

Gun and Missile Systems ***An Integrated Warfare Perspective***

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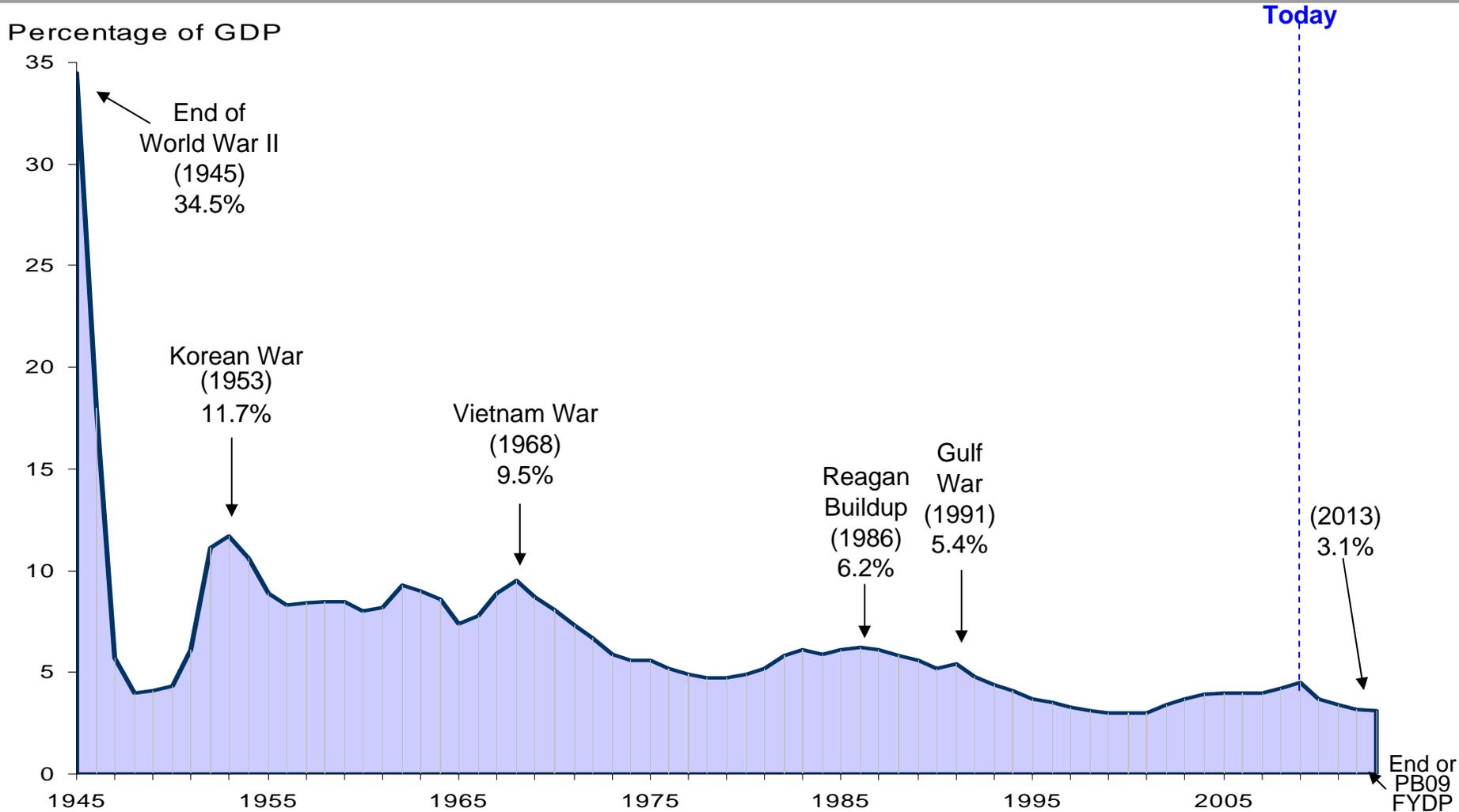
Outline

- **Today's Environment**
- **Where are we going?**
- **How might we get there?**





Defense Budget as a Percentage of GDP

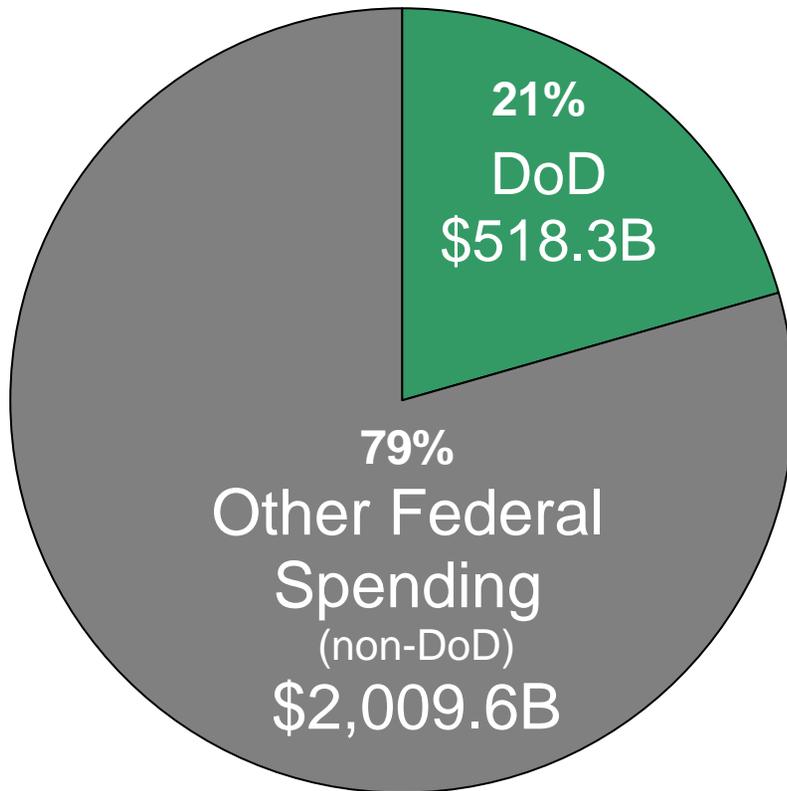


Source: Calculations based on Office of Management and Budget, *Historical Tables, Budget of the United States Government, Fiscal Year 2009* (Washington D.C.: U.S. Government Printing Office, 2008), at www.whitehouse.gov/omb/budget/fy2009/pdf/hist.pdf (November 27, 2008)



