



Surface Navy Combat Systems Engineering Strategy

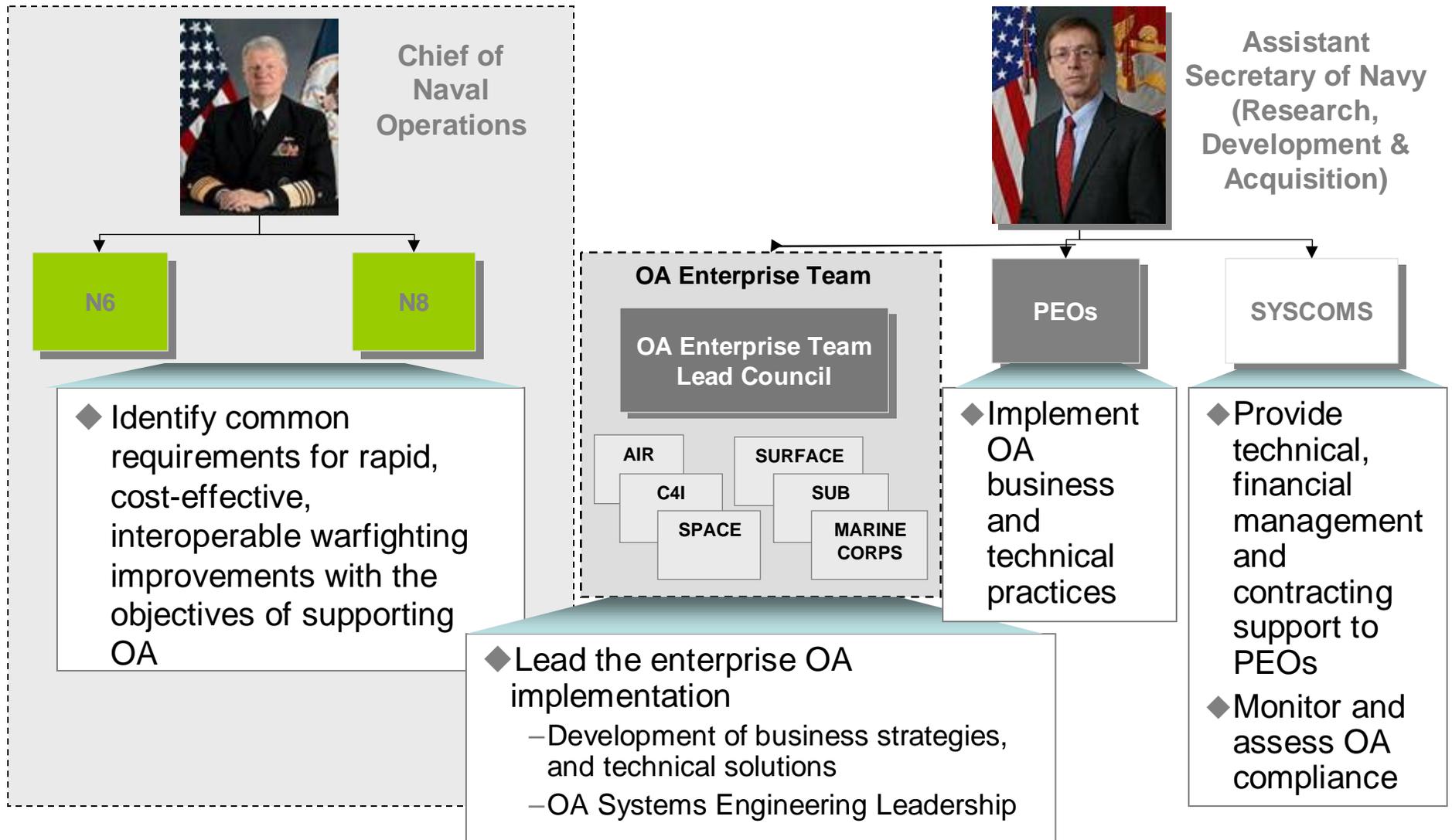
Surface Navy Open Architecture Path Forward
For Defense Daily Open Architecture Summit
18 November 2008

RDML Terry Benedict
Program Executive Officer for
Integrated Combat Systems

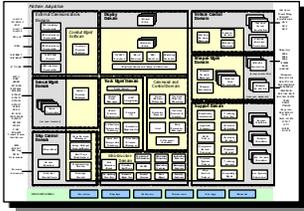
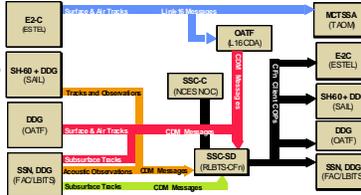
Agenda

- ◆ Navy Enterprise OA
- ◆ OA in 08
- ◆ Evolving of Aegis Combat System Development
- ◆ Implementing OA
- ◆ Surface Combat System Objective Architecture
- ◆ Defining Objective Architecture Components and Interfaces
- ◆ Fielding Common Components
- ◆ Rapid Capability Insertion Process (RCIP)
- ◆ Small Business Opportunities
- ◆ Summary

