9th Annual Disruptive Technologies Conference

Navy IAMD

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PEO IWS D

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Rapidly Evolving Missions Drive Navy Capability Advancements

Operational Environment

Humanitarian Assistance

Short and Medium Range Ballistic Missiles

Persistent ISR

Complex Threats Employing Advanced Technology in Challenging Environments

Sub-Sonic Anti-Air & Anti-Surface Missiles

Simultaneous Raids Across Multiple Mission Areas

Intermediate Range Ballistic Missiles

Anti-Piracy

Small Boat Attacks

Cyber Warfare

Super-Sonic Anti-Air & Anti-Surface Missiles

Disaster Relief

Torpedoes

Anti-Ship Ballistic Missiles

Advanced Super-Sonic Anti-Air & Anti-Ship Missiles

Mines

Stealth Under-Sea

Capability Advancements

Integrated AAW & Situational Awareness

Area Air Defense In Clutter Environments

High Data Rate Battle Group Networks

Over Land Defense

Improved Self-Defense

Integrated Air and Missile Defense

Space Based BMD Tracking

Enhanced Shipboard Sensors (Radar + ES/EA)

UAV Integration

Cyber Defense

Engage Long Range Ballistic Missiles

Multi-Ship Resource Coordination

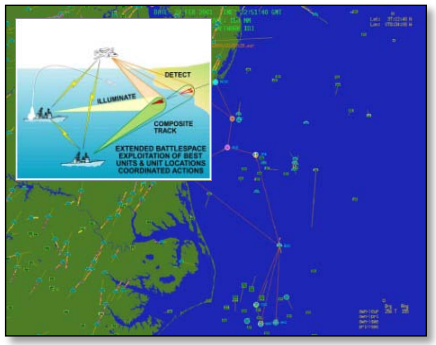
Rail Guns

Directed Energy

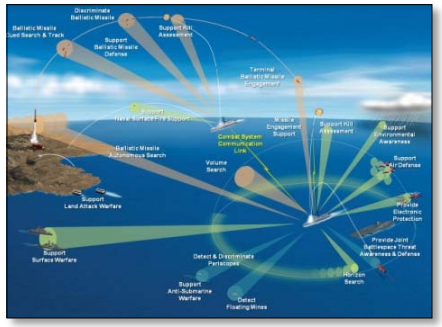
IAMD is a Core Navy Mission Driving Capability Enhancements

Navy Technical and Operational Architecture

- **Navy surface forces operate in a regional joint networked environment with joint and coalition forces**
  - *Link 16* – Joint operations, situational awareness, BMD
  - *Cooperative Engagement Capability* – Integrated surface force tracking and engagement network, Navy IFC



- **Surface combatant force foundation is Multi-mission operations**
  - Area Air Defense, Ballistic Missile Defense, Under Sea, Surface, Strike, Naval Gunfire Support
  - Driven by COCOM requirements to operate forward



- **Strategy of Advanced Capability Builds provides incremental warfighting improvements for countering evolving threats with new capability**
  - Network based COTS computing environments enable rapid insertion of new capabilities to meet threat drivers
  - COTS allows for faster upgrades and reduces combat system variants

Capability Trends

Current Systems	Future Systems
Individual On-board Mission Systems (AAW, BMD, USW, etc.)	Increased Integration of On-board Mission Systems
Ships with AAW focus Or BMD focus	Integrated AAW and BMD
Rotating Radars On Carriers	Phased Arrays on Carriers
Improved SPY-1 variants on CGs and DDGs	Advanced Phased Array Technology
Independent Hard Kill and Soft Kill Systems	Integrated Hard Kill & Soft Kill
CM/Decoys for Soft Kill	Improved Electronic Attack for Soft Kill
Manually Operated Small Guns	Automated Gun Systems for Small Boat Raids
Extended Battlespace Through EOR using SPY-equipped Ships	More Flexible EOR Expanding To Other Navy/Force Sensors