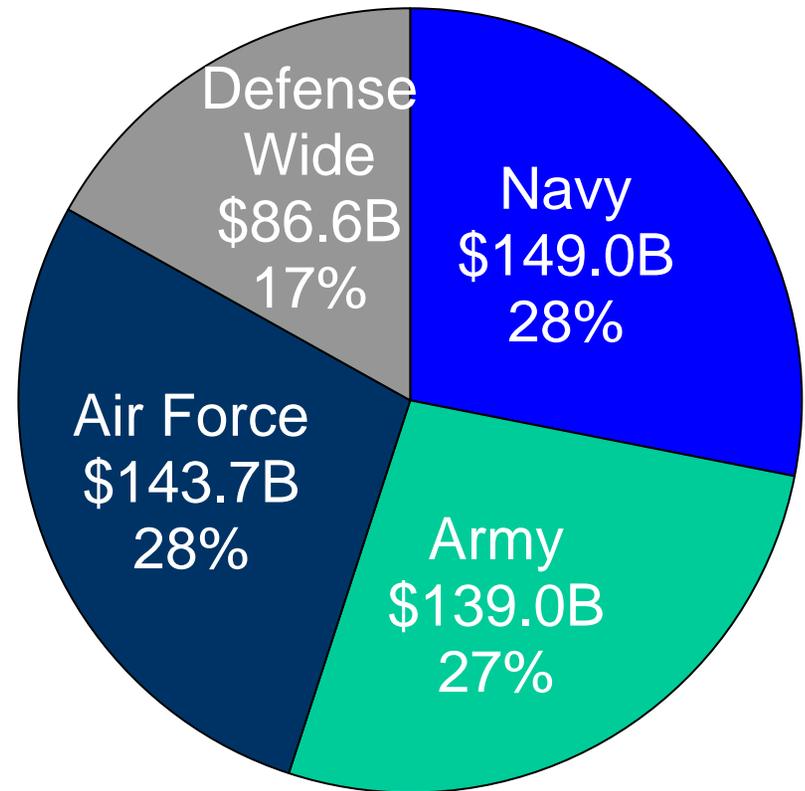
FY2009 Budget Authority

Department of Defense Budget as % of Federal Budget



Total Federal Budget = \$2,527.9B

Department of Navy Budget as % of DoD Budget



Total DoD Budget = \$518.3B
(does not include non-DoD National Defense)

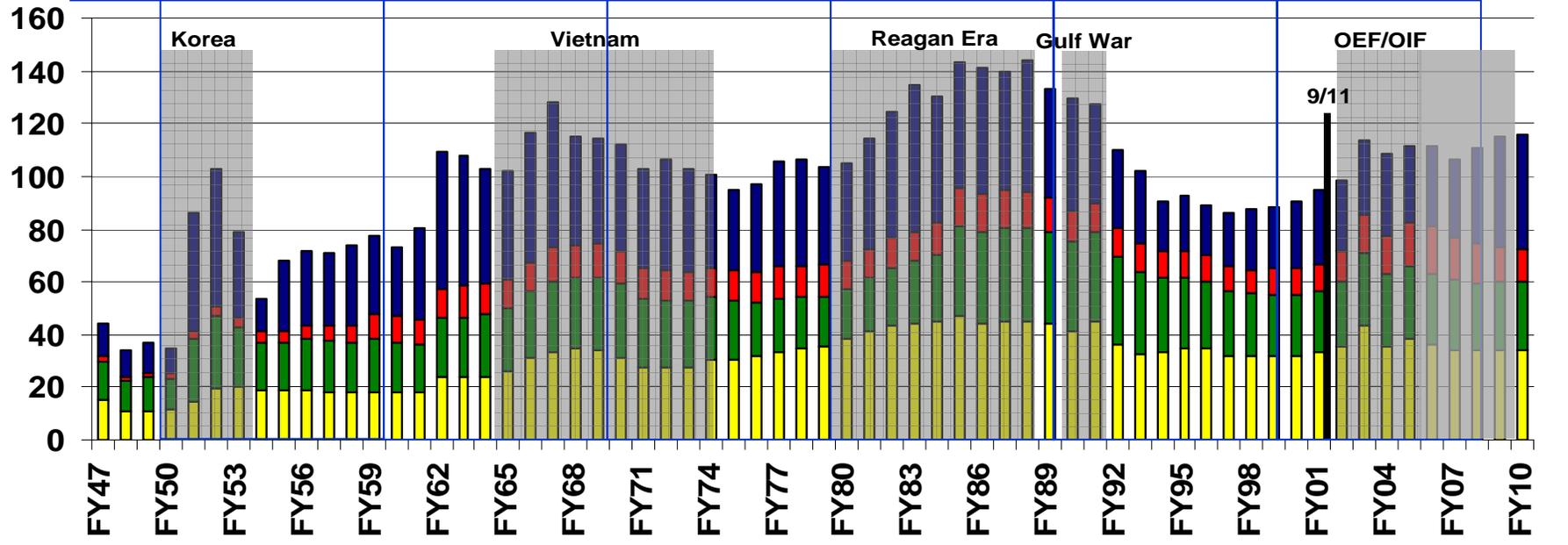
Source: National Defense Budget Estimates for FY2009, September 2008 ("The Green Book")



Navy TOA Profile 1947 - 2010

AVG % of TOA BY DECADE

CY06 \$B	1950s	1960s	1970s	1980s	1990s	2000-2006
O&M	26%	25%	30%	34%	35%	35%
PERS	28%	23%	22%	21%	29%	25%
R&D	7%	11%	11%	10%	10%	13%
PROC	39%	41%	37%	35%	26%	27%



*Consumer Price Index conversion factors were used for FY45 - FY61 (CY\$).



** Official DoD conversion factors were used for FY62 - FY11 (CY\$).

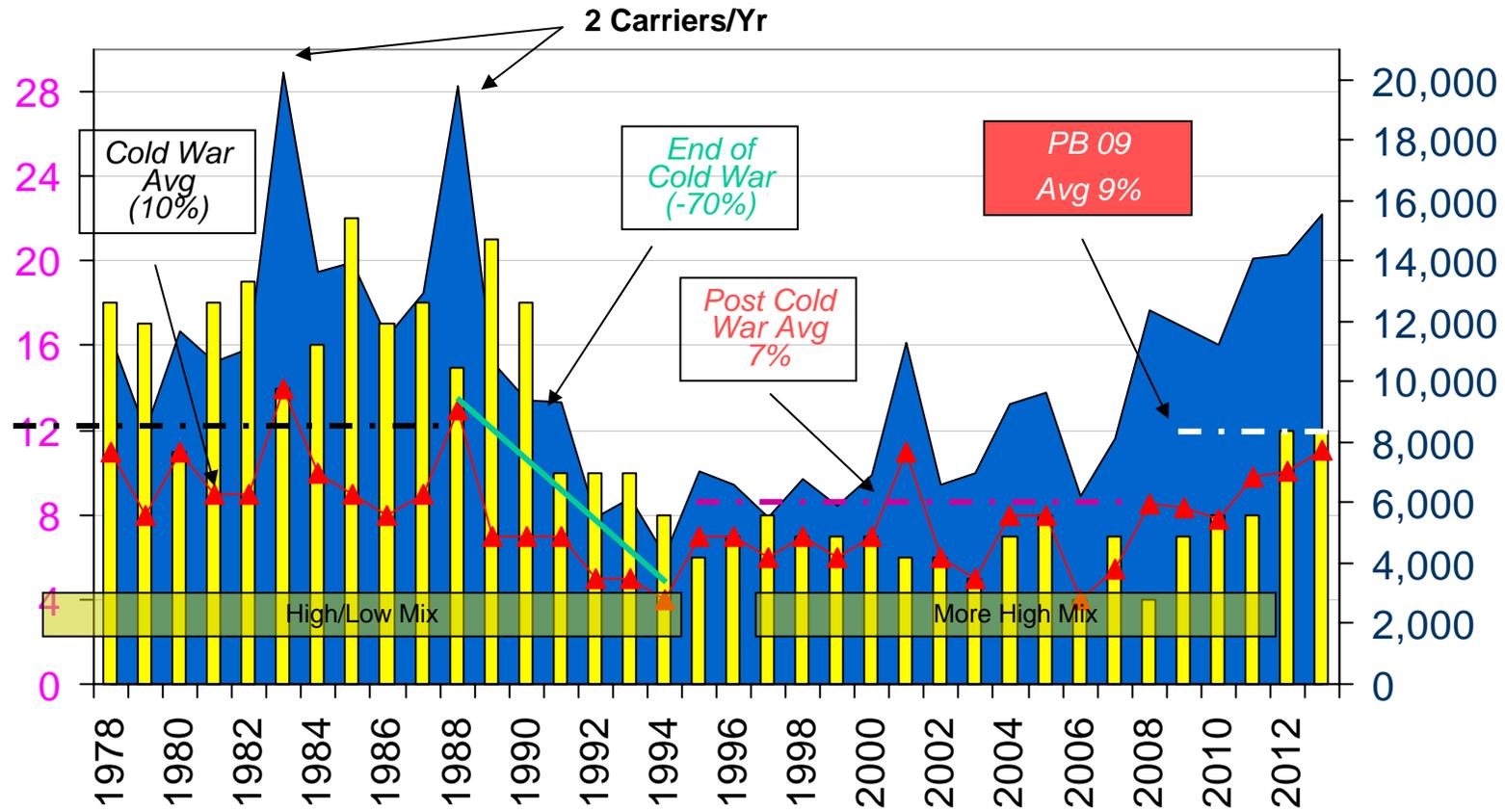
Navy TOA mirrors DoD Underlying Outlay Cycle