OA is an Enterprise effort requiring participation from many



We are Changing Business/Technical Practices and Culture

Change Business Practices	Change Technical Practices	Change Culture
<p>Assessing Programs</p> 	<p>Modularizing Architectures</p> 	<p>Training our Workforce</p> 
<p>Changing Contracts</p> 	<p>Integrating components & publishing interfaces to build new capabilities</p> 	<p>Communications - OA Website</p>  <p>https://acc.dau.mil/o</p>
<p>Disclosing Designs and Reuse - SHARE, NESI</p> 	<p>Conduct SOS Engineering Experiments</p> 	<p>Research</p> 
<p>Exercising Intellectual Property Rights</p> 	<p>Building communities to collaborate and share</p> 	<p>Outreach</p>  <p>Press Industry Days</p>

OA in 08 On Track



OA EXCOMM 1 16 Oct 03



OA EXCOMM 2 02 Jun 04

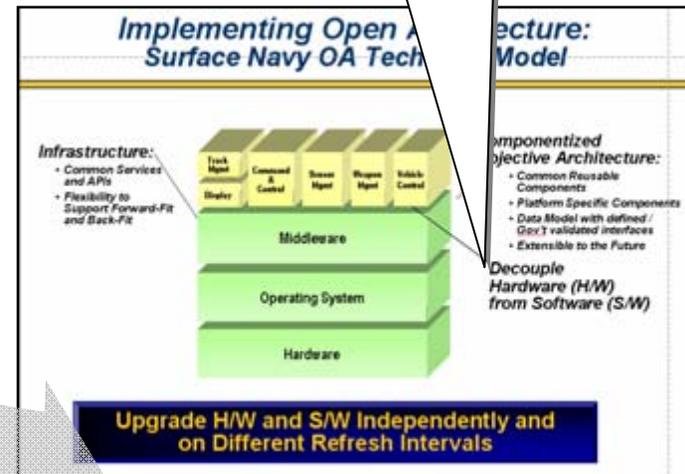
Consistent Message:

- OACE Category 3 for Aegis & SSDS ships
- Decoupling of H/W & S/W
- Enable unconstrained computing growth

Pursue more competition over time

Aegis & SSDS receiving OA in 08

- CG 52
 - CVN 68
- } In yard this FY



SNA Brief 15 Jan 08

USS BUNKER HILL (CG 52) Status

- ◆ Duration: Week 35 of 52 Weeks
- ◆ Successful AEGIS Light Off (ALO)
- ◆ Successful AWS (CTL-3) computer program install

