NDIA 2011
Integrated Warfare Systems Conference

Integrated Combat Systems (IWS 1.0)
CAPT Jon Hill, MPM
Mr. Nilo Maniquis, Deputy MPM

Distribution Statement A: Approved for Public Release: Distribution is Unlimited
PEO IWS 1.0
Integrated Combat Systems

- Responsible for integrated combat systems for surface combatants, carriers, and amphibious ships

- Responsible for integration of weapon system elements into SSDS combat system, AEGIS combat system, and AEGIS weapon system

- Key functions:
  - Design and development
  - Production and fielding
  - Maintenance and upgrades
IWS 1.0 - Integrated Combat Systems

Aegis

Requirements

Development

Integrated TEST

In-Service Engineering

Combat System Certification

Fielding

Training

Aegis SSDS

AEGIS B/L 7.2
AEGIS ACB 16
SSDS ACB 16

AEGIS B/L 5.3
AEGIS B/L 6.1
AEGIS B/L 6.3
AEGIS B/L 7.1.2
AEGIS B/L 7.1.3
AEGIS B/L 7.1R
AEGIS B/L 8.1.0
AEGIS B/L 8.1.1
SSDS MK 1
SSDS MK 2

Aegis B/L 9 A/C/D/E
SSDS ACB 12

Aegis B/L 9 A/C
SSDS MK 2

AEGIS B/L 7.1R
AEGIS B/L 7.1.3
AEGIS B/L 8.1.1

SSDS

AEGIS SSDS

AEGIS B/L 9 A/C
SSDS MK 2

Aegis Ashore

CSG

DDG (AEGIS)

LHA (SSDS)

ENG
Integrated Combat Systems (IWS 1.0)
Functionally Aligned Organization

MPM, Integrated Combat Systems 1.0 MPM
DMPM, Integrated Combat Systems 1.0 DMPM
PM, Fleet Readiness 1.0 FR

Strategic Planning 1S
Systems Engineering 1E
AEGIS CS Development 1A
SSDS CS Development 1D
Production 1P
Ship Integration 1B
Test and Evaluation 1T
In Service 1R
Configuration Management 1C
Lead BFM 1.0 / 7.0 / JPO 1F

Operational Requirements Definition
System Integration, Demonstration, and Operational Test
Component/Element Engineering Test and Evaluation
Component / Element Development
System/ Subsystem Definition and Design

Requirements Definition
Integration & Test
Development

Lifecycle Support

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PEO IWS 1.0 High Priority Efforts

- Combat Systems Wholeness
  - AEGIS Readiness initiatives underway
  - Carrier Wholeness under assessment

- Fleet Interoperability (CEPN/Link 16)
  - AEGIS Baseline 7.1.3
  - Accelerated Mid Term Interoperability Improvement Program (AMIIP)

- ACB 12 AEGIS Baseline 9 Completion & Fielding

- Future
  - ACB 16 and Evolution to ACB 20
  - Science and Technology & Technology Insertion
  - Competition
The Total Combat System
A Strong Industrial Base is Critical
Evolving to Meet Next Generation Threats and Complex Environments

B/L 5
CG 59-65, 67,68, 70-73
DDG 51-78 (AAW)
MIL-SPEC Computers
13 CGs & 28 DDGs

B/L 6
CG 66&69
DDG 79-90 (AAW)
MIL-SPEC/COTS Hybrid Computers
2 CGs & 12 DDGs

B/L 7.1.2 / 7.1.3
DDG 91-102 (AAW)
DDG 103-112 (AAW)

B/L 7.1R
Fielding

B/L 8
CG 52-58 (AAW)
7 CGs

B/L 7.2
(FY 14)
22 DDGs

AEGIS Modernization

B/L 9
CG 59-64 (AAW)
DDG 51-78 (IAMD)
DDG 113 AF (IAMD)
AEGIS ASHORE (BMD)

Future

ACB 16
IAMD Sensor Integration

ACB 20
Complex Threats
Employing Advanced Technology in Challenging Environments

All COTS
Combat Management System Computers

Represented 30-years of AEGIS Combat Systems at Sea with Over 30-years to Come

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AEGIS Wholeness Review

Navy Efficiency Efforts
- SIAP (2000)
- Optimum Manning (2001)
- Revolution in Training (2001)
- AEGIS COTS Complexity (2002)
- Increased OPTEMPO (2003)
- Decreased Live-Fire Missile Events (2003)
- Reduced Shore Support (2005)
- In-service AEGIS Baseline Freeze (2005)