Shipbuilding Procurement History

FY2009 President's Budget

Ships / Ship Construction % DoN TOA

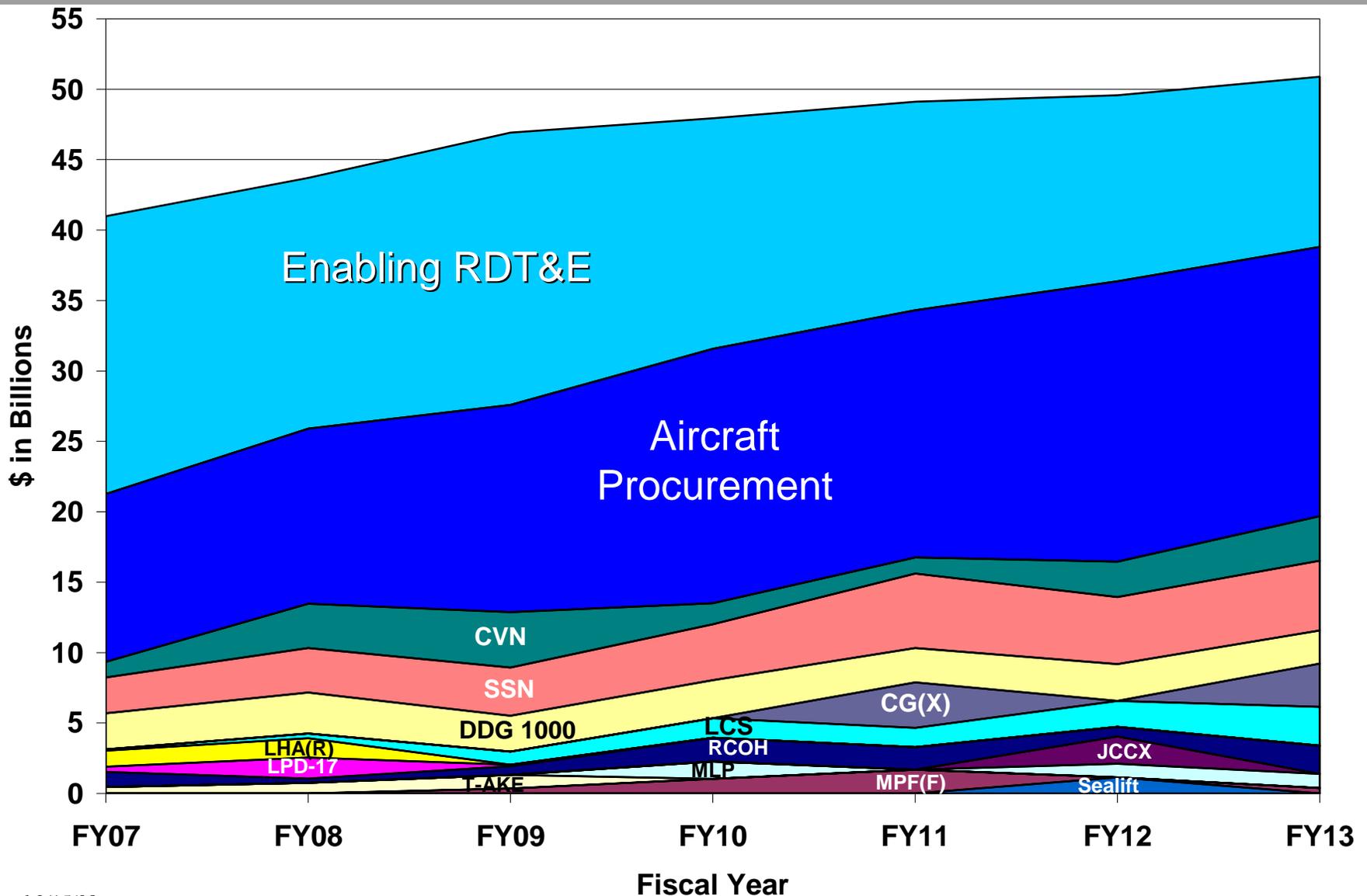


■ Total New Const (FY07\$M)
 ■ Ship Qty
 ▲ Ship Constr as % DoN TOA

FYDP Projections Now Below Cold War Averages

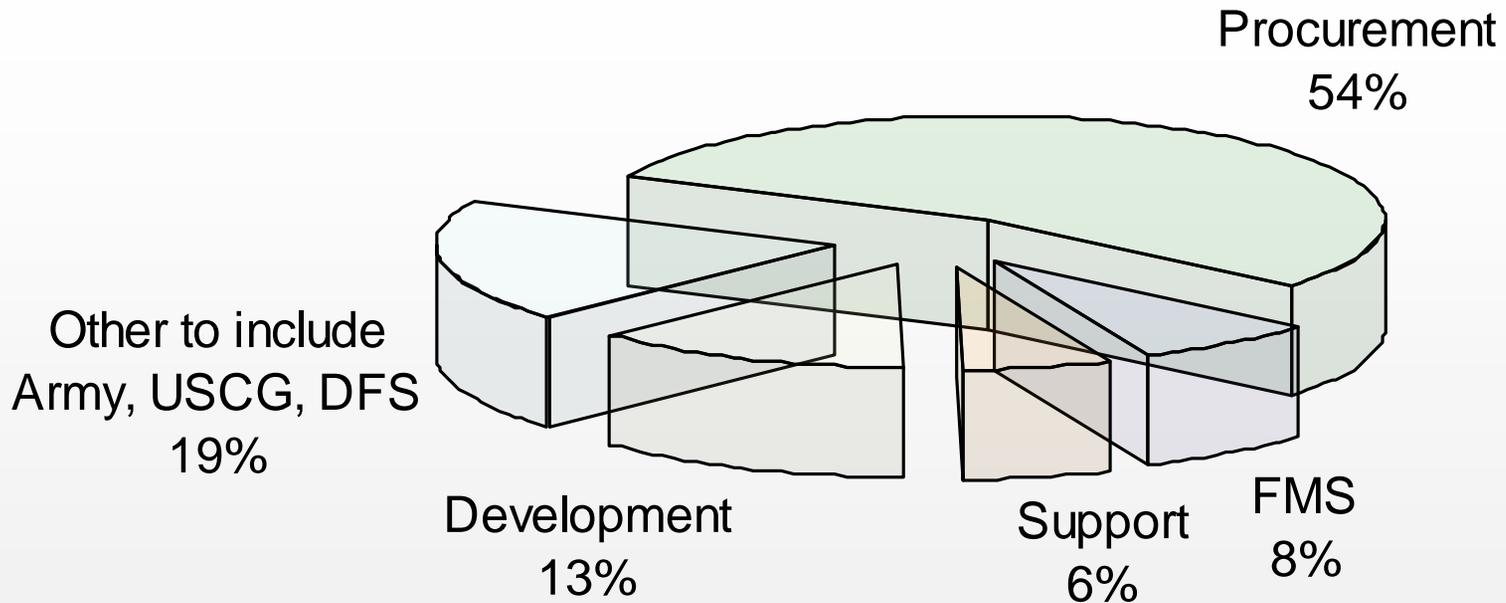


Navy R&D and Procurement FY2009 President's Budget





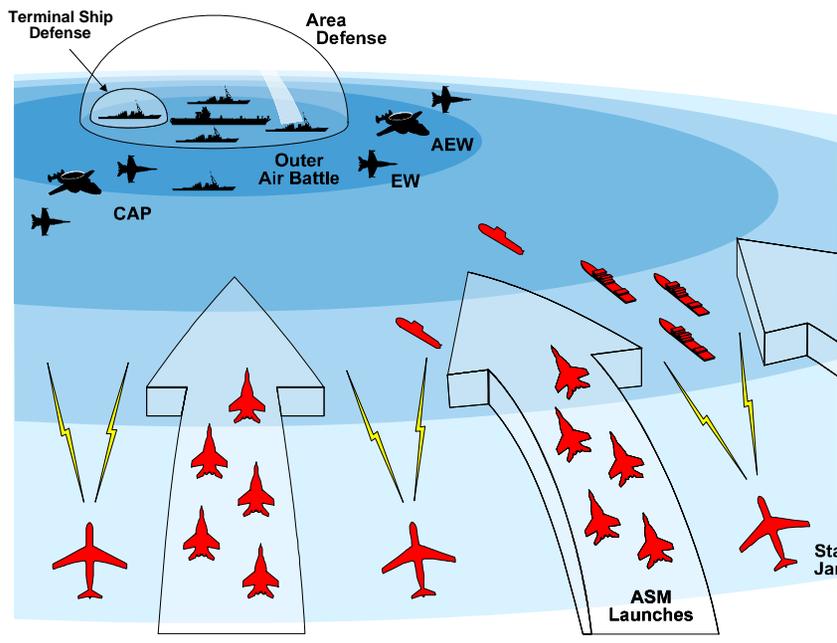
FY09 Weapons Funding Allocations



