



AEGIS

BALLISTIC

MISSILE

DEFENSE

Aegis BMD; The Way Ahead

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6 December 2011



Aegis BMD's Role in the BMDS

Aegis BMD

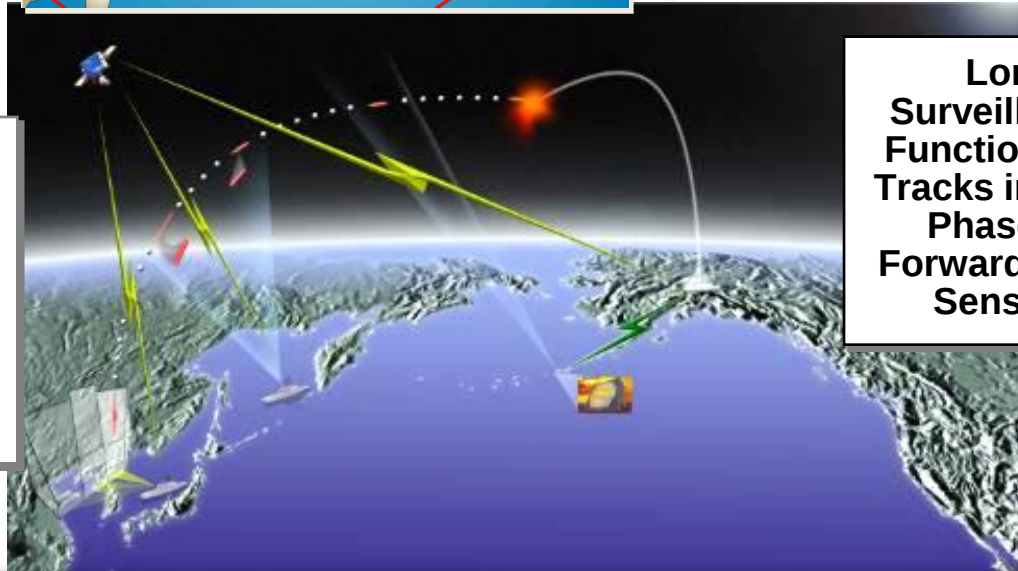
**Ascent/Midcourse
Engagement
Capability
Defeats Short,
Medium &
Intermediate
Range Ballistic
Missiles**



**Terminal Defense
Capability Defeats
Shorter Range Ballistic
Missiles**



**Long Range
Surveillance & Track
Function Detects and
Tracks in Early Ascent
Phase Providing
Forward Based BMDS
Sensor Support**



**Future
Adding Early
Intercept
Capability**

**Anti-ICBM
w/SM-3 Blk IIB
(Aegis Ashore)**

Proven Against Single Salvo, Dual Salvo & Separating Targets



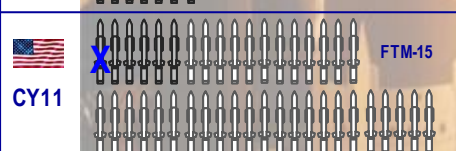
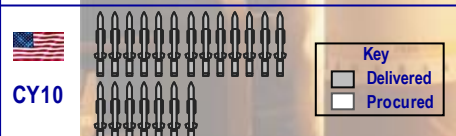
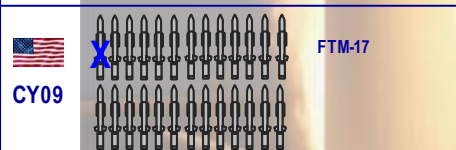
Aegis BMD Fleet Today (November 2011)

Aegis BMD

SM-3 Blk I Deliveries



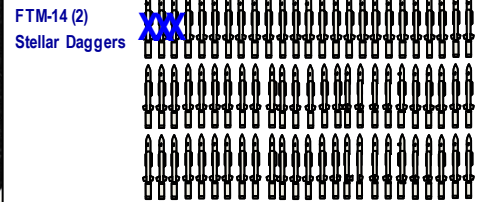
SM-3 Blk IA Deliveries



SM-3 Blk IB Deliveries



SM-2 Blk IV Deliveries (75)



Norfolk BMD Ships

VELLA GULF		*BARRY (FY11)	
MONTEREY		MAHAN (FY12)	
RAMAGE		ROSS (FY12)	
STOUT		ARLEIGH BURKE (FY12)	
COLE		DONALD COOK (FY12)	
*LABOON			

SDGO BMD Ships

DECATUR
BENFOLD
MILIUS
HIGGINS
JOHN PAUL JONES

Mayport Based BMD Ship

THE SULLIVANS
CARNEY (FY12)