MH-60R Integration

SPY-1 MMSP Upgrade

Volume Search Radar

AMDR-S

SEWIP

MK38 Gun System

AEGIS Ashore

NIFC-CA SBT SM-3 BLK IIA

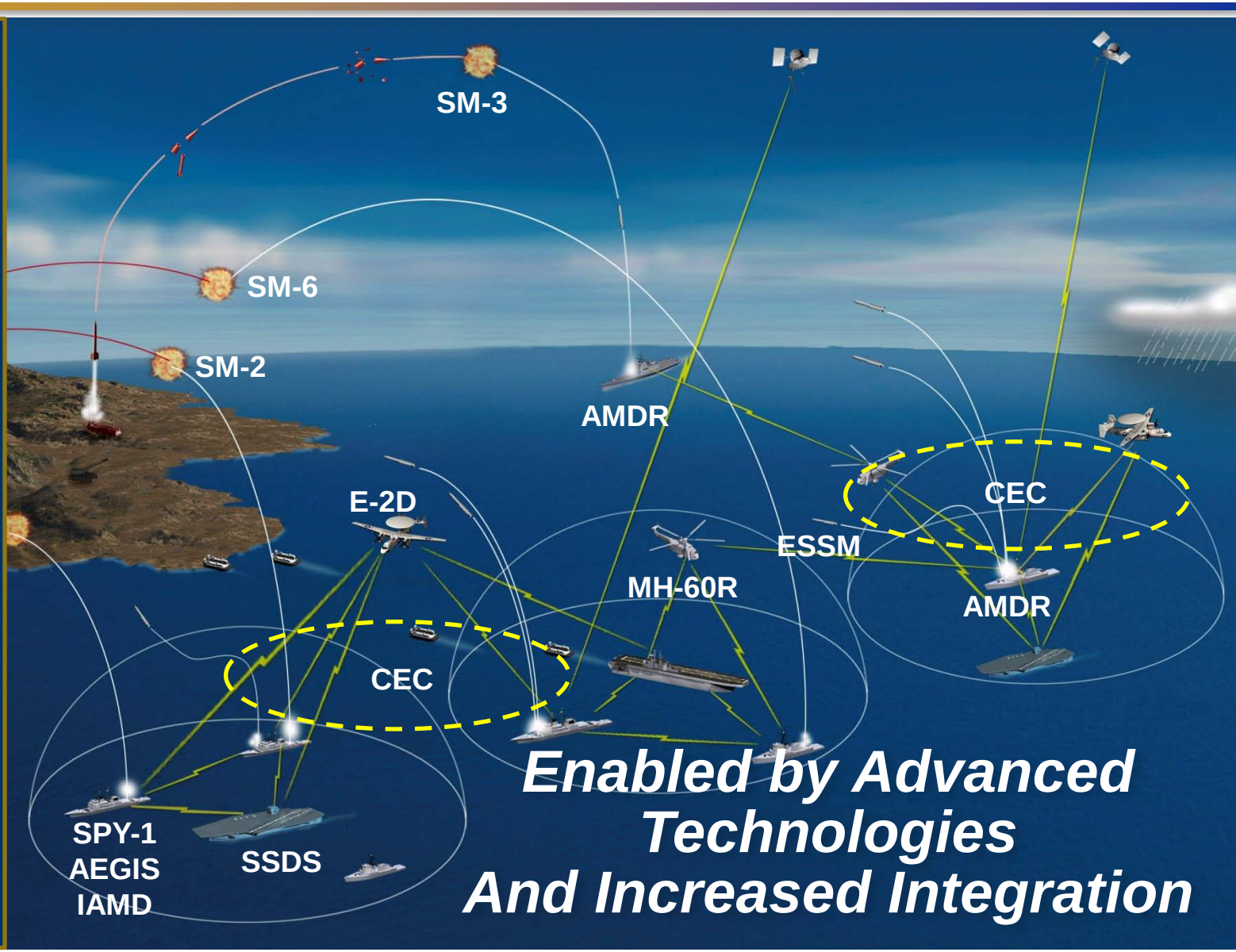
Combat System Capability Roadmap

Improved Mission Capability

Enabling Developments

Force Integration

Advanced Technologies



Enabled by Advanced Technologies And Increased Integration

Pushing the IAMD Mission Forward

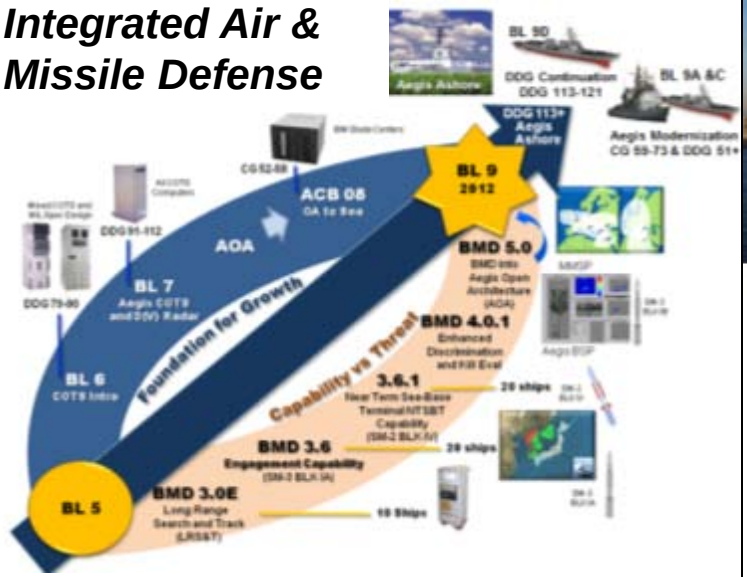
Improved Mission Capability

Enabling Developments

Force Integration