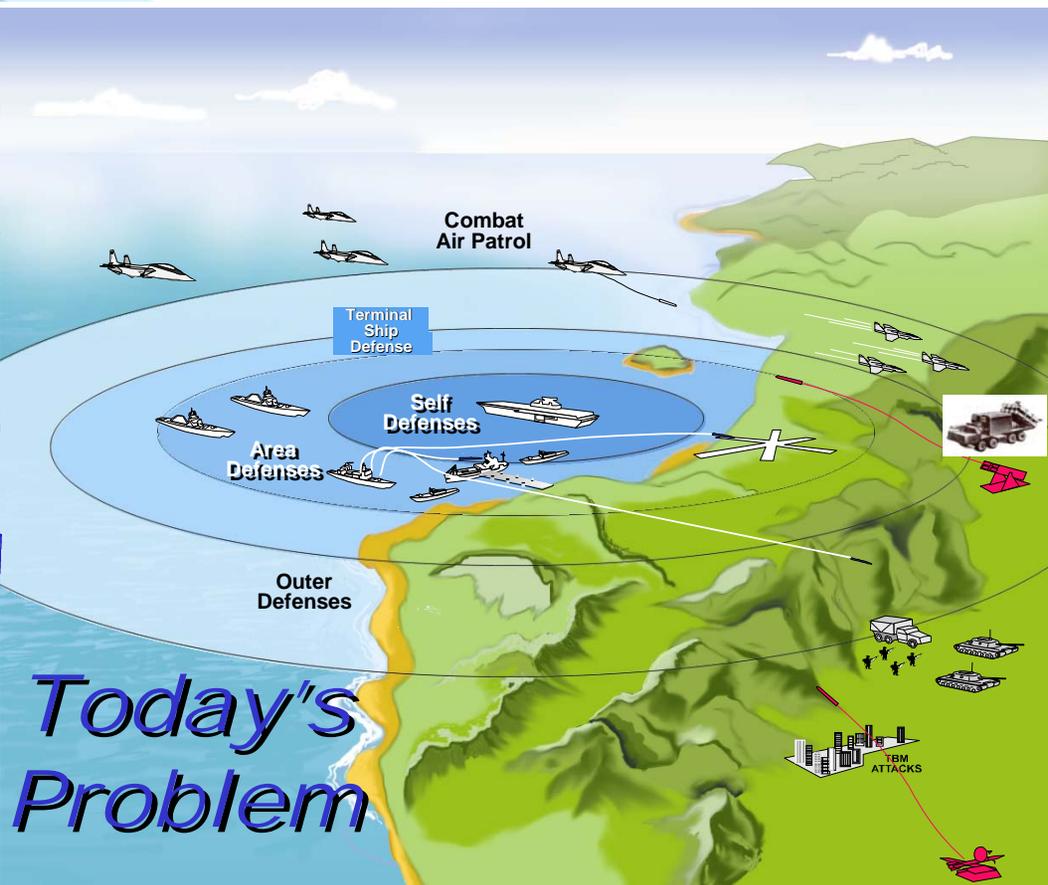


Today - Changing Operational Environment

"Yesterday's" Problem



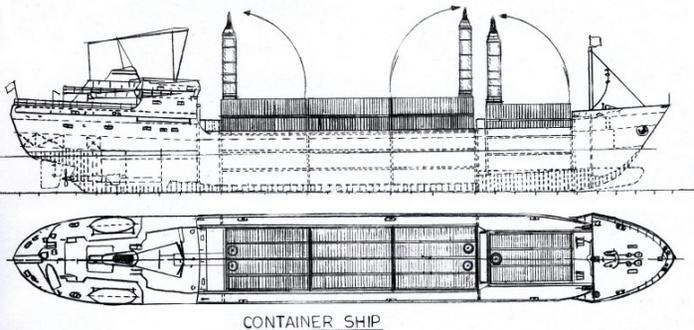
Blue Water Navy



Today's Problem



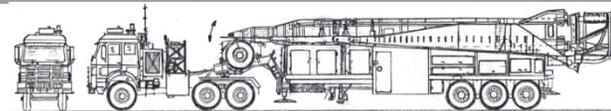
New Threats ...and Some Old Ones



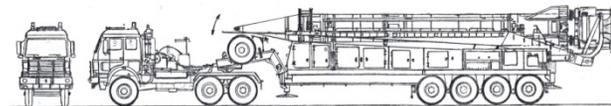
CONTAINER SHIP

**DHS/MDA concerns to
hide ballistic Missile**

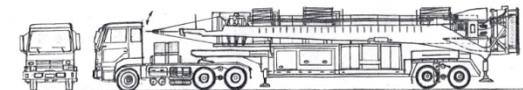
**China tests Russian
submarine missile**