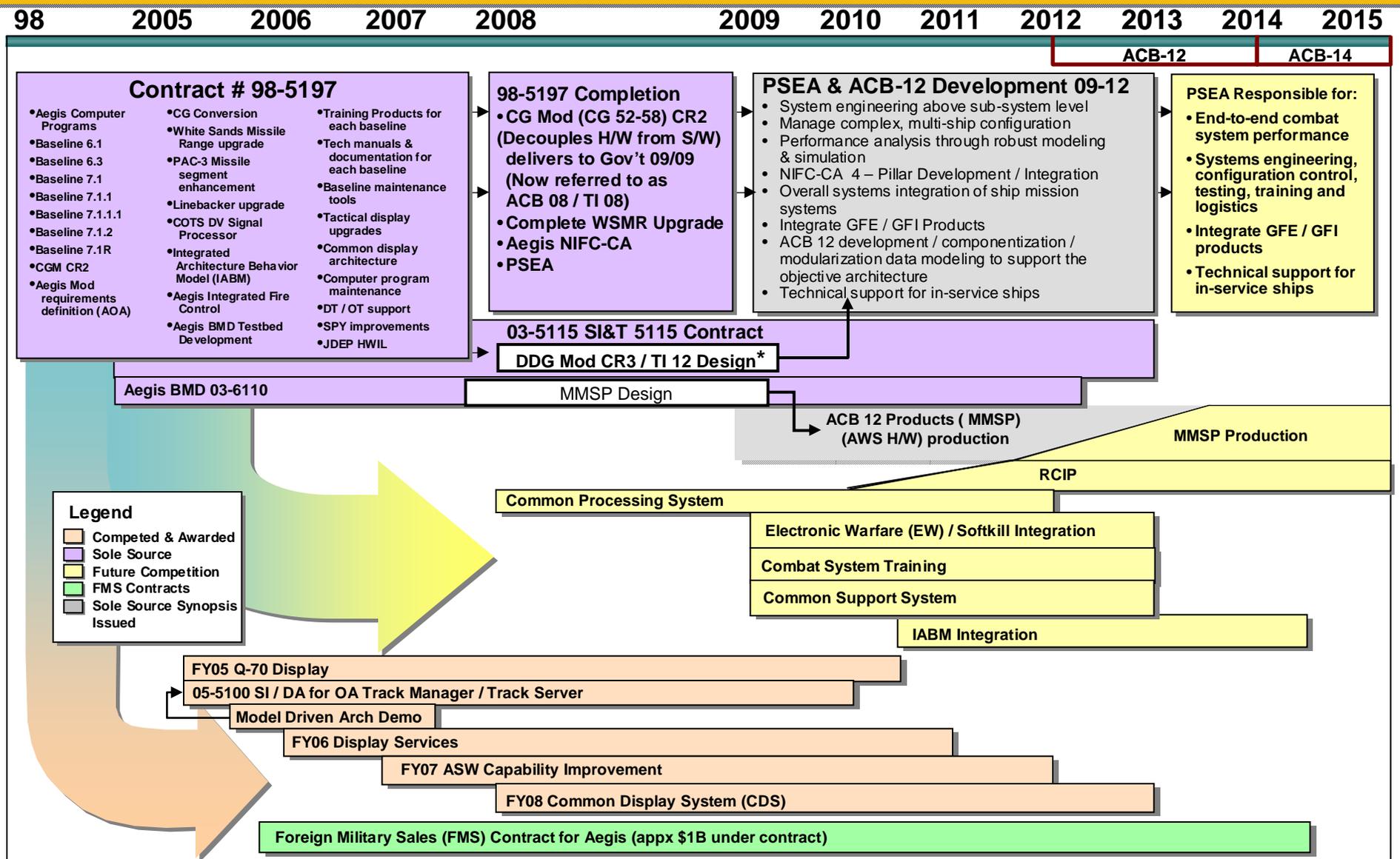


CIC before



CIC currently

Evolution of Aegis Combat System Development



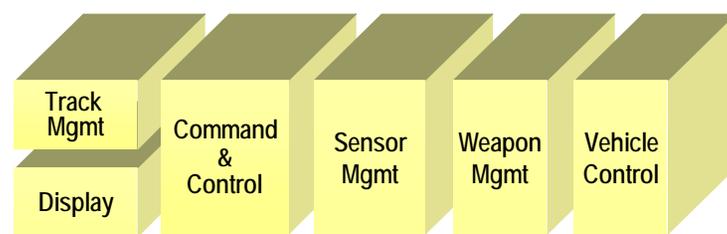
Implementing Open Architecture: Surface Navy OA Technical Model

Infrastructure:

- **Common Services and APIs**
- **Flexibility to Support Forward-Fit and Back-Fit**

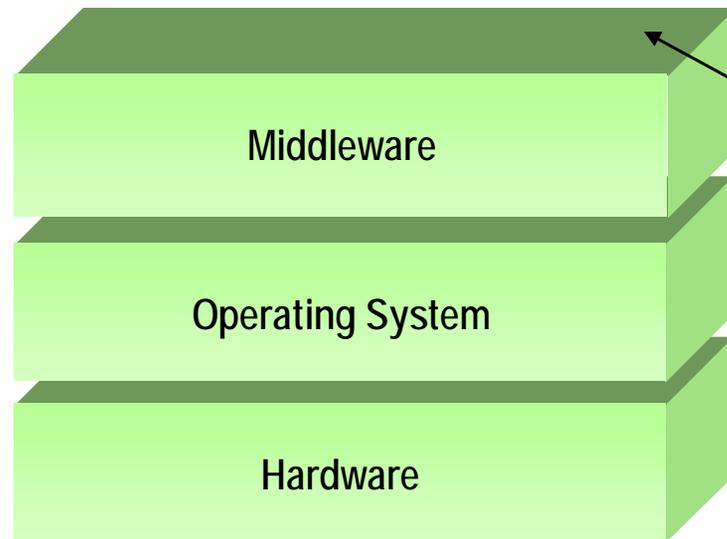
Common Computing Environment:

- **Standards-based Interfaces to network**
- **Commercial Mainstream Products and Technologies**



Componentized Objective Architecture:

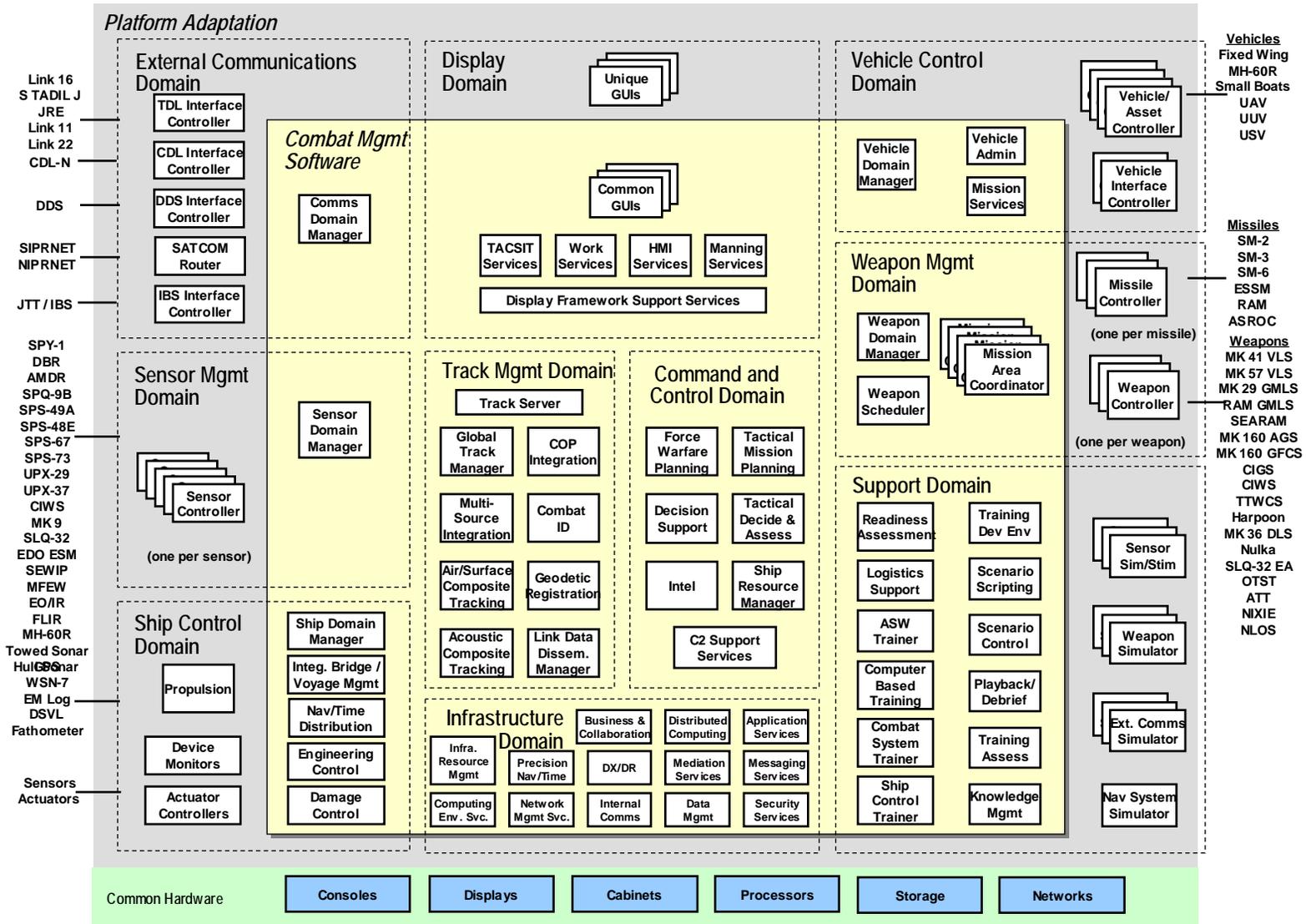
- **Common Reusable Components**
- **Platform Specific Components**
- **Data Model**
- **Extensible to the Future**



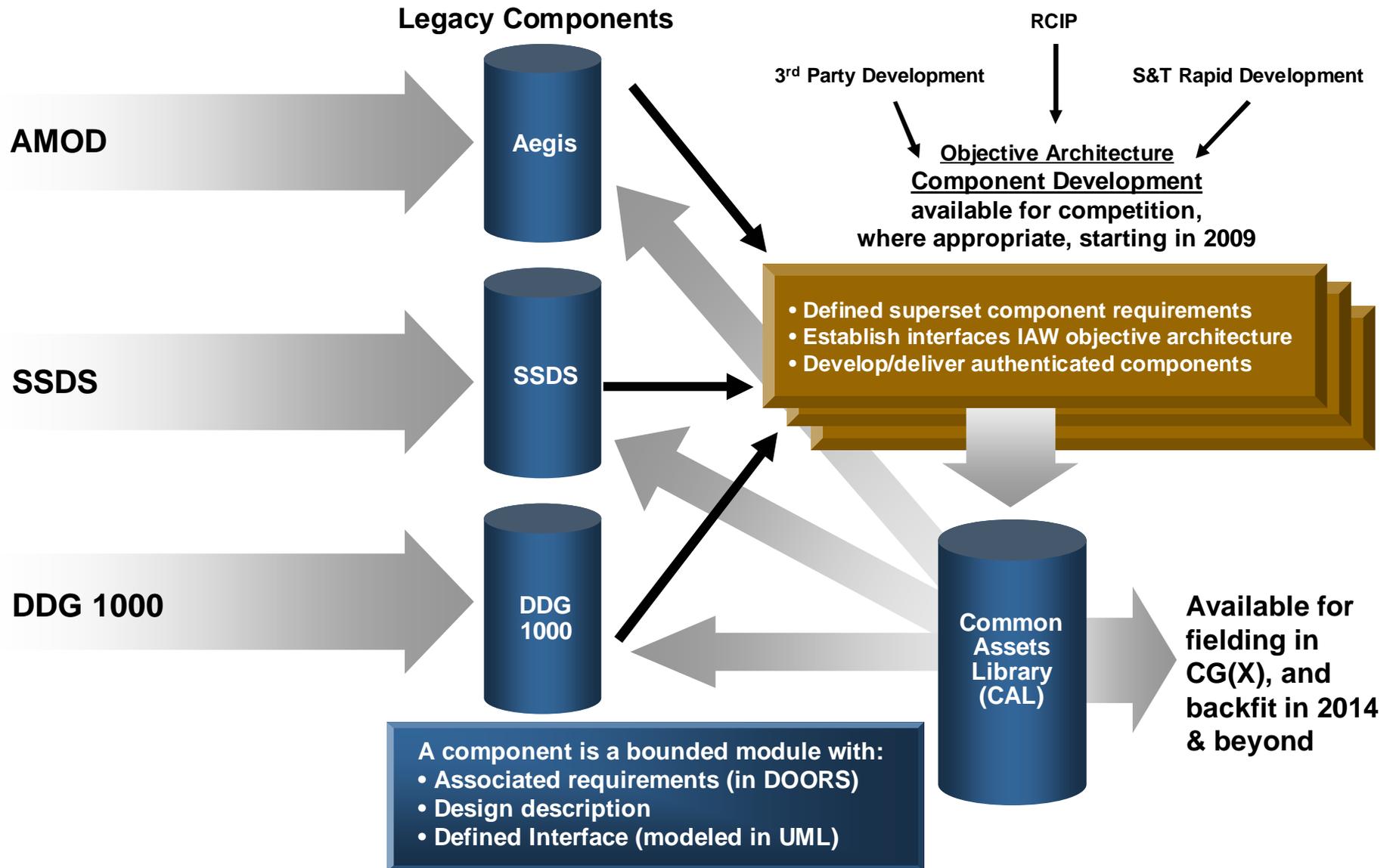
Decouple Hardware (H/W) from Software (S/W)