Advanced Technologies

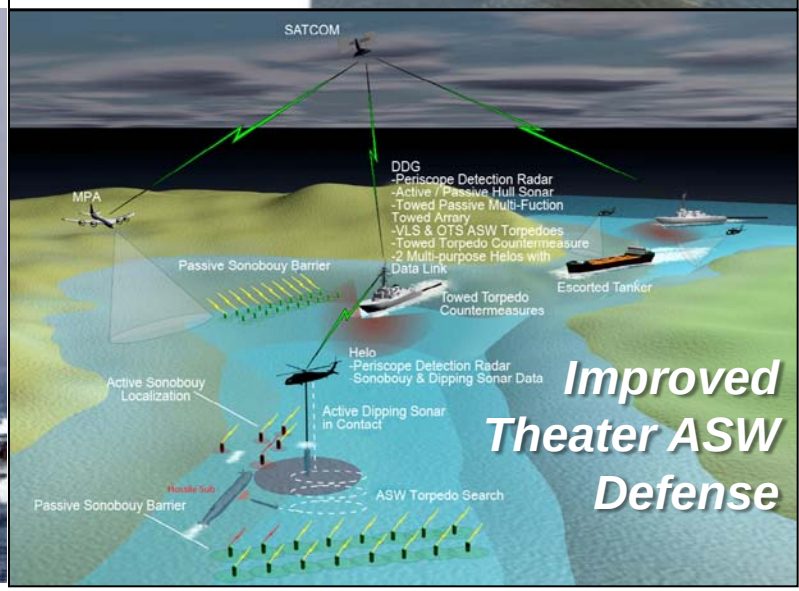
Integrated Air & Missile Defense



Transition of Phased Radar Technology to New Carriers

Improved Large Deck Self- Defense

Improved Small Boat Defense



Improved Theater ASW Defense

Enabling Developments
AEGIS Baseline 9 Combat System Upgrade

Improved Mission Capability

Enabling Developments

Force Integration

Advanced Technologies

AEGIS Baseline 9 (BL 9)			
Air Defense Cruiser	IAMD DDG	New Construction IAMD DDG	AEGIS Ashore
			