SHAHAB-3B



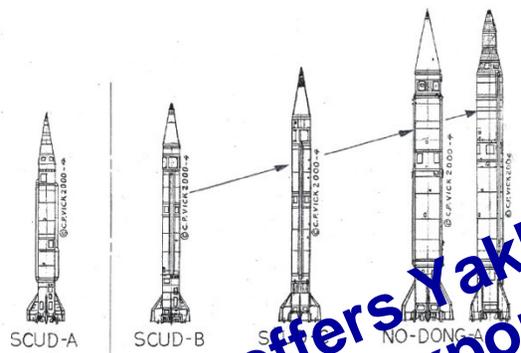
SHAHAB-3



GHAURI

Mobile Missile Launcher

NO-DONG - A DESIGN HERITAGE



**Russia offers Yakhont
missile for export**



**US protests Iran
Harassment of
US ships**





Surface Ship Weapons Defense in Depth

SM-3

SM-6

SM-2

ESSM

RAM

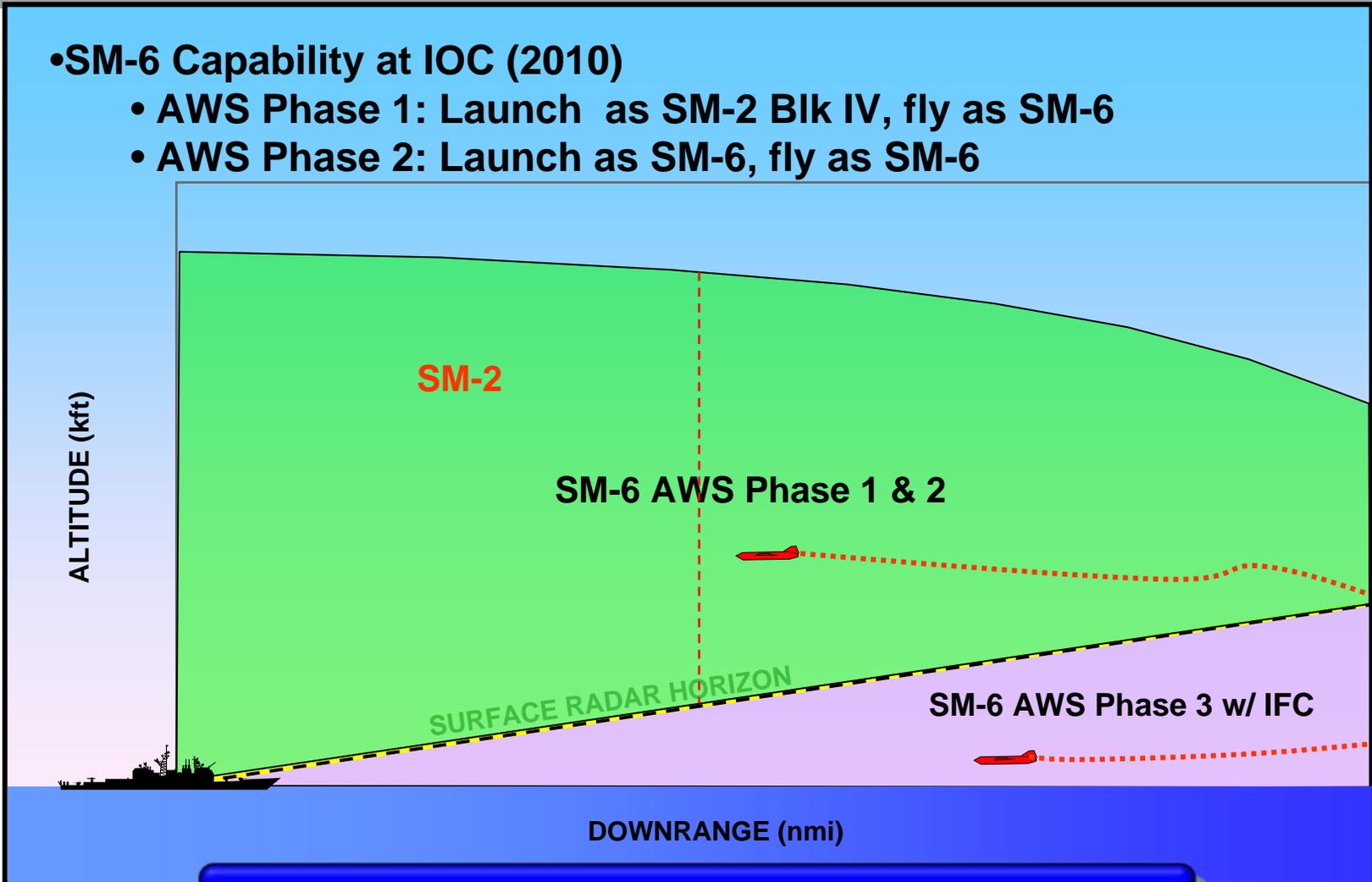
CIWS

MK 38 MK 46 MK 110 MK 75 MK 45 5"/62 AGS/LRLAP

SM-6 Battlespace

- **SM-6 Capability at IOC (2010)**

- AWS Phase 1: Launch as SM-2 Blk IV, fly as SM-6
- AWS Phase 2: Launch as SM-6, fly as SM-6



SM-6 Buys Battlespace Game Changer



PEO IWS

Supporting the Warfighter Today

Mission

- Force Protection
- Counter-Rocket Artillery & Mortar (Phalanx)
- Anti-ship cruise missile defense
- Fleet area air and missile defense
- Joint theater air and missile defense
- Anti-Surface Warfare
- Naval Surface Fire Support

Description

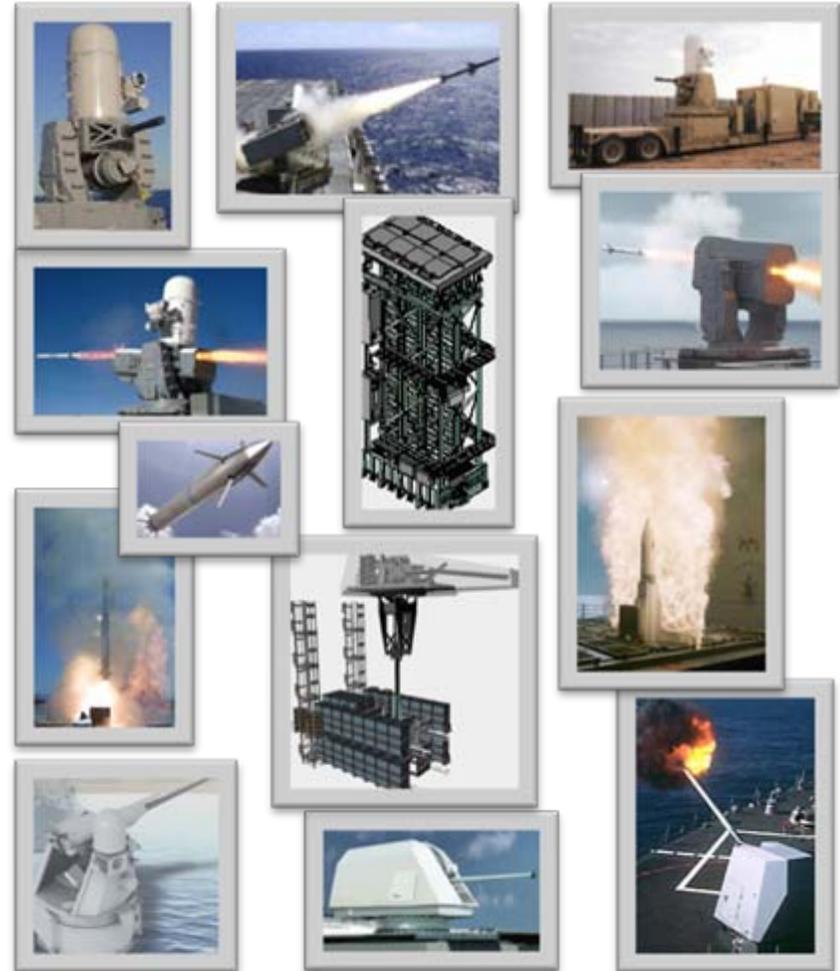
- Autonomous and/or integrated close-in weapons
- Lightweight, low cost, high firepower ASMD
- Medium range, all-weather, guided missiles
- Extended range surface-to-air missile
 - Compatible with joint integrated fire control
- Advanced Gun System / 155mm LRLAP
- Digital, joint-integrated, naval fires control system
- Conventional naval gun systems and ammunition
 - Major, intermediate, minor caliber, and small arms