Upgrade H/W and S/W Independently and on Different Refresh Intervals

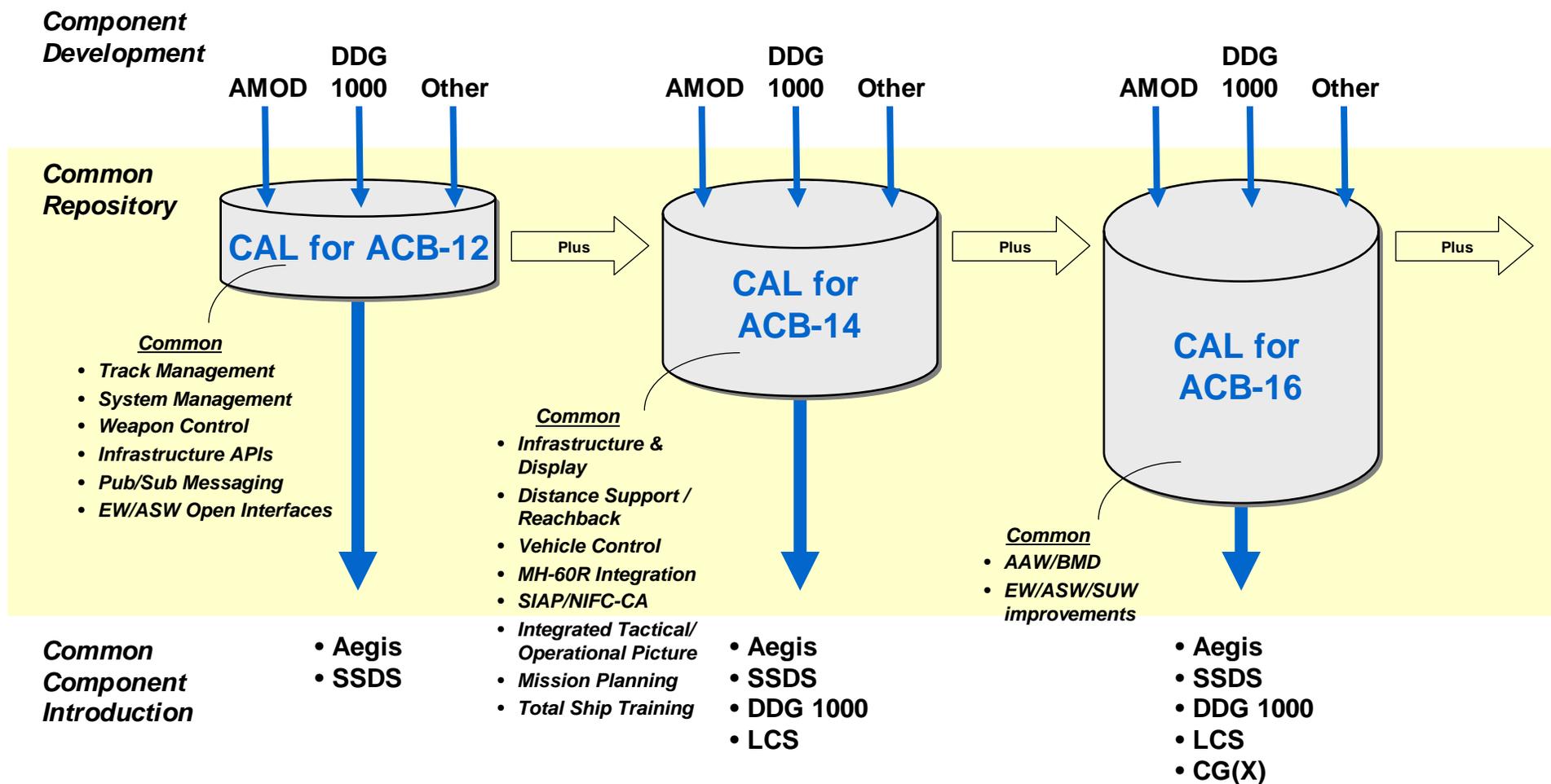
Surface Combat System Top Level Objective Architecture