PHBR BMD Ships

LAKE ERIE (4.0.1 EDM)
PORT ROYAL
RUSSELL
O'KANE
PAUL HAMILTON
HOPPER

YOKO BMD Ships

SHILOH
STETHEM
CURTIS WILBUR
JOHN S. MCCAIN
FITZGERALD

Japan Maritime Self Defense Force

KONGO
CHOKAI
MYOKO
KIRISHIMA

AB201109CC003

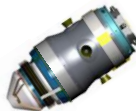
* Not Yet Certified



Aegis BMD SM-3 Evolution

Spiral Development with Incremental Capability Improvements

Aegis BMD

	SM-3 Blk I/IA	SM-3 Blk IB	SM-3 Blk IIA	SM-3 Blk IIB
	• Kinetic Warhead (KW) – 1-Color Seeker – Pulsed Solid Divert / Attitude Control System (SDACS)  	• KW – 2-Color Seeker – Throttleable Divert / Attitude Control System (TDACS)  	• Large Diameter KW – 21" Clamshell Nosecone – 2 Color Seeker – High Divert DACS – Increased Operating Time  	• Lightweight KV (Notional)  
2 nd and 3 rd Stage	• 13.5" Propulsion	• 13.5" Propulsion	• 21" Propulsion – Increased Missile Vbo	• New U.S. Developed 27" Propulsion • High Performance Liquid Upper Stage
1 st Stage	• MK 41 Vertical Launch System (VLS)	• MK 41 VLS	 • MK 41 VLS	• Modified MK 41 VLS
	• MK 72 Booster	• MK 72 Booster (Potential Range Safety Mods for Aegis Ashore)	• MK 72 Booster	• Large Diameter Booster
	Deployed Since 2004 PAA Phase I	First Flight 2011 PAA Phase II	First Flight 2015 PAA Phase III	2020 Deploy Land-Based PAA Phase IV

AB201110CC002



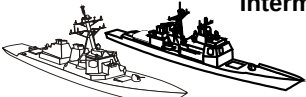
Aegis BMD 4.0.1 & SM-3 Block IB 2nd Generation Weapons System

Aegis BMD

*Aegis BMD 4.0.1 Computer Program and Equipment System:

Approach: Improve Shipboard Signal & Data Processing

Threats: More Sophisticated Short to Intermediate Range Ballistic Missiles



Launch on Remote

Operational:

- Increased Raid Density
- Flexible Firing Doctrine

Cost: \$45-\$55M

Quantity: 1 Test Ship

Provider: Lockheed Martin, NJ & Navy Field Activities/Labs

Status: Initial At-Sea Testing Underway, Available Late CY2011

*Can Also Fire SM-3 Blk IA

SM-3 Block IB Missile:



Approach: Improve SM-3 Kill Vehicle Seeker & Engine

Battle Space: Above the Atmosphere

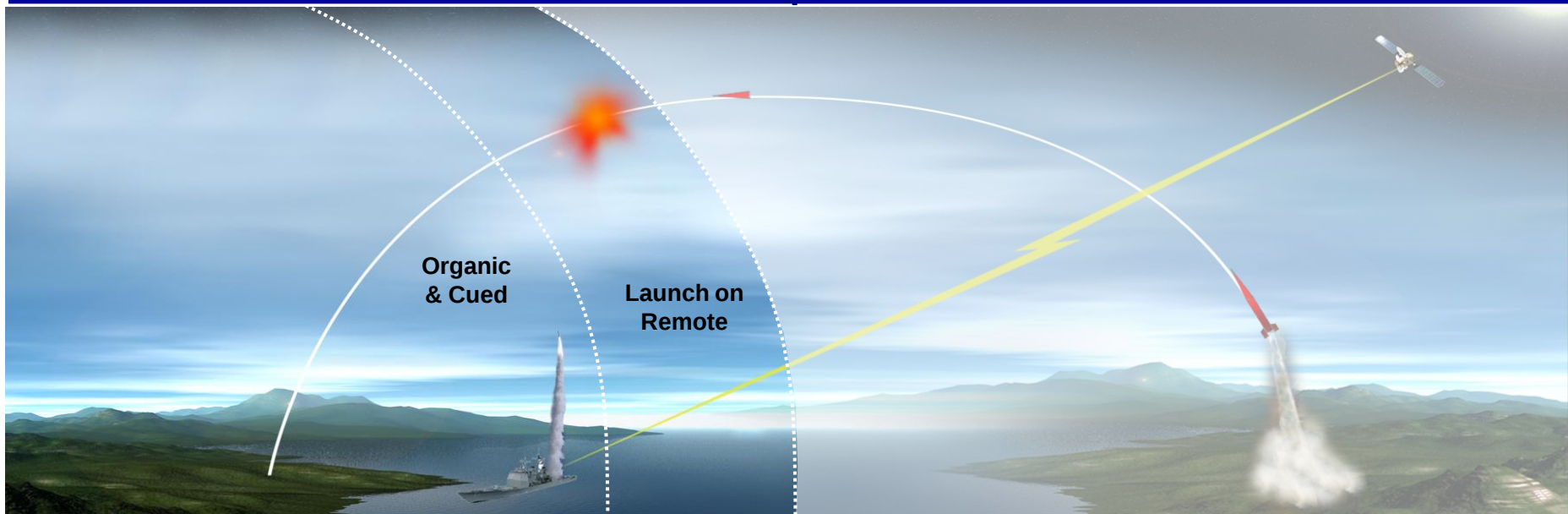
Threats: More Sophisticated Short to Intermediate Range Ballistic Missiles

Cost: \$12-\$15M (est.)