Platforms

- Land-based C-RAM for US and allied ground forces
- CVN, LHD, LHA, LSD, LPD, CG, DDG, FFG, LCS
- Fifteen allied navies

Employment

- Effective against current and future air threats
- Layered defense against terrorist and conventional small fast surface craft
- Engage land targets at long range with precise, high volume fires





PEO IWS

Guns and Gun Weapon Systems

Medium / Minor Caliber Gun Weapons System Mission:

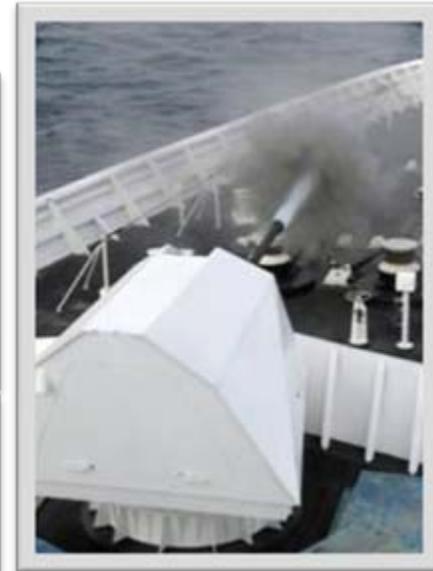
- Warning, disabling & destructive gun fire to respond anti-small boat asymmetric threats in support of Surface Warfare (SuW) and low, slow flyers.

Description:

- Minor Caliber Guns: Lightweight, low cost, remotely controlled stabilized gun weapon systems with on-mount Electro-Optic Fire Control System (EOFCS)
- Medium Caliber Guns: Main battery deck guns on frigate size platforms; also used as secondary battery on DDG 1000 Destroyers.

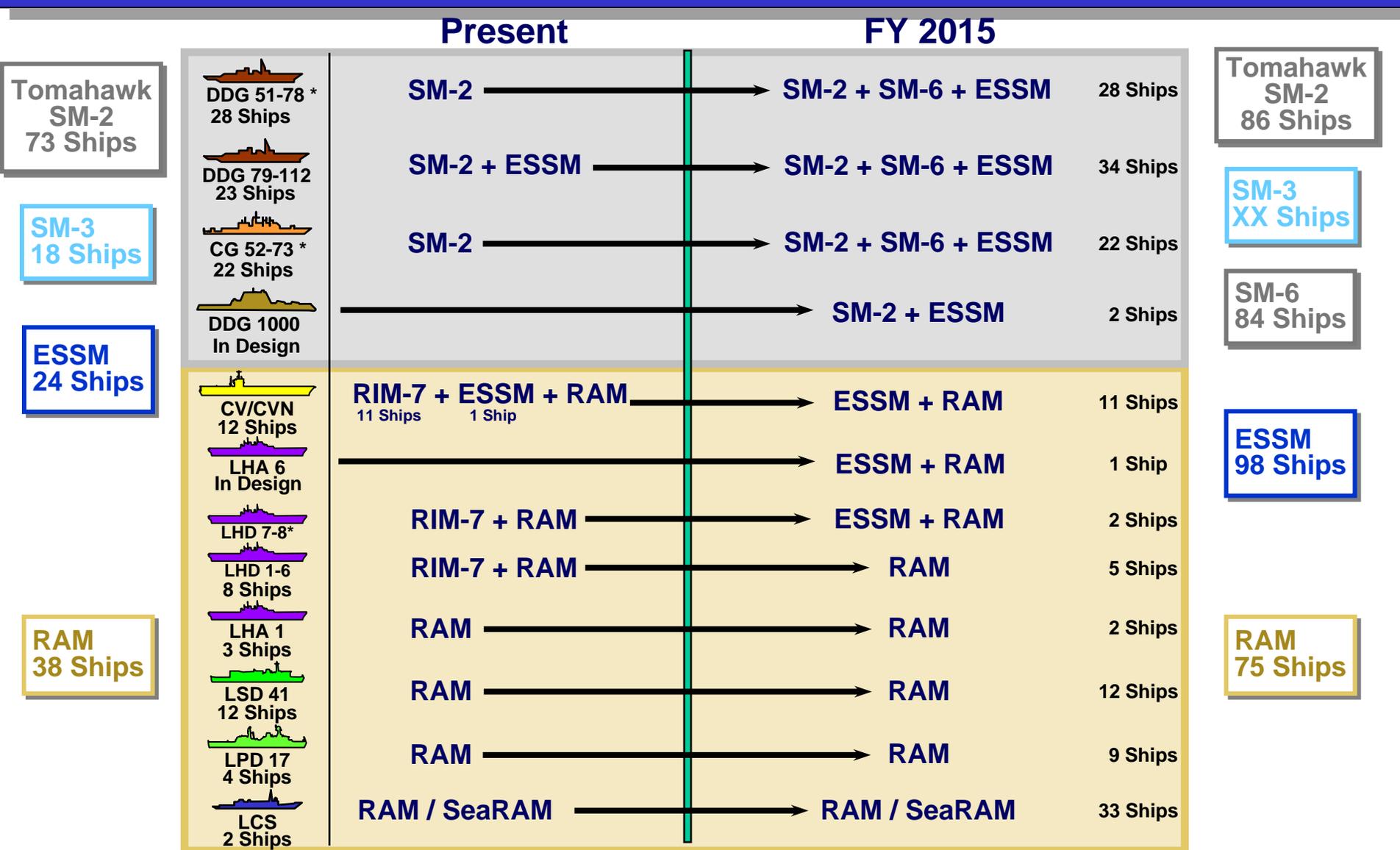
Ships:

- DDG / CG
- LPD-17 / LPD / LHD
- Large Deck Amphibs
- FFG Class Frigates
- Littoral Combat Ships (LCS)
- US Coast Guard Cutters
 - WMSL / WHEC / WMSM / WMEC / WPB