Combat System Objective Architecture Component and Interface Definition



Notional Fielding of Common Components

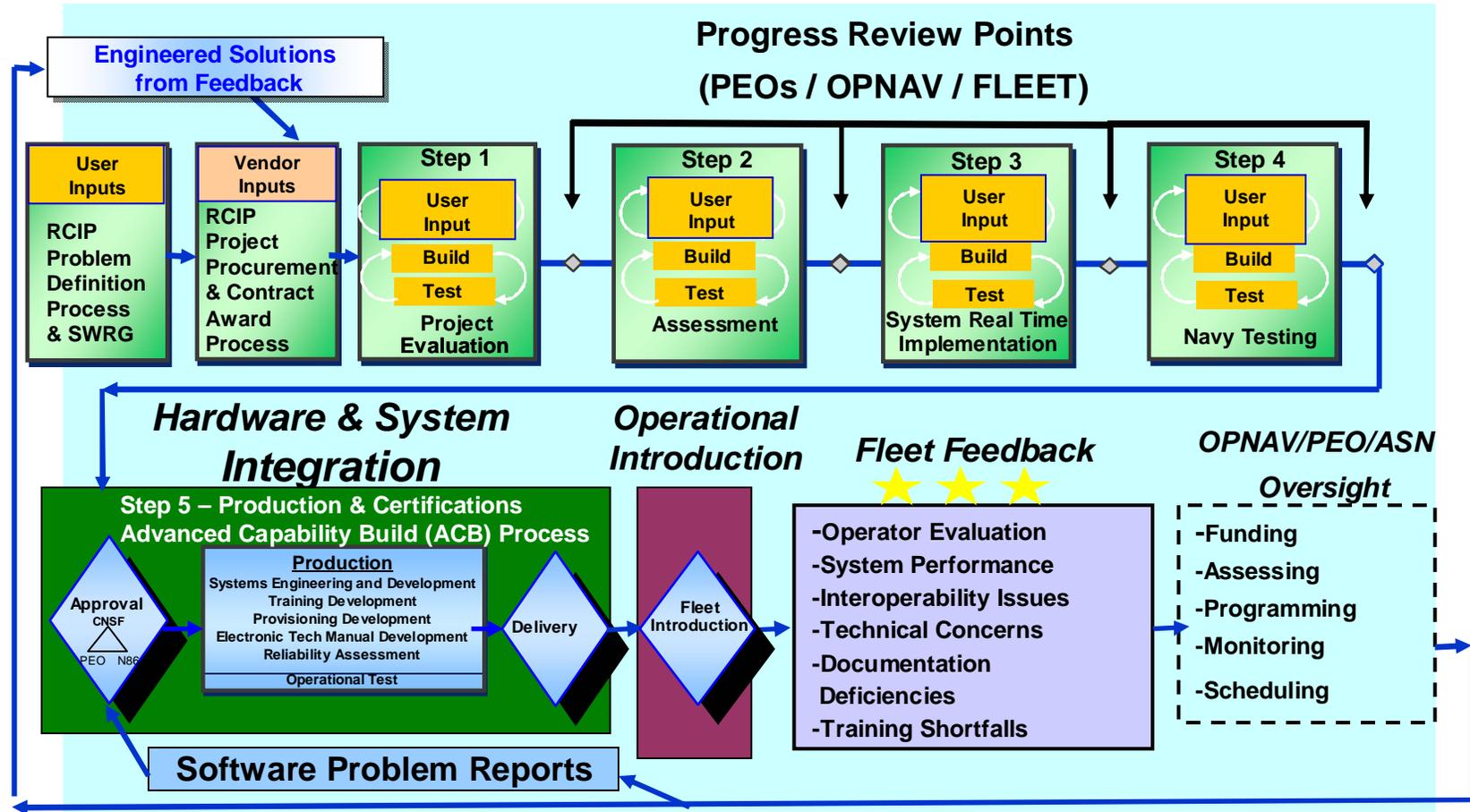


Common Asset Library (CAL) Grows Over Time – Advanced Capability Builds (ACB) draw from library

Combat Systems Engineering Strategy Summary

- ◆ Establishing a combat system based on a common objective architecture with products applicable to multiple ship classes
 - Government owned architecture and authenticated interfaces driven by Architecture Description Document (ADD)
- ◆ Conducting combat system development through disciplined systems engineering principles and processes
- ◆ Future Surface Combat Systems will be created from existing and new development components
- ◆ Two Roles for Industry
 - PSEA – platform system engineering agent
 - Developers – individual components, capabilities

Rapid Capability Insertion Process



Fleet Input, Technical Oversight / Insertion Throughout Development and Operational Testing, Resulting in Increased Capability to the Fleet



NAVSEA Small Business Innovation Research Program (SBIR) Budget Object Classification Code System (BOCS) Trends