In-Service Cruisers *(CG 59-64)*	***In-Service Destroyers*** *(DDG 51-78)*	***New Construction Destroyers*** *(DDG 113-118)*	***AEGIS Ashore***
Capability: • *NIFC-CA* • *CEC* • *SM-2,SM-6* • *ESSM* • *No BMD* • *No MMSP*	***Capability:*** • *IAMD* • *CEC* • *BMD 5.0* • *NIFC-CA* • *SM-2, SM-6, ESSM* • *SM-3 Blk IA,IB* • *CEC Interoperability Mods* • *Link 16 Model 5* • *IFF Mode 4*		***Capability:*** • *BMD only* • *BMD 5.0/5.0 CU* • *SM-3 Blk IA,IB* • *Remote Launcher Mods*
Conducting Integration & Test w/ Tactical Builds	***Conducting integration & Test with Tactical Builds***	***Detailed Design in-progress***	***Detailed Design in-progress***

Network Based COTS Combat Systems

- ***In-Service DDG/CG Upgrade***
- ***New Construction DDG***
- ***AEGIS Ashore***

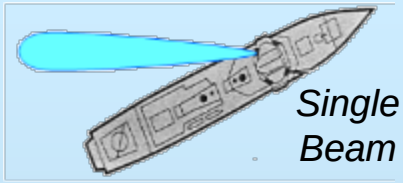
- ***Integrated Air Def & BMD***
- ***Enhanced BMD***
- ***Improved Networking***
- ***Integrated Fire Control***
- ***PAA Phase 2***

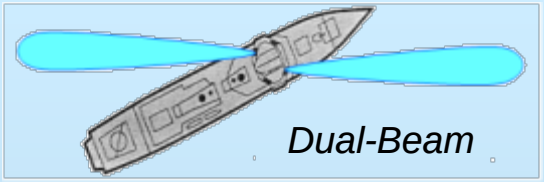
Development on Track for Delivery of Near Term Capability

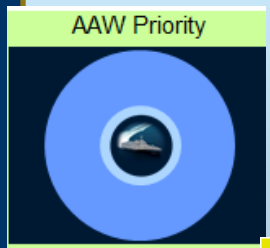
BL 9 Adds DDGs & Land Based AEGIS with BMDS Connectivity

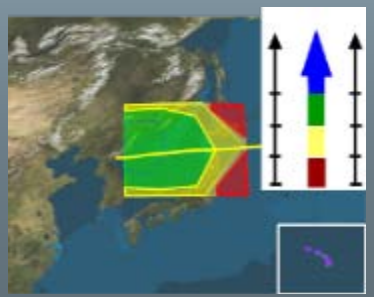
Enabling Developments
Multi-Mission Signal Processor (MMSP) Enables IAMD for SPY-1 Radars

- Improved Mission Capability
- **Enabling Developments**
- Force Integration
- Advanced Technologies

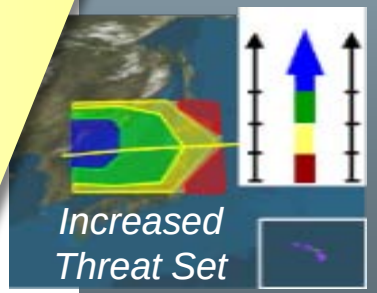








- ✓ Improved Performance in Littoral Environments
- ✓ Improved Performance Against Sea Skimmers
- ✓ Dual-Beam Operation
- ✓ Improved BMD Search
- ✓ Enhanced BMD LRS&T Performance
- ✓ AEGIS BSP Enhanced Range Resolution, Discrimination & Characterization