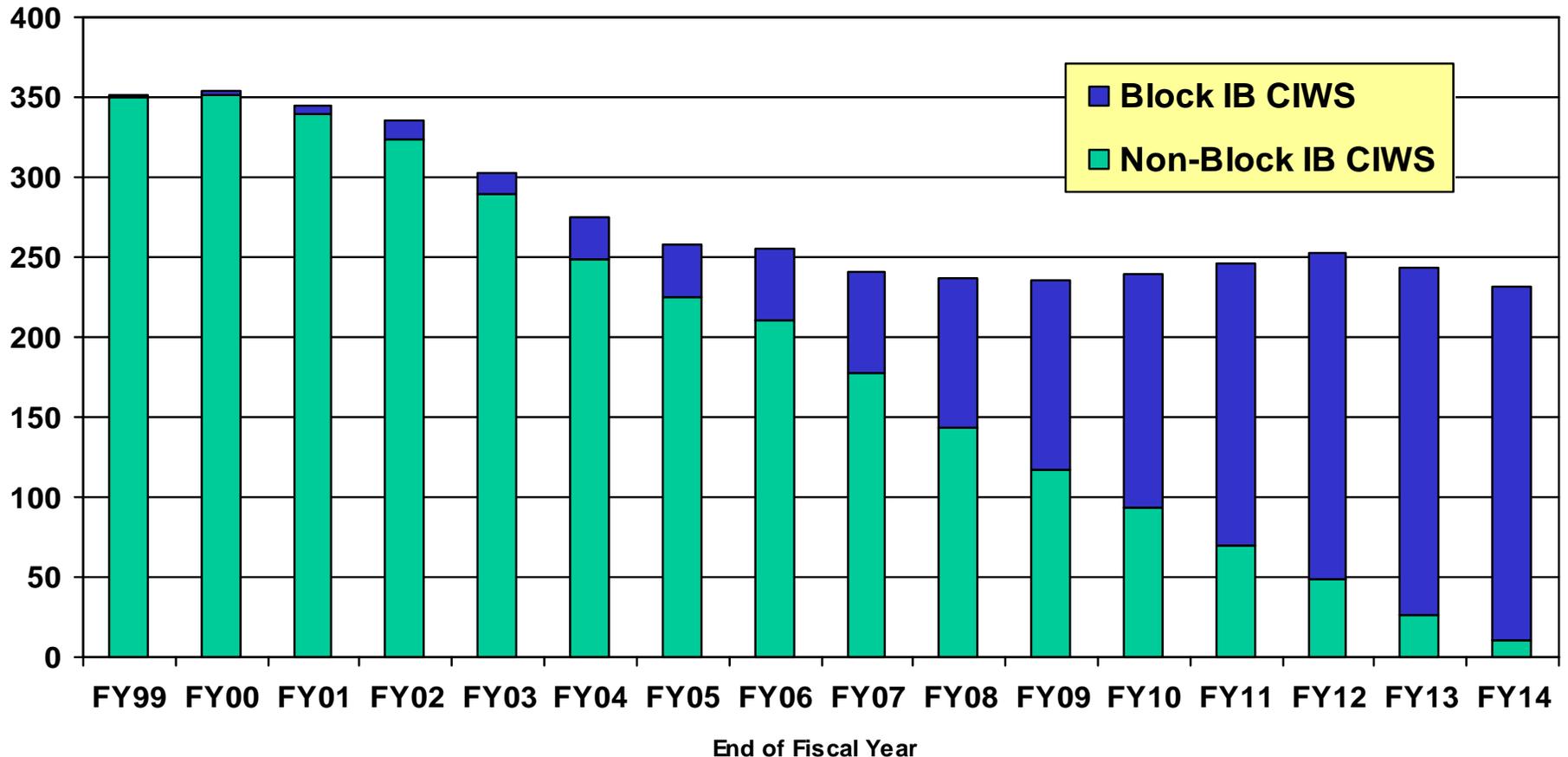
Surface Ship Weapons Missiles



* Some are ABMD / SM-3 capable



CIWS Population (Block IB vs. Non-Block IB)



Increasing capability without increasing footprint.

Note: Includes past and projected decommissioning of Fleet Units.



Future Direction

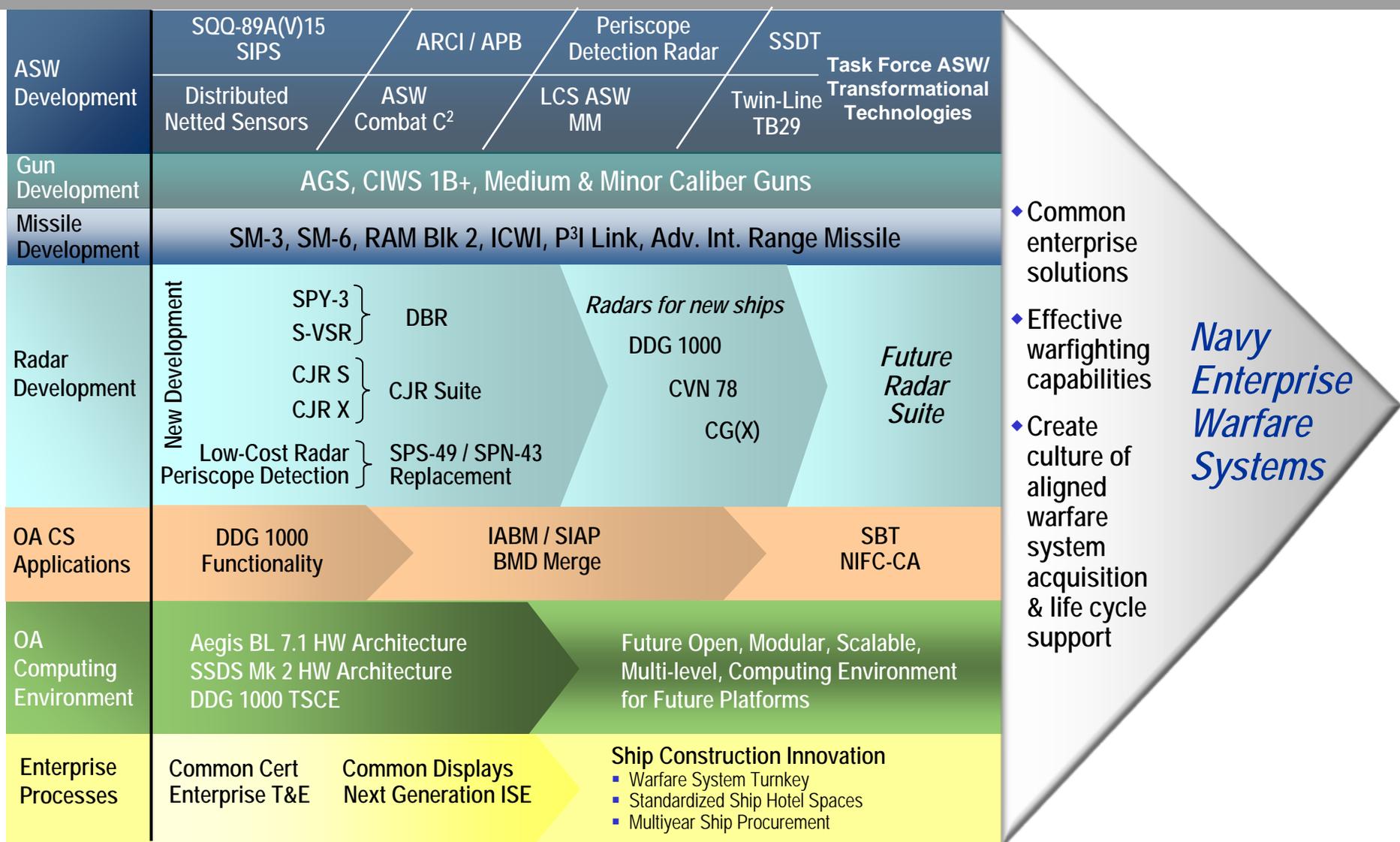
- **Expand the Battlespace to Defeat Evolving Threat**
- **Improve Systems and Employment**
- **Support the Warfighters' Requirements**