SBIR

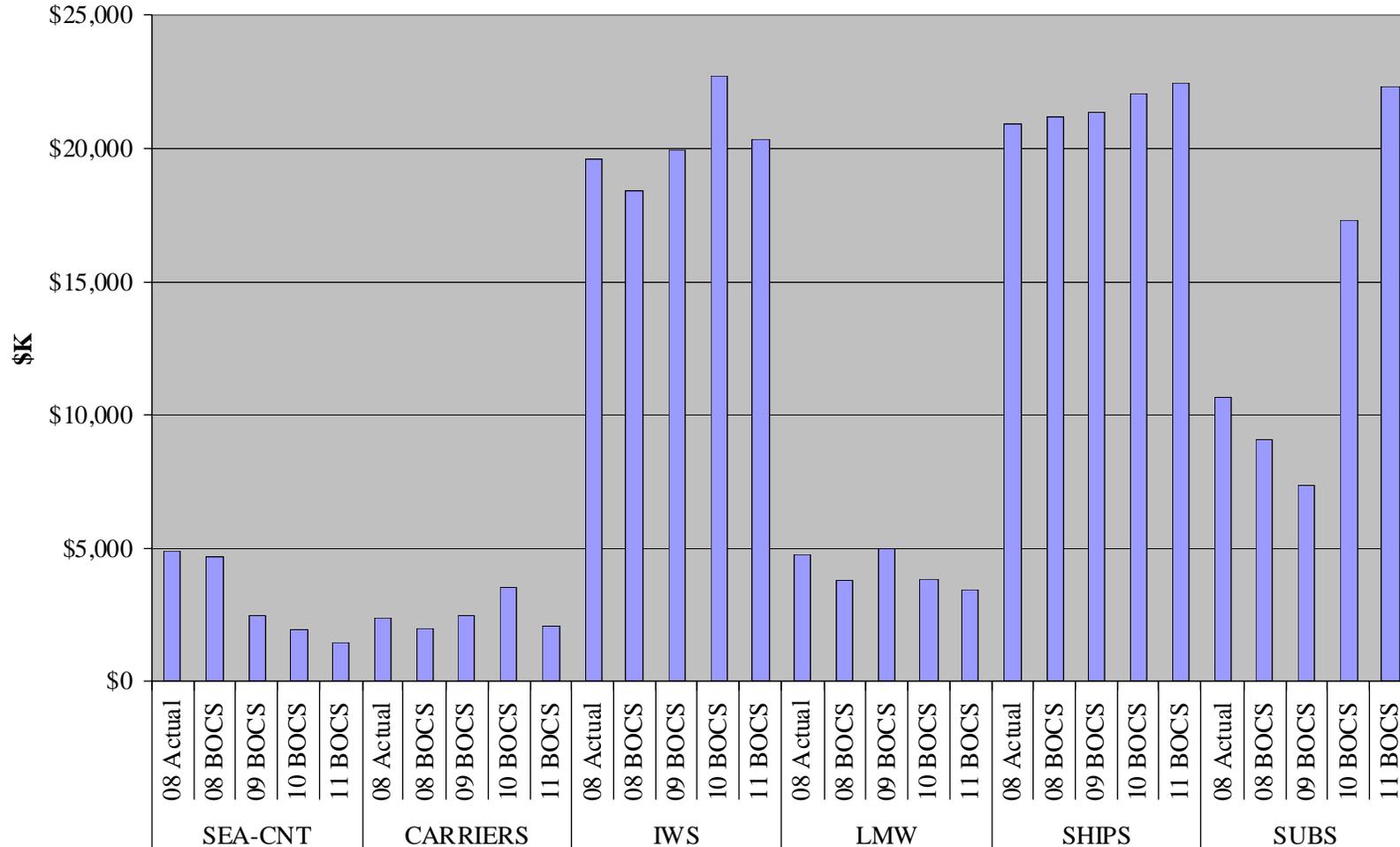


Chart based on 19 Sept 2008 BOCS data from the NAVSEA Comptroller

Back-up

Surface Navy Combat System Modernization Paths

Category	Characteristics	Example	ACB / TI Fielding
Major Ship Class (New Construction / POR)	<ul style="list-style-type: none"> ◆ Fixed beginning / end dates based on shipyard schedule ◆ Hardware decisions constrain software scope and architecture ◆ Commodity-based electronics delivered as late in development cycle as possible 	CG ,DDG, CVN-78 DDG-1000 CG(X)	Advance Capability Build (ACB) / Technology Insertion (TI) <ul style="list-style-type: none"> ◆ Requires COTS Computing Environment ◆ ACB Fixed 2 year period with combat system component test and evaluation before delivery ◆ Content preplanned, but may be delivered w / less than planned capability if problems arise ◆ Software Engineered for delivery in < 9 week availability ◆ ACB's can be fielded in conjunction with major capability upgrades or initial COTS Computing Environment availability
CAPABILITY UPGRADE (Science & Technology Transition)			
Capability Development - POR for Specific Capability Upgrade - Rapid Capability Insertion Process (RCIP) (POR)	<ul style="list-style-type: none"> ◆ Requires traditional development process – deployed in an ACB when ready ◆ May be tested individually but certified as part of an ACB ◆ Rapid capability development upgrades usually within specific S/W components ◆ Rapid Development inside PPBE timelines ◆ May include H/W changes. Engineered for < 9 week availability ◆ May be tested individually but certified as part of an ACB 	NIFC-CA, IABM, BMD, Air Control, DWC SPY-OA, SCCID, RDDL, ATO Correlator	
SOFTWARE AND HARDWARE INFRASTRUCTURE MAINTENANCE			
Technology Insertion (TI) Computing Hardware Refresh (POR)	<ul style="list-style-type: none"> ◆ Provides opportunity to upgrade computing environment (Hardware and Software) and manage COTS obsolescence issues or provide more processing capability ◆ Uses commodity based electronics procurement 	TI 08 TI 12 TI 16 SSDS OA	
Computer Program Software Maintenance (POR)	<ul style="list-style-type: none"> ◆ Computer S/W maintenance is recurring cost that requires separate POR line ◆ License fees for non GPR S/W ◆ Foundation Critical, Safety and Information Assurance issues 	STR	
ENABLER (Must Happen First)			
Install open architecture computing environment (POR) Budgeted Modernization	<ul style="list-style-type: none"> ◆ Establish Network-based COTS computing environment for in-service Combat Management Systems (CMS) ◆ Decouples CMS H/W from S/W. Field latest ACB during ship's first scheduled <i>COTS Computing Environment</i> install availability 	CG Mod, AMOD, SSDS Mk 2	



Naval Open Architecture is changing how we build systems

Naval Open Architecture is the confluence of business and technical practices yielding modular, interoperable systems that adhere to open standards with published interfaces. OA delivers increased warfighting capabilities in a shorter time at reduced cost.