Task Force Evaluations
- B/L 7.1.2 Issues and Recommendations (NSWC/ATRC/RMC/NAVICP)
- AWS / SPY Readiness Task Force Report (SEA 21)
- Fleet Review Panel of Surface Force Readiness (VADM Balisle, USN(Ret))
- Standard Missile-2 Independent Review Team for ASN(RD&A) (Mr. Giacchi)

Leading Indicators Begin to Expose Seams and Unintended Consequences impacting AEGIS Wholeness

Integration of a Body of Studies into a Single AEGIS Wholeness Plan

- Interoperability
- Maintainability, Supportability, Sustainability
- Manpower, Personnel, Training
- Fleet Proficiency – AAW Readiness
- ACB 12
PEO IWS Combat Systems Engineering Development, Modernization, and Fielding Precepts

- Decouple Combat Systems development from Ship Development
- Decouple Combat System Application Software from the underlying COTS Computing Hardware
- Use a Product Line Approach to develop new capabilities and software upgrades
- Build once and apply to many baselines
- Exercise Government Purpose Rights (GPR) to the maximum extent practicable to allow multiple Developers to contribute new Combat System technology and extend legacy capabilities
Common Source Software Library (CSL)

One Software Change Fits ALL SSDS Ship Classes Since the 1990s

SSDS MK 2 Single Source Library

- CVN (RAM Blk II)
- LPD (RAM Blk II)
- LHD 7/8 (RAM Blk II)
- LHA 6 (RAM Blk II)
- LSD (RAM Blk II)

Aegis BL 9 Supports five Different Combat Systems Configurations & Begins Fielding in FY12

- Ballistic Missile Defense (BMD) 5.0

Aegis ACB 12 Baseline and Future (CSL)

- CG WO / MMSP BL 9 A (BMD 5.0)
- CG W / MMSP BL 9 B (BMD 5.0)
- DDG 51 W / MMSP BL 9 C (BMD 5.0)
- DDG 51-112 W / MMSP BL 9 D (BMD 5.0)
- Aegis Ashore W / MMSP BL 9 E (BMD 5.0)

In-Service Baselines (BL) are supported from CSL after modernization availability

Common Tactical Software
Site Data & Configuration Software Files

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Common Source Library . . .
Build Once and Apply to Many Baselines

- Common Source Libraries allow reuse and commonality within a combat system family for modernized ships and new construction ships
- Modernized ships and new construction ships will have the same combat system capabilities
- Investing in disciplined cross-program Configuration Management is critical to leveraging Common Source Library (CSL) components across the enterprise
- Advanced Capability Build (ACB) Process can only be implemented via a CSL
- CSL is critical to improving fleet interoperability issues
- The increasing number of ships supported from CSL will simplify 3rd party competition and integrate product line architectures

Surface Navy Combat Systems will achieve commonality and reuse through implementation of Common Source Libraries
Integrated Air & Missile Defense

- Navy Integrated Fire Control (NIFC-CA)
- Standard Missile Improvements
- Ballistic Missile Defense (BMD)
- Advanced Radar Developments

Combatant Commander Demand for Navy IAMD Capability / Capacity is Increasing
Integrates AEGIS AAW and BMD capability into one computer program and equipment suite

Foundation for all future AEGIS IAMD:
- B/L 9A – CGs 59-64 (AAW Only)
- B/L 9B – CGs 65-73 (IAMD): Cancelled (Impacts BMD Capacity and Force Structure)
- B/L 9C – DDGs 51-78 (IAMD)
- B/L 9D – DDG 113 and Follow (IAMD)
- B/L 9E – AEGIS Ashore (BMD Only)
Advanced Capability Build (ACB 12)