Force Integration
Force Level Sensor and Weapons Coordination

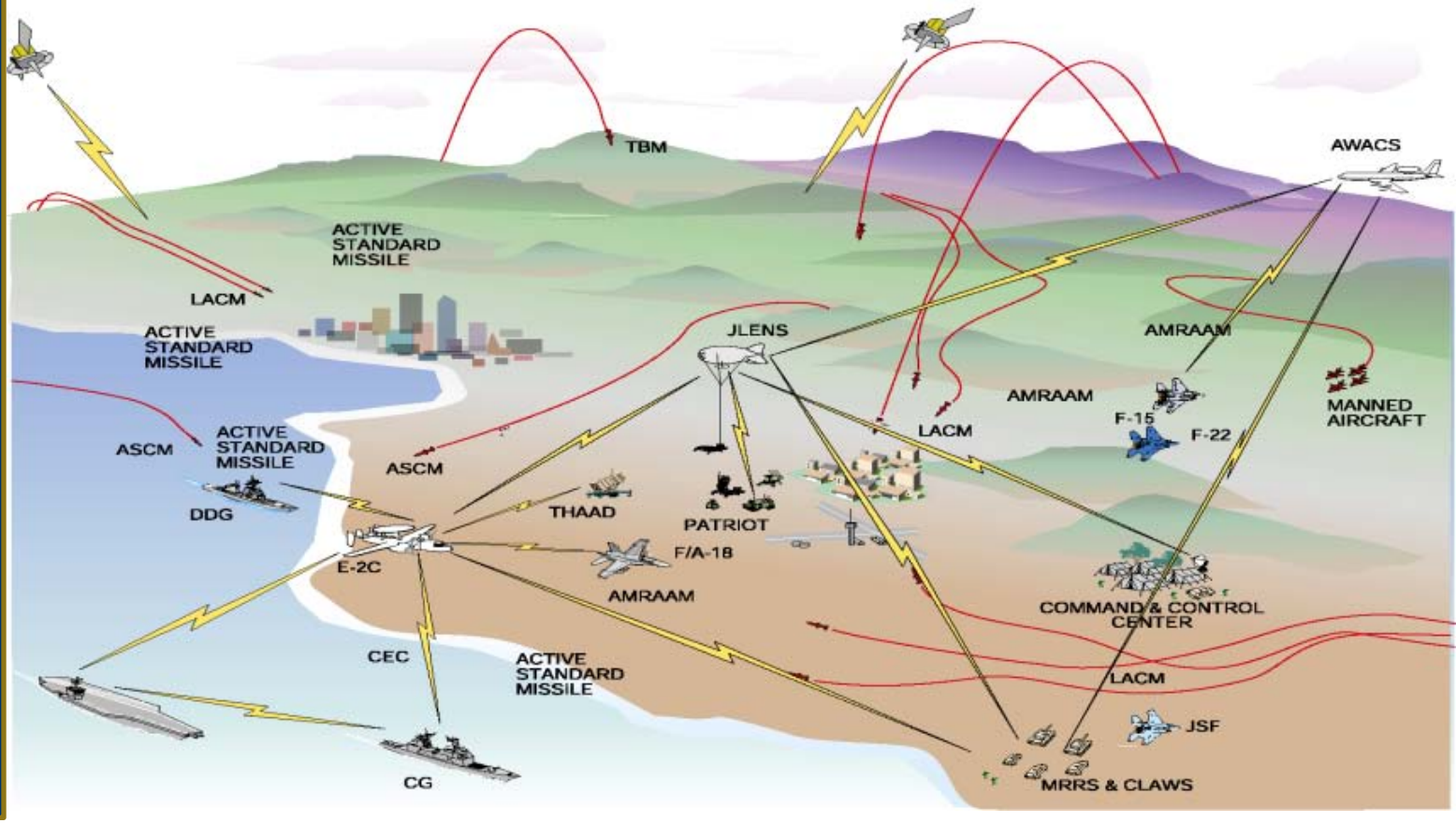
Improved Mission Capability

Enabling Developments

Force Integration

Advanced Technologies

- **Integrated Force Level Kill Chain**
  - **Coordination of Netted Force Operations to Counter Mid-Term Threats**
  - ***AEGIS-to-AEGIS SM-3 Weapons Coordination***
  - ***AEGIS-to-BMDS Weapon Coordination***