Quantity: >300 Planned, Test Rounds Being Fabricated

Provider: Raytheon, Arizona & Navy Field Activities/Labs

Status: First Flight CY2011
IOC 2013

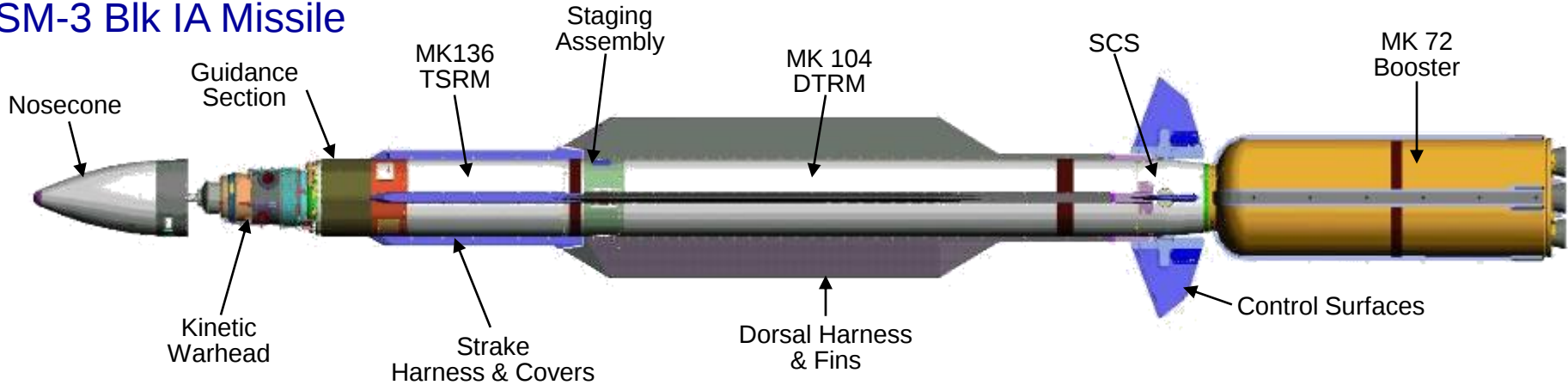




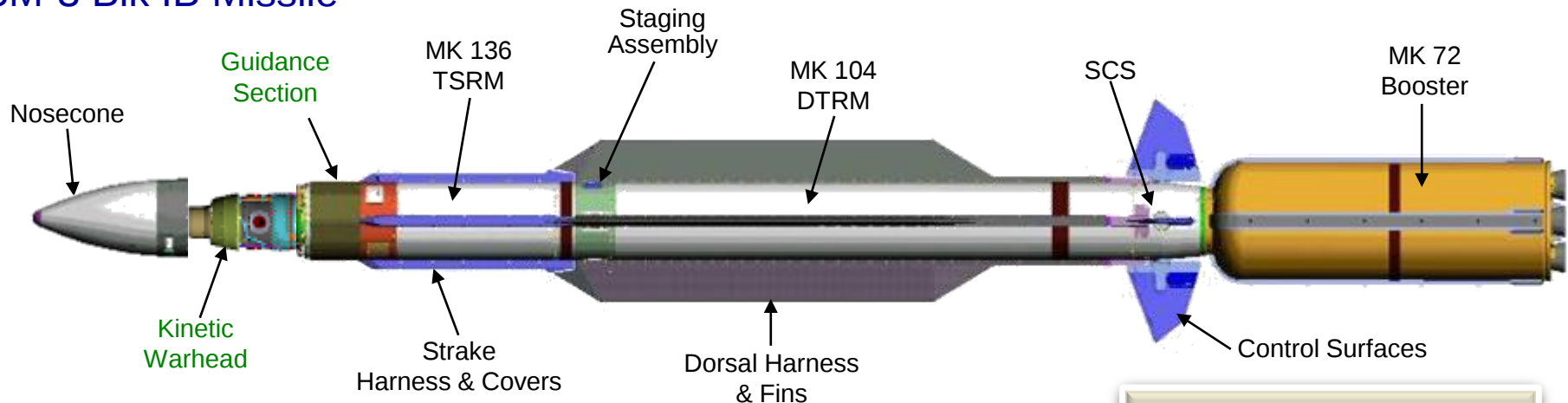
Aegis BMD SM-3 Missile Profile

Aegis BMD

SM-3 Blk IA Missile



SM-3 Blk IB Missile



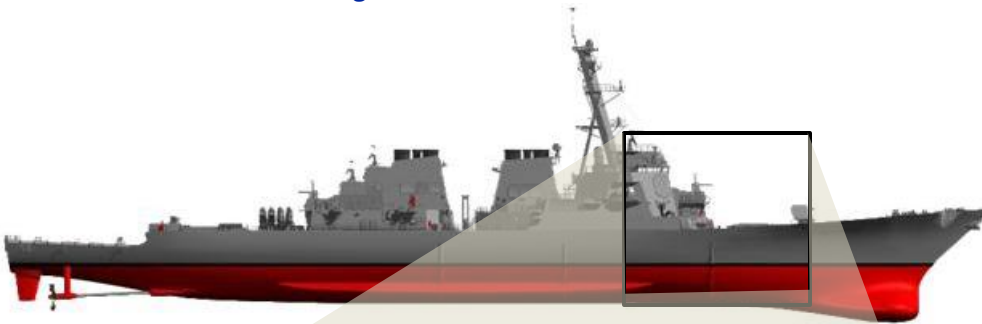
Common with SM-3 Block IA
Changed for SM-3 Block IB

TSRM – Third Stage Rocket Motor
 DTRM – Dual Thrust Rocket Motor
 SCS – Steering/Control Section

