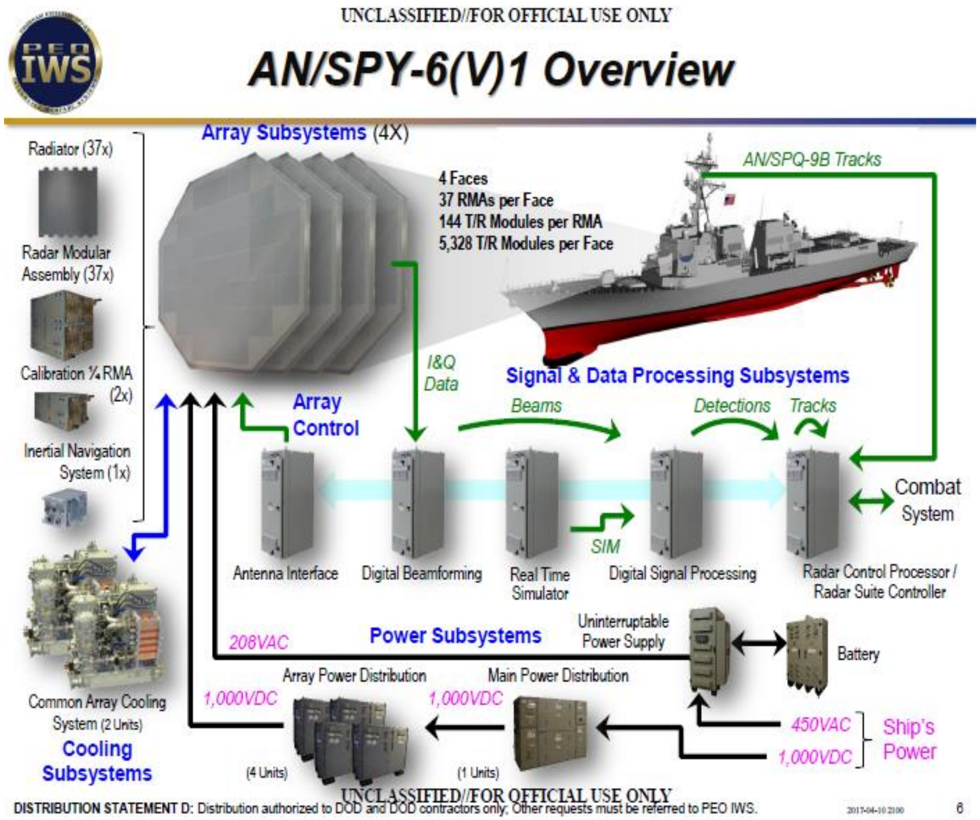
- **Scalability and Modularity**
  - IWS 2.0 partnered with ONR, OSD Title III/ManTech Offices, and Industry in an effort to make AMDR modular, scalable, affordable, and to reduce risk

- **Risk reduction Investments:**
  - **Gallium Nitride (GaN) Power Electronics**
    - OSD Title III
      - Conformal Hermetic Coating for Microelectronics
      - GaN on SiC MMIC Production for S and X-band Radar/EW Systems
    - Conducted follow-on ManTech GaN Producibility programs
  - **Digital Array Radar (DAR)**
    - ONR Future Naval Capability (FNC): Provided an active phased array radar that incudes the digital beamforming (DBF) architecture.
  - **Affordable Common Radar Architecture (ACRA)**
    - ONR FNC: Provided a modular and open combat system interface to integrate with the Product Line Architecture (PLA)
  - **Affordable Electronically Scanned Array Technology (AESAT)**
    - ONR FNC: Provided electronic components to reduce lifecycle costs in the next-generation active ESA radars
      - Components included: High Power/Efficiency MMICS and RF Power Amplifiers, Low Noise Digital Tx/Rx components, and DBF components

- **Open architecture (OA) standards, interfaces, and equipment were implemented into initial design for the radar front-end arrays, electronics and back-end processing**