Force Integration
Naval Integrated Fire Control – Counter Air

Improved Mission Capability

Enabling Developments

Force Integration

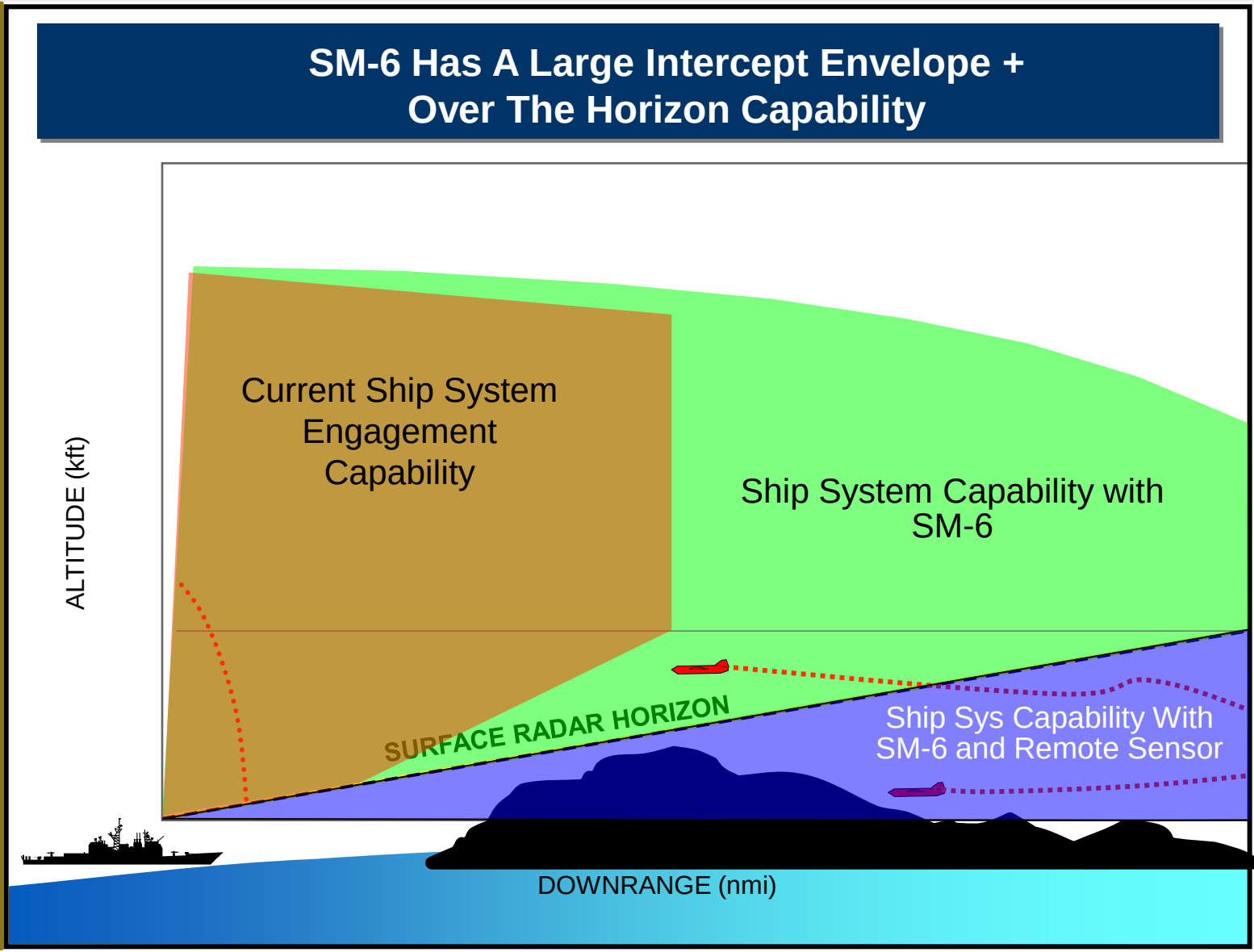
Advanced Technologies

- **Navy Integrated Fire Control – Counter Air (NIFC-CA)**
  - **An Engage On Remote (EOR) and Over The Horizon (OTH) air defense capability, utilizing the full kinematic range of active missiles**
  - **Kill Chains include an active missile, elevated sensor(s), a sensor network, and a weapon control system**

Force Integration
NIFC-CA/SM-6 Extends Battlespace

- *Improved Mission Capability*
- *Enabling Developments*
- ***Force Integration***
- *Advanced Technologies*