Integrated Air and Missile Defense Capabilities

ACB 12 / TI 12

<table>
<thead>
<tr>
<th>Processing Upgrades</th>
<th>Display Upgrades</th>
<th>SPY-1 / SIGPRO Upgrades</th>
<th>Track Management Upgrades</th>
<th>ACS Upgrades</th>
<th>Common Source Library</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY 11</td>
<td>SM-3 IA</td>
<td>MMSP</td>
<td></td>
<td>Guns</td>
<td>CSL</td>
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<tr>
<td>FY 12</td>
<td>SM-3 IB</td>
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<td>SPQ-9B</td>
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<td>FY 13</td>
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<td>BMC4I</td>
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<td>FY 14</td>
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<td>CIWS</td>
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Aegis Modernization
- CG 59-73
- DDG 51-78

DDG 113 +

Aegis Ashore

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AEGIS Combat System Evolution
Improved Multi Mission & IAMD
Programmatic, Vision, Pending Funding Decisions

ACB 12
Integrated Air & Missle Defense
- Radar
  - SPY-1 Open Architecture
  - MMSP
  - AAW, BMD & IAMD Modes
- Combat System
  - AEGIS OA
  - BMD 5.0
  - NIFC-CA
  - I/O Trident Warrior
  - TI-12 Equipment
- Missiles
  - ESSM, SM-2
  - SM-3 BLK 1A/1B
  - SM-6
- EW
  - SLQ-32
- Mission Planning
  - BMD 5.0 Mission Planner

ACB 16
Improved Coordination of Netted Force Operations to Counter Mid-Term Threats
- Radar
  - Layered Defense
  - Sensor Integration
    - SPQ-9B
- Combat System
  - AWSC Integration
  - Combat ID Improvements
    - IFF Mode 5/S
  - C5I Upgrades (CANES, JTT-M, GCCS-M, CDL, CDLMS)
  - Improved BMD with EOR and SBT (BMD 5.1)
- Missiles
  - ESSM, SM-2
  - SM-3 BLK 1A/1B
  - SM-6
- EW
  - SEWIP BLK II & III
  - Integration (w/RDDL)
- ASW
  - Periscope Detection (SPQ-9B)
  - Open ASW Interface with
    - MH-60R Integration
- Readiness
  - Total Ship Training Capability

ACB 20
Improved Joint Weapon & Sensor Coordination to Counter Far-Term Threats
- Radar
  - AMDR, Active X & S Band
  - AMDR CW illumination
  - SPY-1
- Combat System
  - Support AMDR & SPY-1 Ships
  - Improved IAMD raid handling capability
  - BMD 6.X
  - Multi-Sensor Integration
  - PLA Components & Arch
  - Sensor Coordination
  - TI-20 Equipment
- Missiles
  - ESSM, SM-2
  - SM-3 BLK 1A/1B
  - SM-3 BLK II A
  - SM-6
- EW
  - SEWIP BLK II / III
- Mission Planning
  - Advanced AAW & BMD Mission Planner

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### SSDBS Combat System Evolution

**Improved Ship Survivability & Interoperability**

Programmatic, Vision, Pending Funding Decisions

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#### ACB 12
**Improved Situational Awareness**

<table>
<thead>
<tr>
<th>Radar/Sensor</th>
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<tbody>
<tr>
<td>DBR Integration</td>
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<tr>
<td>SPS-48G Integration</td>
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<tr>
<td>MH-60R / PLVC Ph 0</td>
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<tr>
<td>CIWS 1B BL2 Integration (LSD class)</td>
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<tr>
<td>IFF Mode 5/S Implementation</td>
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**Combat System**

- System Track Manager/Track Server
- CEC (USG-2B)
- CV-TSC Incr. 2
- CANES
- GCCS-M (1-way)
- CPS & CDS
- IA Hardening

**Weapons**

- ESSM (Uplink)
- Improved CIWS Integration (LSD Class)

**EW**

- SEWIP BLK II

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#### ACB 16
**Improved Coordination of Netted Force Operations**

<table>
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<tr>
<th>Radar/Sensor</th>
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<tbody>
<tr>
<td>CIWS 1B BL2 Sensor Integration (CVN, Amphib Class)</td>
</tr>
<tr>
<td>SPS-48G Elevation Upgrade</td>
</tr>
</tbody>
</table>

**Combat System**

- C5I/C4I Updates
- Interoperability Improvements (IFF Mode 5/S)

**Weapons**

- CIWS Integration

**EW**

- SEWIP BLK II (incl RDDL)