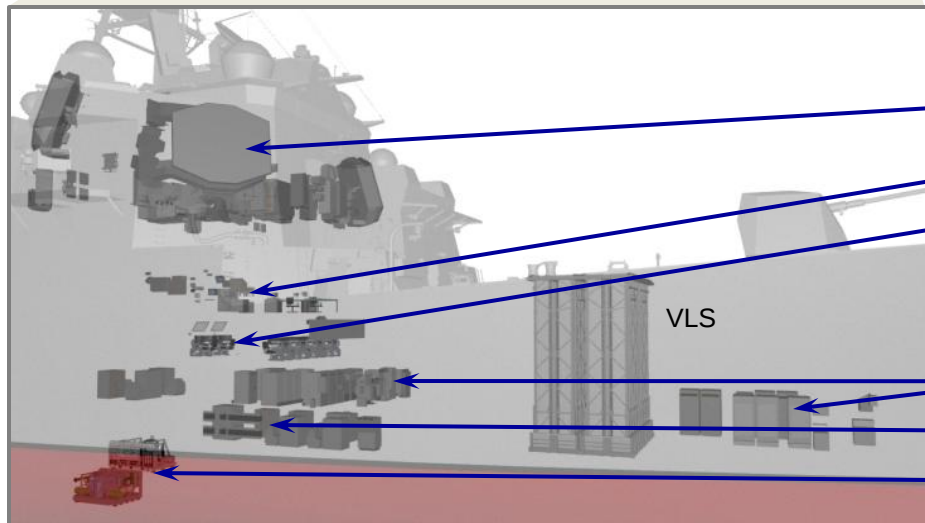
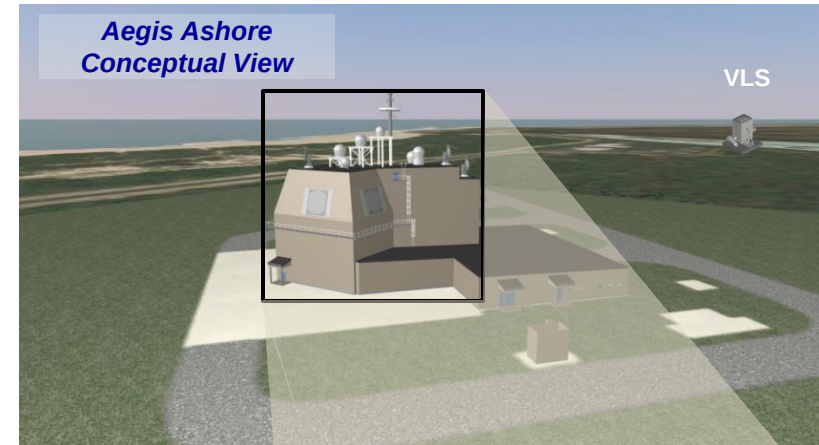


Aegis BMD Transition From Sea To Ashore

Aegis BMD



U.S. Navy Destroyer (DDG 113)



SPY Radar and FCS

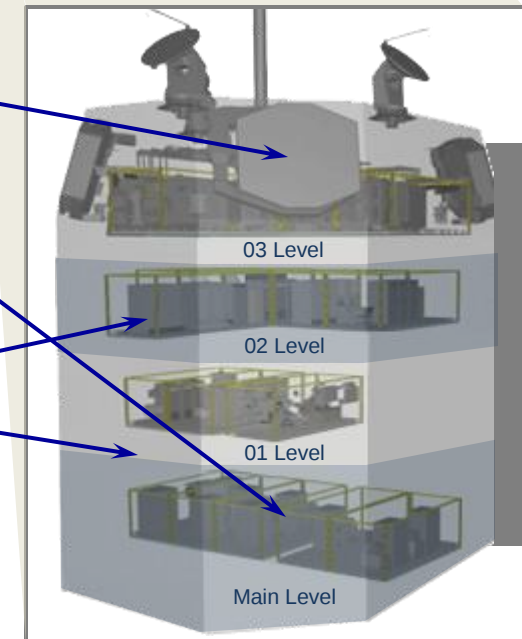
CSMC

CIC

Processors

Power Supplies

Water Coolers



Acronyms

FCS	Fire Control System
CSMC	Combat System Maintenance Central
CIC	Combat Information Center
VLS	Vertical Launch System

AB201110CC009



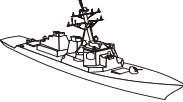
Aegis BMD 5.0 & SM-3 Block IB

Aegis BMD

* † Aegis BMD 5.0 Computer Program and Equipment System:

Approach: Integration of BMD 4.0.1 Capability into Aegis Modernization/Advanced Capability Build-12

Threats: More Sophisticated Short to Intermediate Range Ballistic Missiles

 **Launch on Remote**

Operational:

- Increased Raid Density
- Flexible Firing Doctrine

Cost: \$10M for Ship Integration of BMD 5.0 as part of ACB-12 (Material; Procurement of ORDALTS; Installation)

Provider: Lockheed Martin, NJ & Navy Field Activities/Labs

Status: Under Development as Part of ACB-12, Available 2014

* Can Also Fire SM-3 Blk IA

† BMD Module in Navy's ACB-12

SM-3 Block IB Missile:



Approach: Improve SM-3 Kill Vehicle Seeker & Engine

Battle Space: Above the Atmosphere

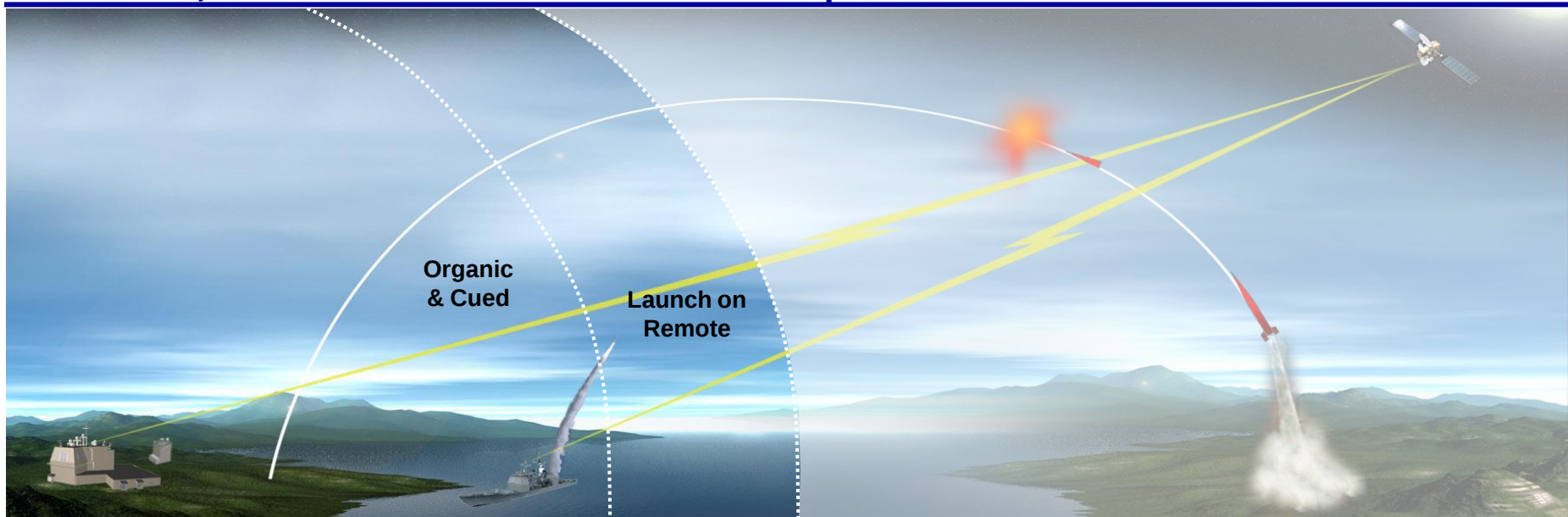
Threats: More Sophisticated Short to Intermediate Range Ballistic Missiles

Cost: \$12-\$15M (est.)

Quantity: >300 Planned, Test Rounds Being Fabricated

Provider: Raytheon, Arizona & Navy Field Activities/Labs

Status: First Flight CY2011
IOC 2013





Aegis BMD 5.0 CU, SM-3 Block IB & SM-6

Aegis BMD

• Aegis BMD 5.0 CU Development Strategy

- Aegis Baseline 9 (ACB12/ABMD 5.0) is foundation for Aegis BMD 5.0 Capability Upgrades
- Integrates into the Baseline 9 Common Source Library

• Aegis BMD 5.0 CU Capabilities

- Incorporate Endo Organic Engagement
- Expand/Update Baseline 9 MRBM and IRBM threat set
- Increase SM-3 engagement capacity and Max SM-3 Missiles in Fight
- Sea-Based Terminal Increment 1 with SM-2 Block IV and SM-6

SM-3 Block IB Missile:



Approach: Improve SM-3 Kill Vehicle Seeker & Engine

Battle Space: Above the Atmosphere

Threats: More Sophisticated Short to Intermediate Range Ballistic Missiles

Cost: \$12-\$15M (est.)

Quantity: >300 Planned, Test Rounds Being Fabricated

Provider: Raytheon, Arizona & Navy Field Activities/Labs

Status: First Flight CY2011
IOC 2013

SM-6 Missile (Modified):