SM-6 Has A Large Intercept Envelope + Over The Horizon Capability



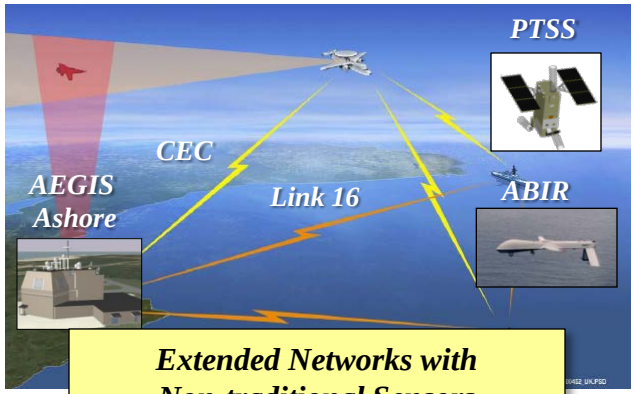
Advanced Technology Development

Improved Mission Capability

Enabling Developments

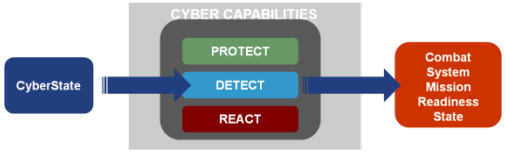
Force Integration

Advanced Technologies

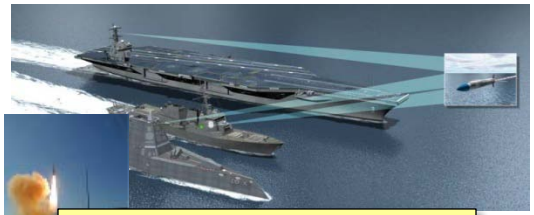


Extended Networks with Non-traditional Sensors

Force-Level Radar Resource Management

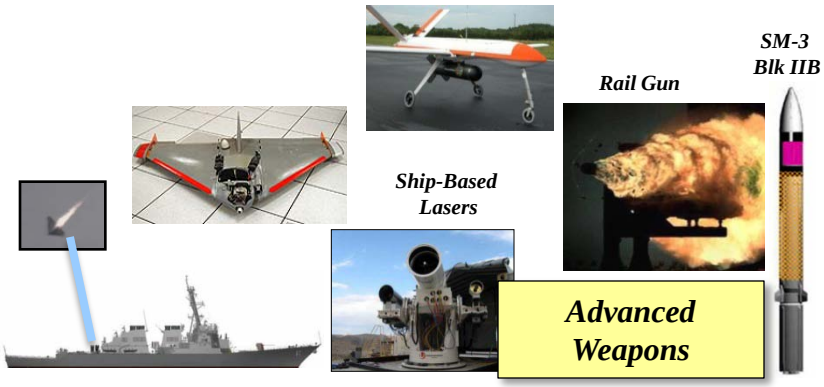


Improved Cyber Defense



Hardkill/Softkill Coordination

Advanced Radar and Detection Capabilities



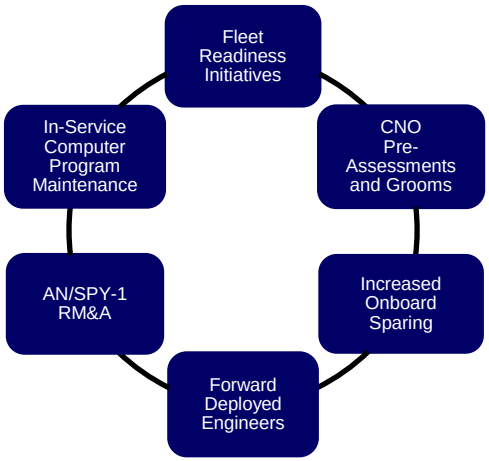
Advanced Weapons

Supporting Capacity Requirements Combat System Wholeness

CEC LINK 16

Interoperability

Maintainability, Supportability, Sustainability



Manpower, Personnel, Training

Fleet Proficiency

Summary

- The Surface Navy is vital to global presence
- Navy capability has been built on a Defense in-depth concept and will continue to be
- Evolving capabilities of existing systems, with an emphasis on integration
- The challenge is doing more under fiscal constraints
- Discipline in management and engineering is an imperative for effectively Upgrading and Sustaining The Fleet