**Quality....
Let's not forget about it!**





PEO IWS Future Direction



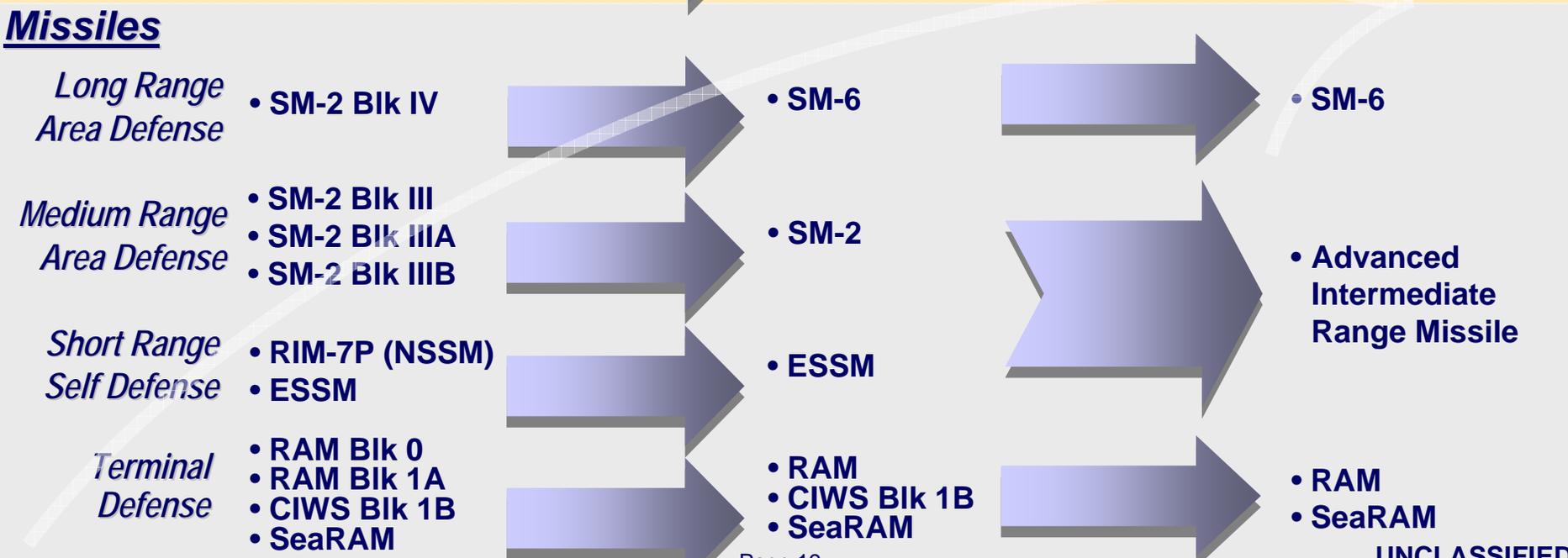
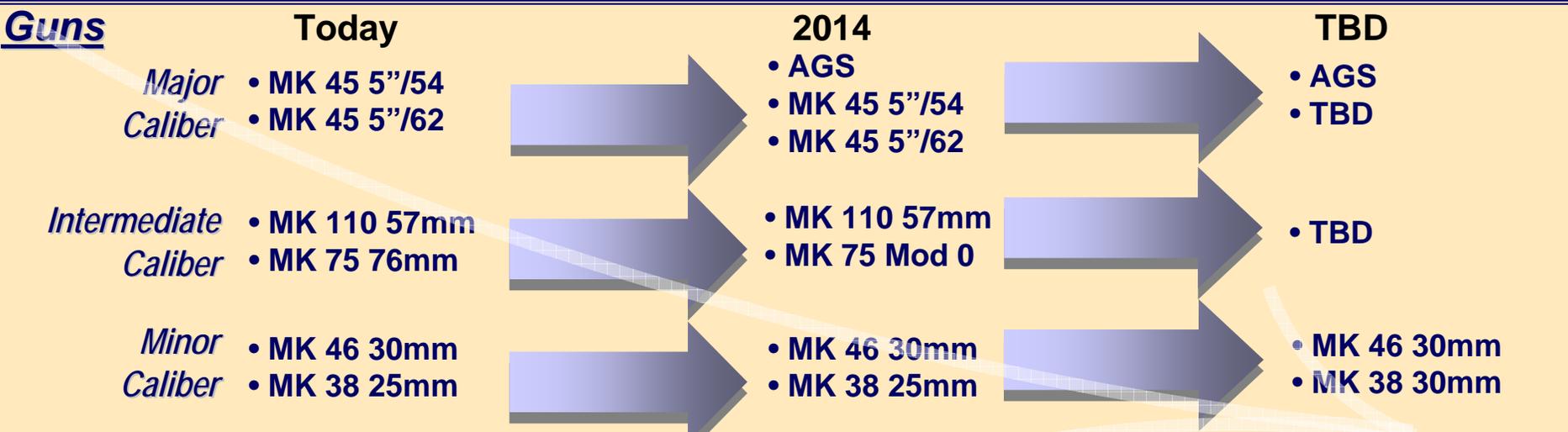
- ◆ Common enterprise solutions
- ◆ Effective warfighting capabilities
- ◆ Create culture of aligned warfare system acquisition & life cycle support

Navy Enterprise Warfare Systems

Transition from Platform to Enterprise Solutions



PEO IWS Missile and Gun Evolution





Advanced Intermediate Range Missile

- **Fill anticipated Gaps between SM-6 ER Active and RAM Block II**
 - Each will IOC in 2011
- **Dual Mode Semi-Active and Active Seeker**
- **SM-2 Block IIIB and ESSM were introduced in Mid 1990s.**
- **Investment to Pace the Threat**
 - Develop Capability to Defeat Future Air Threats at Intermediate Ranges

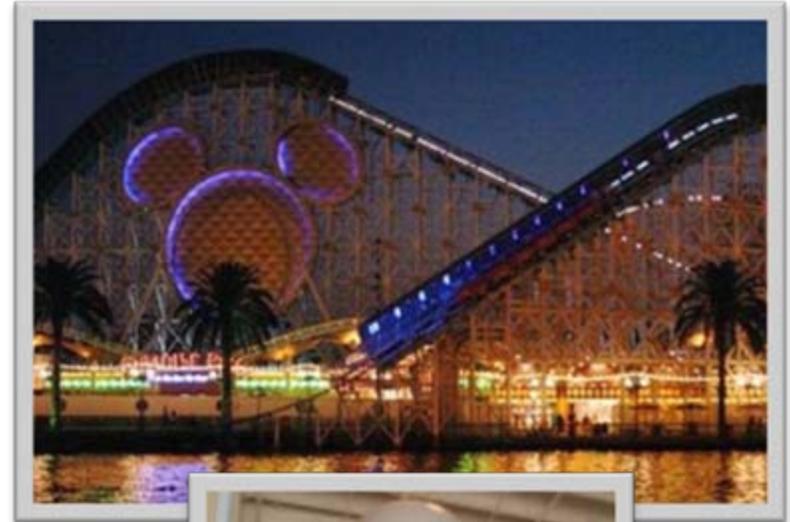




Future Trends

Fighting at Hypervelocity

- **Current Surface Ship Weapons programs have planned product improvements through the mid term, i.e. 2015.**
- **Hypervelocity and Directed Energy Technologies are the future of Surface Ship Weapons and Launching Systems**
- **Enablers:**
 - New and improved power systems on future ships
 - Advanced materials and manufacturing techniques
- **Electromagnetic Rail Gun**
- **Free Electron Laser**
- **Solid State Lasers**
- **High Power Microwaves**
- **Enhanced Weapon System Technologies**





Summary

- **Persistent Technology Innovation is the US Asymmetric Advantage**
 - Problem never gets any easier
- **Government/Industry Partnership will get Us to the Next Generation of Capability**
- **Integrated Guns and Weapon system Approach Ensures Maximum Benefit from Our Efforts**