Approach: Modify Existing SM-6 Missiles

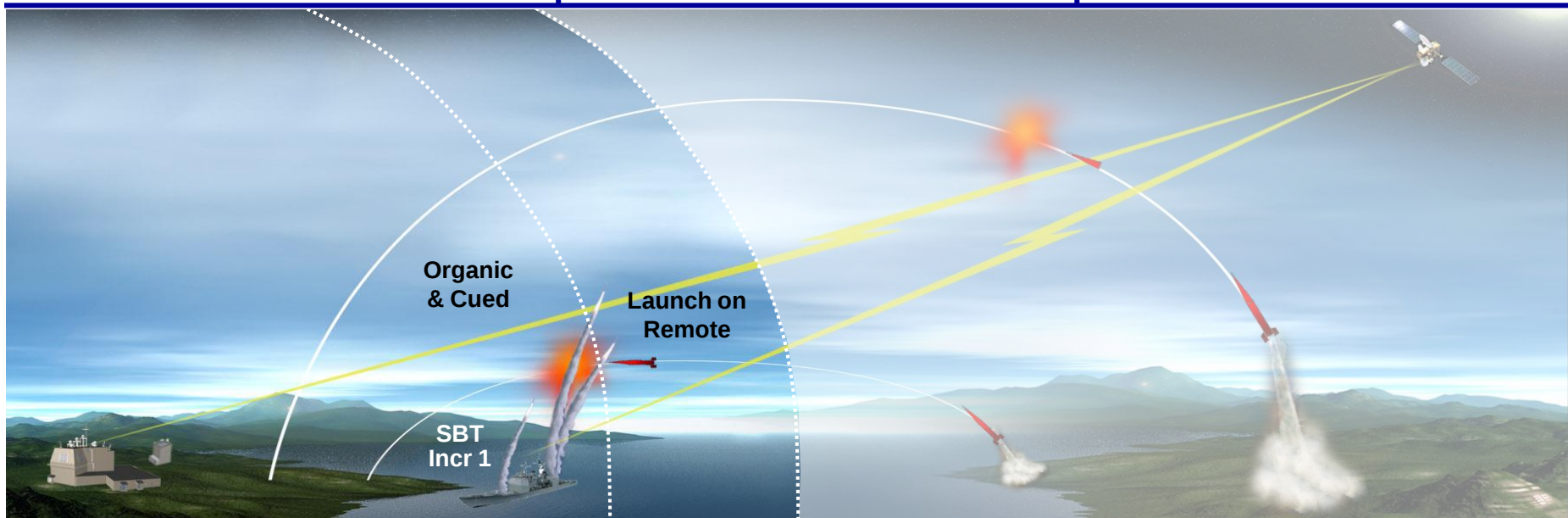
Battle Space: In the Atmosphere

Threats: Short and Medium Range Ballistic Missiles

Quantity: TBD

Provider: Raytheon, Arizona & Navy Field Activities/Labs

Status: IOC FY15





Aegis BMD 5.1, SM-3 Block IIA & SM-6

3rd Generation Weapons System

Aegis BMD

Aegis BMD 5.1 Computer Program and Equipment System:

Approach: Modify Existing Systems to Fly SM-3 Blk IIA & Use Off Board Sensors for Engagement

Threats: More Sophisticated Short to Intermediate Range Ballistic Missiles



Engage on Remote

Operational: Flexible Firing Doctrine

Cost: \$23M

Quantity: TBD

Provider: Lockheed Martin, NJ & Navy Field Activities/Labs

Status: Development, IOC 2018

SM-3 Block IIA Missile:

Approach: Increased Reach & Velocity Biggest Missile Compatible w/Mk41 VLS

Battle Space: Above the Atmosphere

Threats: More Sophisticated Short to Some Intermediate Range Ballistic Missiles

Cost: ~\$20M-\$24M

Quantity: TBD

Provider: Joint U.S. & Japan

Status: Development, 1st Flight Late 2016



SM-6 Missile (Modified):

Approach: Modify Existing SM-6 Missiles

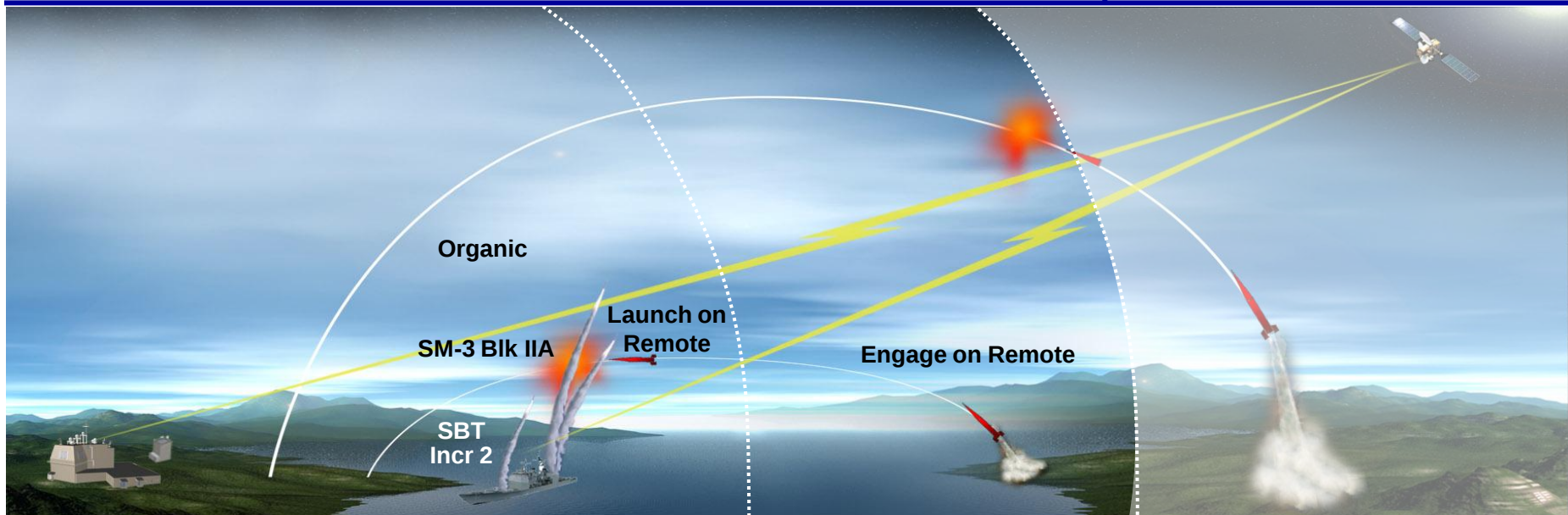
Battle Space: In the Atmosphere

Threats: Short and Medium Range Ballistic Missiles

Quantity: TBD

Provider: Raytheon, Arizona & Navy Field Activities/Labs

Status: IOC FY15





Navy/MDA Joint Management

Aegis BMD

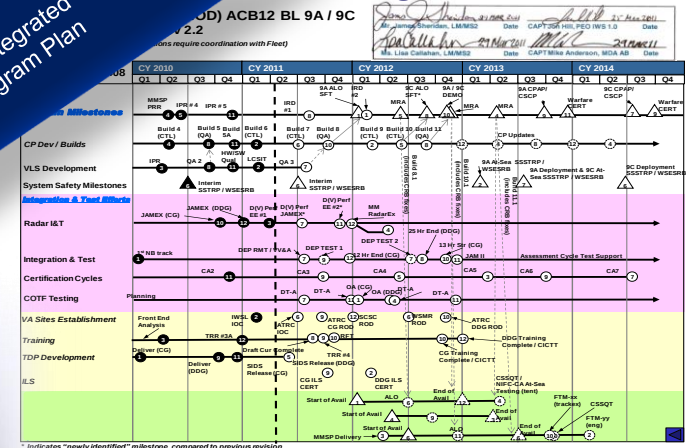
Integrated Work Breakdown Structure (WBS) ACB-12/PAA 2 Progress (B/L 4 CG, DDG 113 and PAA2 upgrade SRRs)