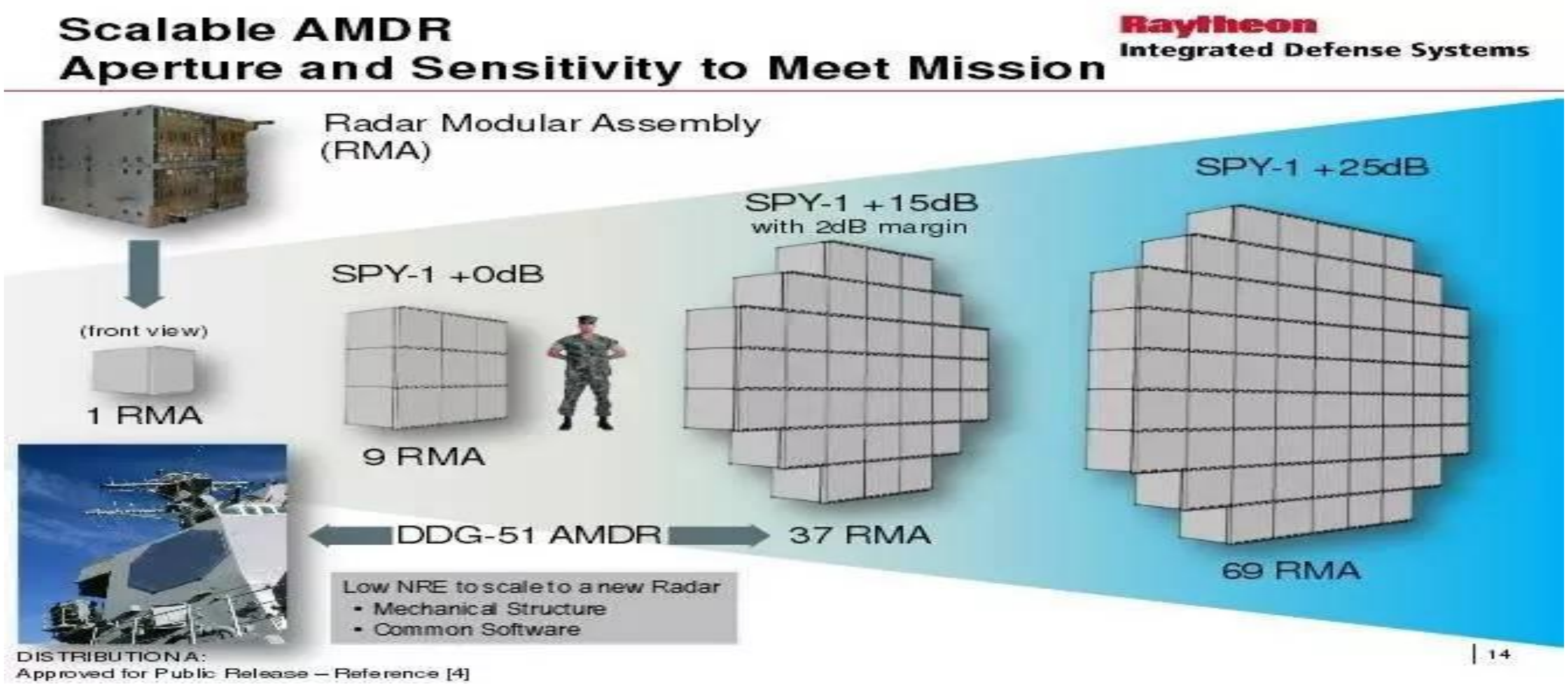
AMDR Hardware Systems Engineering

- **An active, digital radar enables multiple and simultaneous high-fidelity radar beams for a rapid volumetric search**
- **Implementation of the modular hardware and advancements in R&D achieved the following radar system and performance benefits:**
  - Eased the Systems Engineering Workload
    - Decreased the complexity of the radar design
  - Improved the integration and testing of the radar system
  - Active Performance
    - Improved detection sensitivity
    - Improved clutter attenuation
  - SS Reliability
    - Improved/Increased Mean Time Between Failure (MTBF)
      - 10^8 (100 Million) hours
    - Graceful Degradation Performance
  - Enables Digital Beamforming (DBF) Architecture
- **Cost Savings applied to the acquisition program**
  - Sustainment and Lifecycle costs also decrease