**Training**

- Integrated Training / Fleet Synthetic Training

**Readiness**

- Total Ship Training Capability

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#### ACB 20
**Improved Command & Control**

<table>
<thead>
<tr>
<th>Radar/Sensor</th>
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<tr>
<td>DBR Engage on Remote Support</td>
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<tr>
<td>SPQ-9B 3D support</td>
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<tr>
<td>IFC sensor support via CEC</td>
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</table>

**Combat System**

- Integrated HK/5K weapon scheduling
- CVN 68 Class Radar Upgrades
- Expanded Fault Det/Isolation
- Improved Network Health/Diagnostics
- Force Level Sensor Coordination
- Space Track Processing (CEC)
- Advanced IA Protection

**Weapons**

- ESSM Block 2 integration (CVN 78)
- NSSMS 2T Uplink (CVN 78)

**EW**

- SEWIP Block 3 integration
- SEWIP Block 2 Backfit
- SEWIP Block 2/ HGHS integration
- RDDL Backfit

**Training**

- Training Upgrades

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**Improved Situational Awareness**

- Adv. Senior Integration (DBR)
- Improved Fleet Interoperability
- Increased ASW/SUW Surveillance
- Employment of Advanced EW

**Improved Coordination of Netted Force Operations**

- Integrated Tactical & Operational Picture
- Joint Digital Air Control
- ASW Ship Defense
- Coordinated IAMD Tracking
- Joint Sensor Netting (IAMD)
- Multi-sensor Coordination
- Improved EW Capability for Advanced Threats

**Improved Command & Control**

- Integrated Hard and Soft Kill
- Increased OTH Surveillance (UxVs)
- Integrated Mission and Tactical Planning
- Joint Integrated Fire Control
- Spectrum Management
**Strike Group Composition Support**

- Mix of AEGIS Baselines / Ships Provide Mission Capability Options
  - Guarded Unit Defense → Forward BMD SAG
  - SRBM / MRBM / Limited IRBM Defense → Independent BMD SAG
  - Sea-Based Terminal (SBT) Protection → Layered IAMD Support
  - NIFC-CA Operations → Extended Strike Group Reach
  - Littoral Operations → Clutter Environments and Restricted Operational Areas

- Focus Development Efforts and Upgrades on Deployers

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S&T and Technology Insertion

- Select investments and potential technology insertion for near, mid and far-term applications based on combat system capabilities vision
  - Prioritize to Address Fleet Issues & Concerns
  - Systems Engineer and Test prior to integration

- One Key Focus Area:
  - Development of an Automated Test / Analysis (ATA) capability provides reproducible and quantitative evaluation of system performance in order to support improved quality and affordability

Focus efforts toward improving capabilities for in-service and future combat systems
CSEA Competitions
  - Government control of design decisions, interfaces, and the open system architecture
  - Acquisition of appropriate data rights
  - Directs use of Common Source Library (CSL)

Expected benefits to the Navy
  - Encourage innovation, incentivize superior performance, and reduce costs
  - Improve the Navy's ability to encourage participation from third party developers
  - Allow the Navy to provide mature technology and high quality products and engineering services to the fleet at a competitive price

AEGIS CSEA RFP
  - Update released through FEDBIZOPS 19 OCT 2011
  - Key Dates
    - Proposals due 15 DEC 2011
    - Projected Contract Award 1 OCT 2012

SSDS CSEA RFP
  - Projected RFP Release Late 2012
  - Projected Contract Award 2014
Ship Integration & Test (SI&T) Agent Competition

- **Competition**
  - Government control of design decisions and interfaces
  - Acquisition of appropriate data rights

- **Expected benefits to the Navy**
  - Encourage innovation, incentivize superior performance, and reduce costs
  - Allow the Navy to provide mature technology and high quality products and engineering services to the fleet at a competitive price

- Projected RFP release 2012
- Projected contract award late 2013
Affordability & Better Buying Power

Target Affordability and Control Cost Growth – IWS 1.0

- Mandate Affordability as a Requirement
- Eliminate Redundancy within Warfighting portfolios
- Set shorter program timelines and manage to them

- Drive productivity growth through Will / Should Cost Management
- Stabilize Production Rates
Questions & Answers