Common WBS

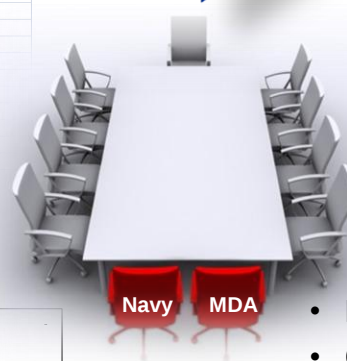
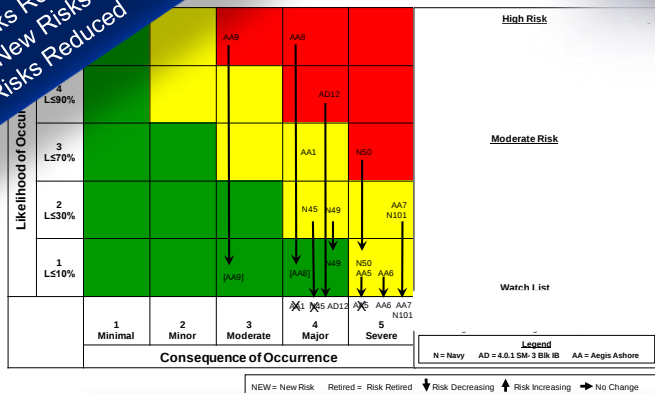
Breakdown Structure (Rev 5A)	
	Description
	MMSP, "31"=NIFC/CA, "32"=ACB12/TI12, "41"=SM6, "47"=JTM
	Program Management Services
BB.01.01	Program Management
BB.01.01.01	Radar Program Management
BB.01.01.03	Quality/Mission Assurance/CMMI
BB.01.01.04	Program Business Mgmt Support/Finance
BB.01.01.05	Data Management Support
BB.01.01.06	Configuration Management
BB.01.01.07	Business Services
BB.01.01.08	Program Planning
BB.01.01.09	Common Cost Model Working Group
BB.01.01.11	Program Studies and Evaluations
BB.01.01.12	Production PMO
BB.02	Systems Engineering
BB.02.01	Systems Eng Integration Team
BB.02.01.01	Systems Engineering & Tech Oversight
BB.02.01.02	System Safety Engineering Services
BB.02.01.03	Combat System Design

Navy/MDA Integrated Master Program Plan

Master Program Plan



Integrated Risk Management
 * X Risks Retired
 * Y New Risks
 * Z Risks Reduced



Coordinated & Joint Reviews

- Navy / MDA BODs
- Certification Panels
- Mission Readiness Assessments (MRA)/ Test Readiness Reviews (TRRs)
- Engineering Technical Reviews, AA PDR, CDR, B/L 4 CG/SBT SRR and DDG 113/PAA 2 SRR
- Risk Management Board (RMB)
- Deep Dives/Focus Days for Engineering Technical Reviews (AA...SRR)

Collaboratively Managing Lockheed Martin Through Common Processes, Reviews and Coordinated Contractual Direction



Aegis BMD . . . We Deliver

Aegis BMD







Aegis BMD 3.6.1, SM-2 Block IV & SM-3 Block IA Currently Fielded Weapon System

Aegis BMD

Aegis BMD 3.6.1 Computer Program and Equipment System:

Approach: Modify Existing Ship Systems

Threats: Short to Intermediate Range Ballistic Missiles

 **Initial Launch on Remote**

Operational:

- Retain Multi Mission Capability
- Near Term Sea Based Terminal

Quantity: 23 (as of 16 November 2011)

Provider: Lockheed Martin, NJ & Navy Field Activities/Labs

SM-2 Block IV Missile:



Approach: Modify Existing SM-2 Block IV Missiles

Battle Space: In the Atmosphere

Threats: Short Range Ballistic Missiles

Quantity: 72 (as of 16 November 2011)

Provider: Raytheon, Arizona & Navy Field Activities/Labs

SM-3 Block IA Missile:



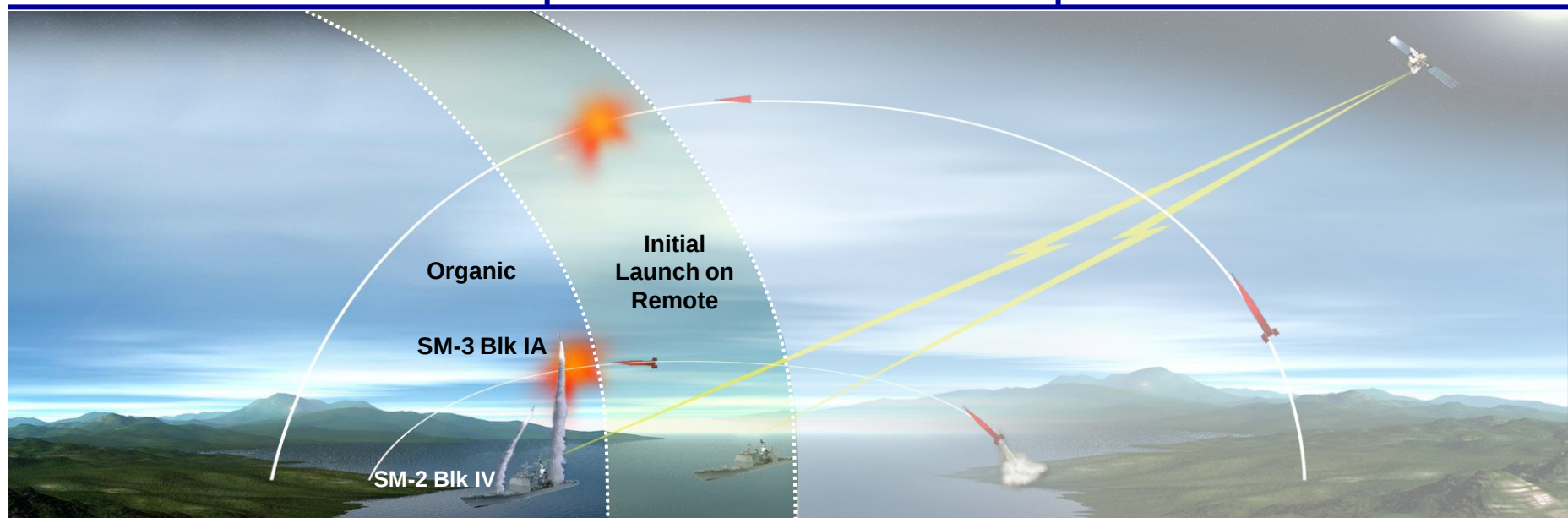
Approach: Add 3rd Stage & Kill Vehicle to Existing SM-2 Blk IV Booster Stack

Battle Space: Above the Atmosphere

Threats: Short to Intermediate Range Ballistic Missiles

Quantity: 81 (as of 16 November 2011)

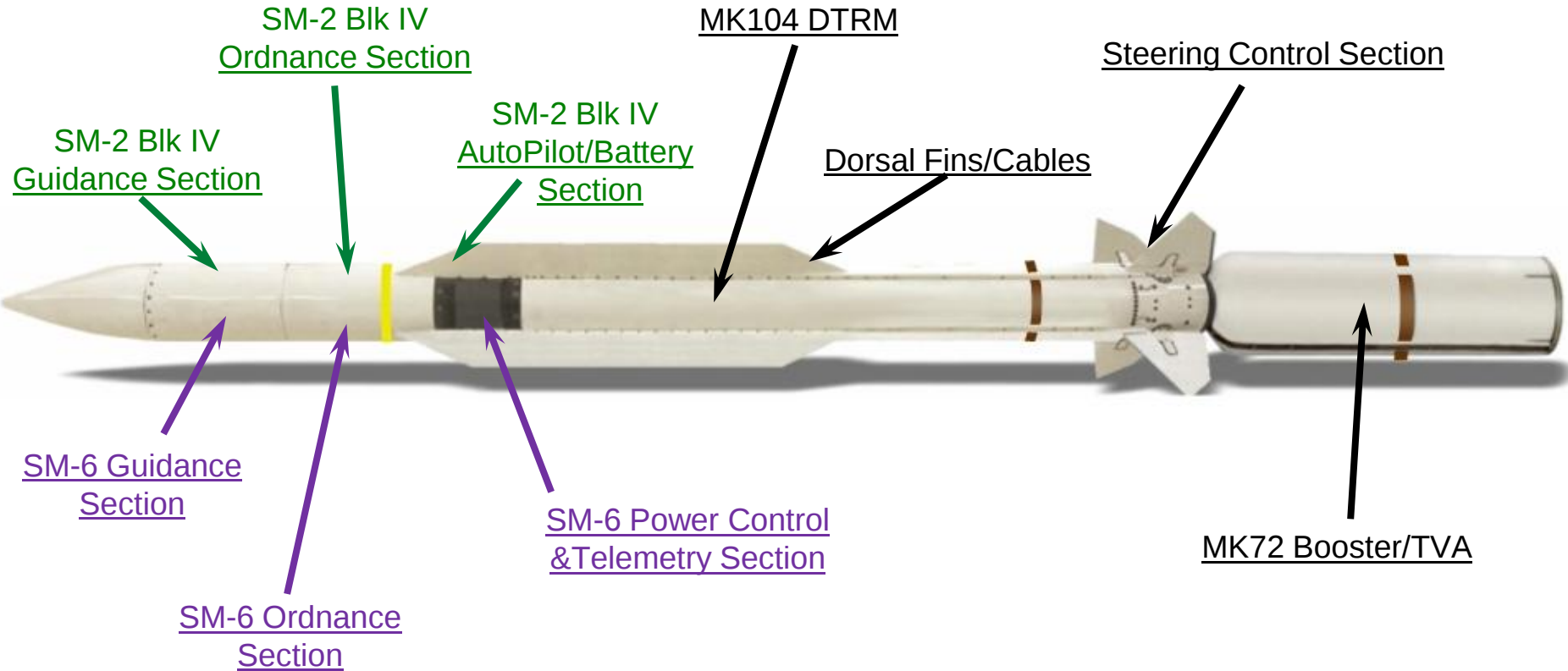
Provider: Raytheon, Arizona & Navy Field Activities/Labs





Aegis BMD SM-6 Missile Profile

Aegis BMD



BLACK = Common

PURPLE = SM-6 Unique

GREEN = SM-2 Blk IV Unique