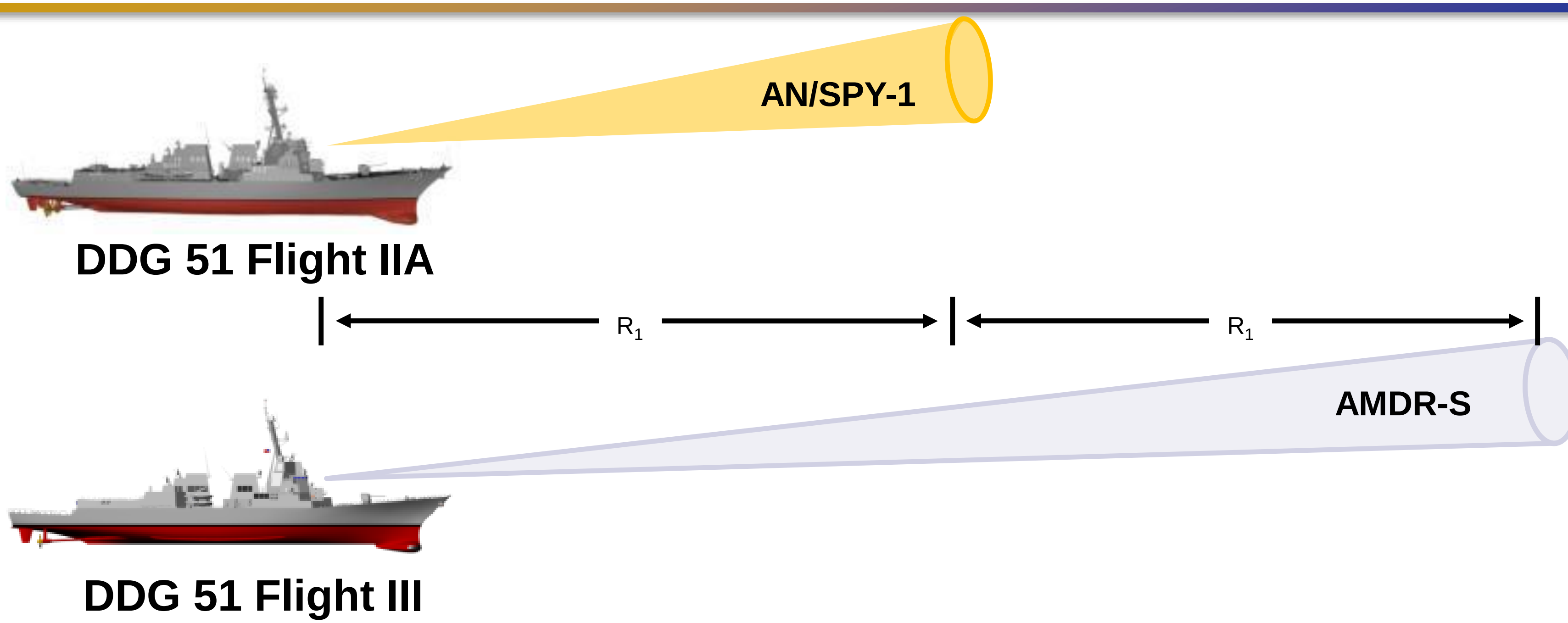
AMDR (AN/SPY-6) Hardware Overview

AMDR Systems Engineering
Final AMDR Array Design



- Each RMA measures 2' x 2' x 2'
  - Each RMA is essentially an individual radar
- This common architecture ensures the radar's extensibility and scalability to other platforms, and their particular mission requirements
  - EASR is a derivative of AMDR that will be installed on CVNs and Amphibs
- Common and Open front/back-end architectures ensure:
  - Low NRE for future radar derivatives(radar scaling)
  - Common Logistics, Spares, Manning, and Training

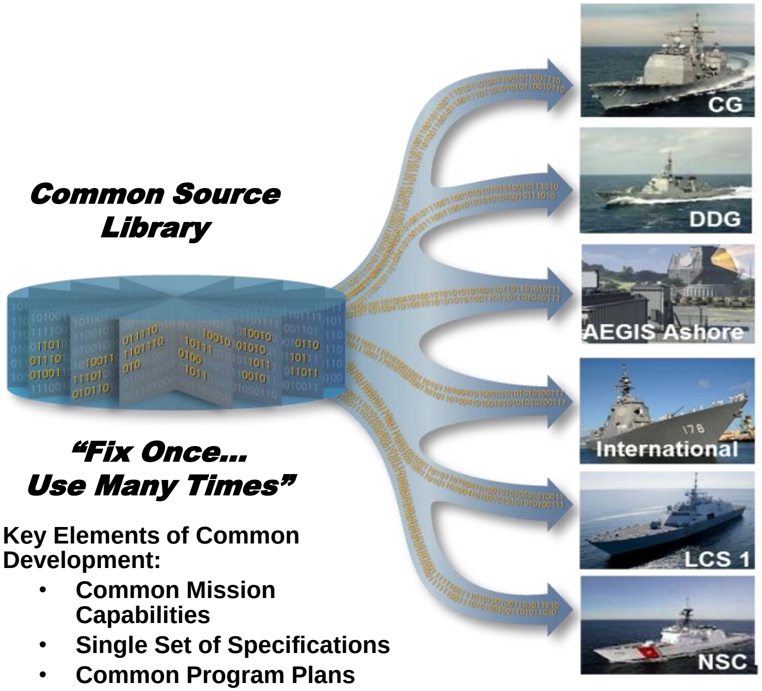
AMDR Benefits



- AMDR-S will acquire and track a target *half the size* and at *twice the range* compared to the AN/SPY-1, providing increased flexibility in ship operating location
- Ability to react to and provide engagement data for the stressing Very Low Observable/Very Low Observable Flyer (VLO/VLOF) target in a dense clutter environment
- Capable of operating in natural and man-made environments to meet multi-mission requirements.

AMDR is in development to support robust IAMD (BMD and AAW) Raid Capability

- **Apply Product Line Architecture (PLA) principles to create common, open interfaces to enable integration**
  - Allows future radars the ability to integrate with other combat systems
  - Allows the USN to have 3rd party vendors develop and integrate additional capability into the radar and combat system.
- **Integration of SPY-6 into AEGIS**
  - Relied on a “modified” B/L 9 ACS and the AEGIS Common Source Library (CSL)
    - Developed new components and new interfaces
  - Demonstrated successful simulation of the AAW and BMD Fire Control Loops
  - Significant ROI for B/L 10 (ACB-20) for future integration and testing
  - Significant reduction of NRE for integration/testing into other combat systems (e.g. SSDS)



Key Elements of Common Development:

- **Common Mission Capabilities**
- **Single Set of Specifications**
- **Common Program Plans**
- **Single Set of Processes & Metrics**
- **Integrated Team Structure**
- **Enterprise Products**

QUESTIONS?

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Backups