OA CORE PRINCIPLES

Modular design and design disclosure

Reusable application software

Interoperable joint warfighting applications and secure information exchange

Life cycle affordability

Encouraging competition and collaboration

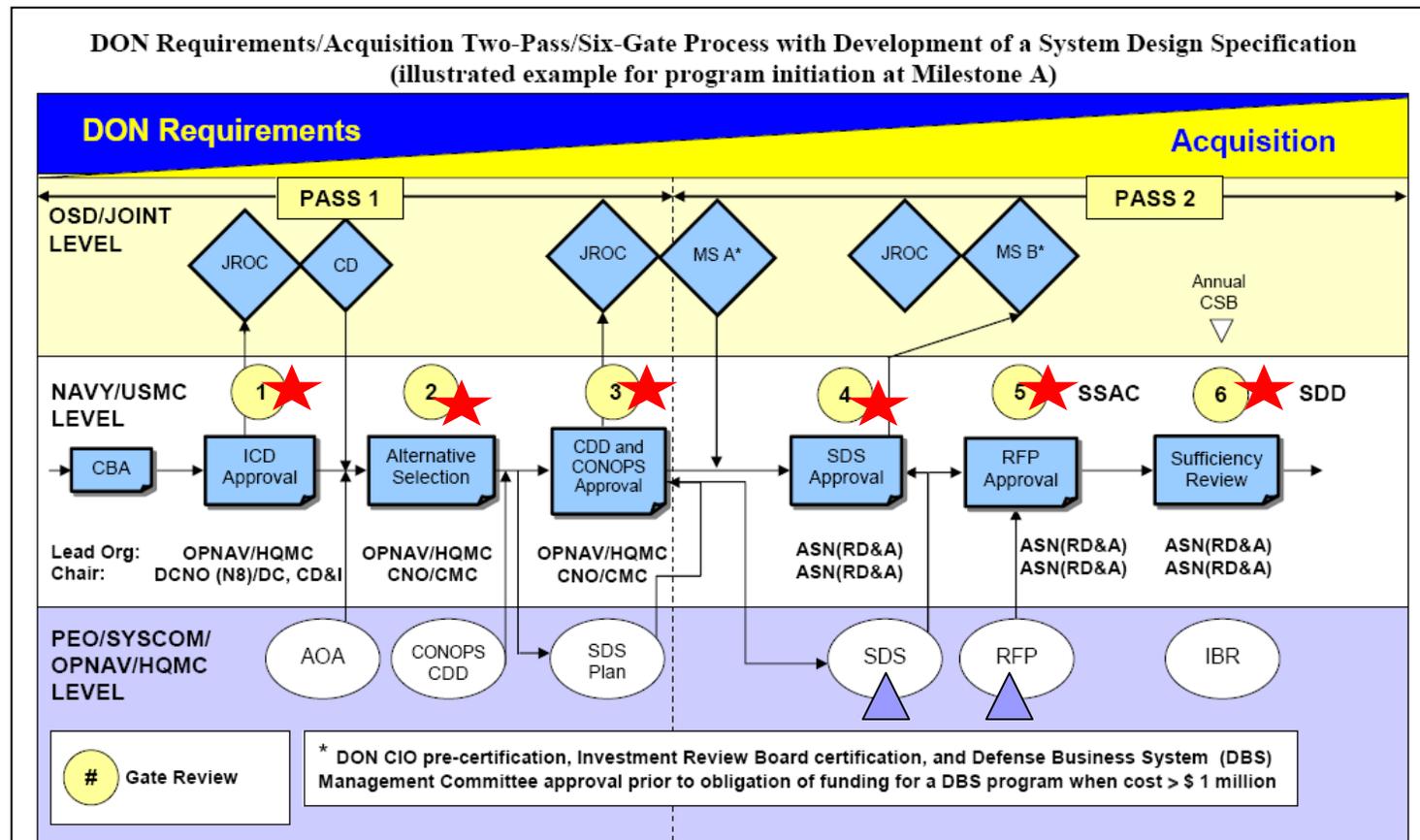
Source: Official Navy definition, ASN RDA Rhumb Lines, 12 Dec 2006

Source: OPNAV Itr Ser N6N7/5U916276 dtd 23 Dec 05



OA checkpoints are being built into the Department of Navy's Six Gate Review Process to ensure compliance

- ★ OA Checkpoints
- ▲ OA Guidance



SECNAV introduced the six-gate, two-pass process to more effectively integrate the Naval requirements and acquisition decision processes. This process improves visibility and insight into the development, establishment and execution of programs.