



Ballistic Missile Defense Overview



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Precision Strike Annual Review

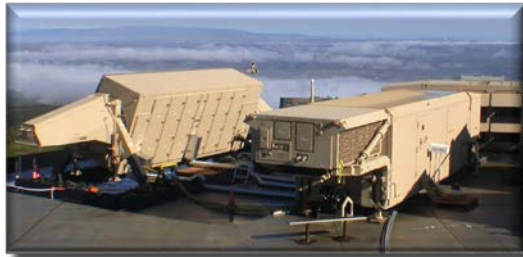
MG Ole Knudson, USA
Deputy Director
Missile Defense Agency
March 15, 2016



Missile Defense Agency

Missile Defense Agency Mission

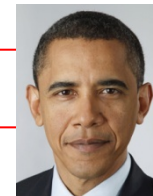
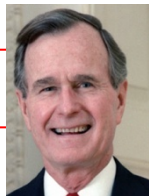
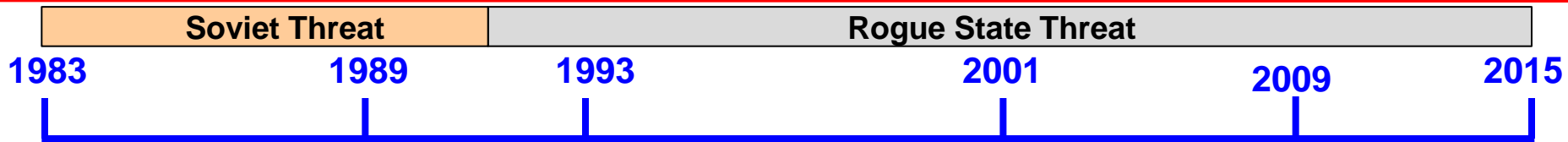
To develop and deploy a layered Ballistic Missile Defense System to defend the United States, its deployed forces, allies, and friends from ballistic missile attacks of all ranges and in all phases of flight



**Missile Defense Capability
Globally Deployed**



Historical Framework 1983–2015



Strategic Defense Initiative Organization

Ballistic Missile Defense Organization

Missile Defense Agency

SDIO



BMDO



MDA



Program

Research

Strategic Defense System Phase I

Global Protection Against Limited Strikes

Theater Missile Defense

National Missile Defense

Ballistic Missile Defense System

Are missile defenses technically feasible?

Defense of U.S. using space- and ground-based interceptors and sensors

Defense of U.S. and deployed forces, allies (space, ground, sea BMD)

Defense of overseas forces, allies (ground, sea BMD)

Defense of U.S. forces, allies (ground, sea BMD), and development of U.S. defenses (no deployment)

Deployment of limited missile defenses to protect homeland, U.S. forces, allies and friends using a single, integrated system for layered protection



Ballistic Missile Ranges

- Intercontinental Ballistic Missile -



Approximate Ranges

Intercontinental ballistic missile (ICBM): > 3,410 miles

Intermediate-range ballistic missile (IRBM): 1,860 to 3,410 miles

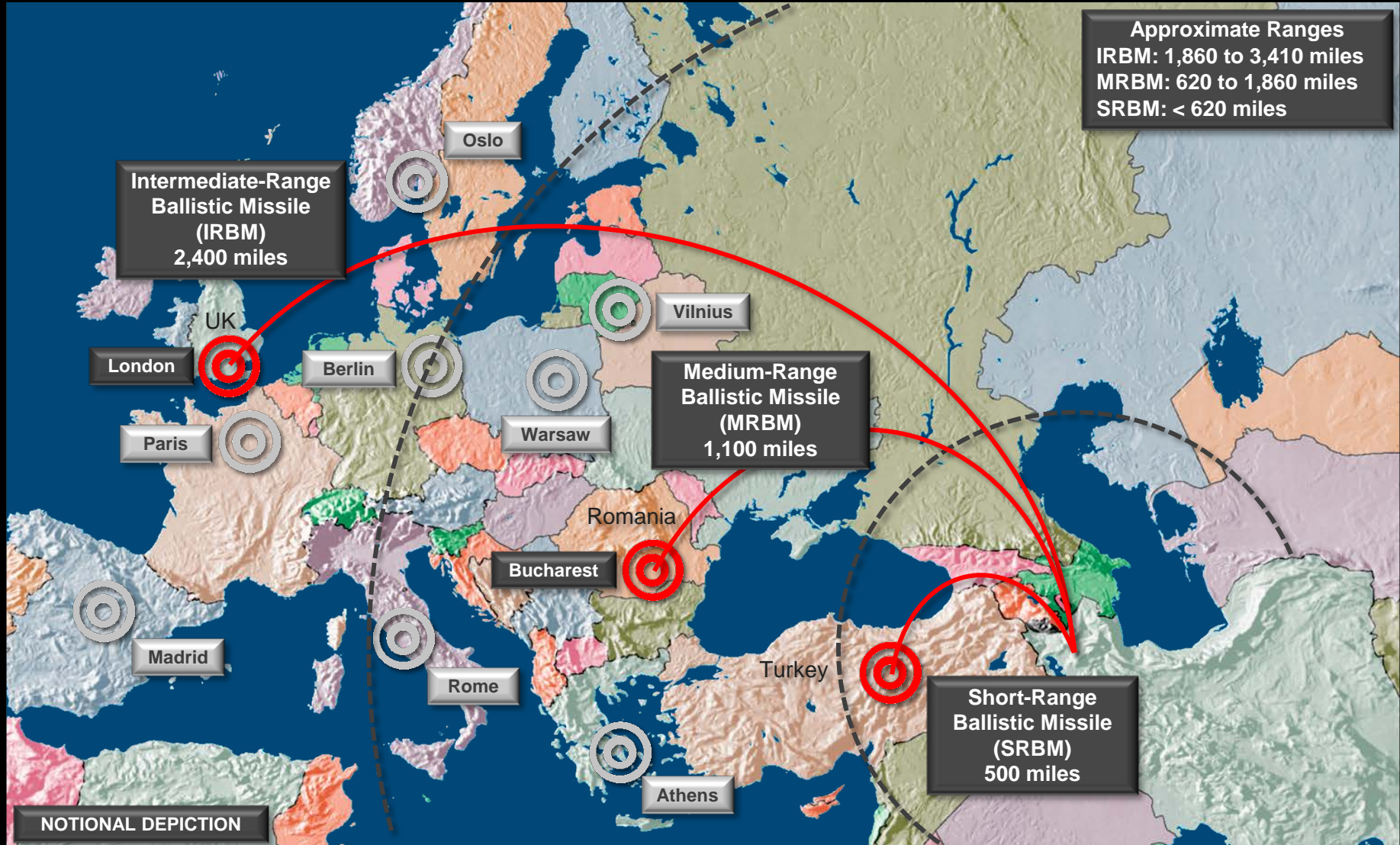
Medium-range ballistic missile (MRBM): 620 to 1,860 miles

Short-range ballistic missile (SRBM): < 620 miles



Ballistic Missile Ranges

- Intermediate-, Medium- and Short-Range





The Increasing Ballistic Missile Threat



Taepo Dong-1 Launch, August 1998



North Korean Taepo Dong-2 SLV Launch, December 2012



Iranian Ashura 2-stage solid MRBM launch 2012



Iranian Safir SLV on launch pad, February 2015



North Korean Mobile Long-Range Missile on Parade, 2015



North Korean KN08 ICBM Launcher on Parade, 2012



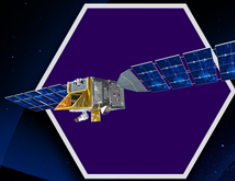
North Korean Taepo Dong-2 SLV Launch, February 2016



Today's Ballistic Missile Defense System

SENSORS

An effective layered defense incorporates a wide-range of sensors to detect and track threat missiles through all phases of their trajectory. Satellites and a family of land- and sea-based radars provide worldwide sensor coverage.



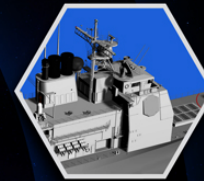
SATELLITE SURVEILLANCE



FORWARD-BASED RADAR



UPGRADED EARLY WARNING RADAR



AEGIS BMD SPY-1 RADAR



SEA-BASED X-BAND RADAR

BOOST/ASCENT Defense Segment

Potential New Technologies

USNORTHCOM
SM-3
Standard Missile-3

USPACOM
AEGIS ASHORE

USSTRATCOM
Vertical Launch System

USCENTCOM
Deckhouse

USAFRICOM
AEGIS
Ballistic Missile Defense

MIDCOURSE Defense Segment

USEUCOM
EKV
Exoatmospheric Kill Vehicle

GBI
Ground-Based Interceptor

GMD
Ground-Based Midcourse Defense

TERMINAL Defense Segment

AEGIS
Sea-Based Terminal

PAC-3
Patriot Advanced Capability-3

THAAD
Terminal High Altitude Area Defense

THE SYSTEM OF ELEMENTS

C2BMC Command and Control, Battle Management, and Communications

The Command and Control, Battle Management, and Communications (C2BMC) program is the hub of the Ballistic Missile Defense System (BMDS). It is a vital operational system that enables the U.S. President, Secretary of Defense and Combatant Commanders at strategic, regional and operational levels to systematically plan ballistic missile defense operations, to collectively see the battle develop, and to dynamically manage designated networked sensors and weapons systems to achieve global and regional mission objectives.

NMCC

USSTRATCOM

USNORTHCOM

USPACOM

USEUCOM

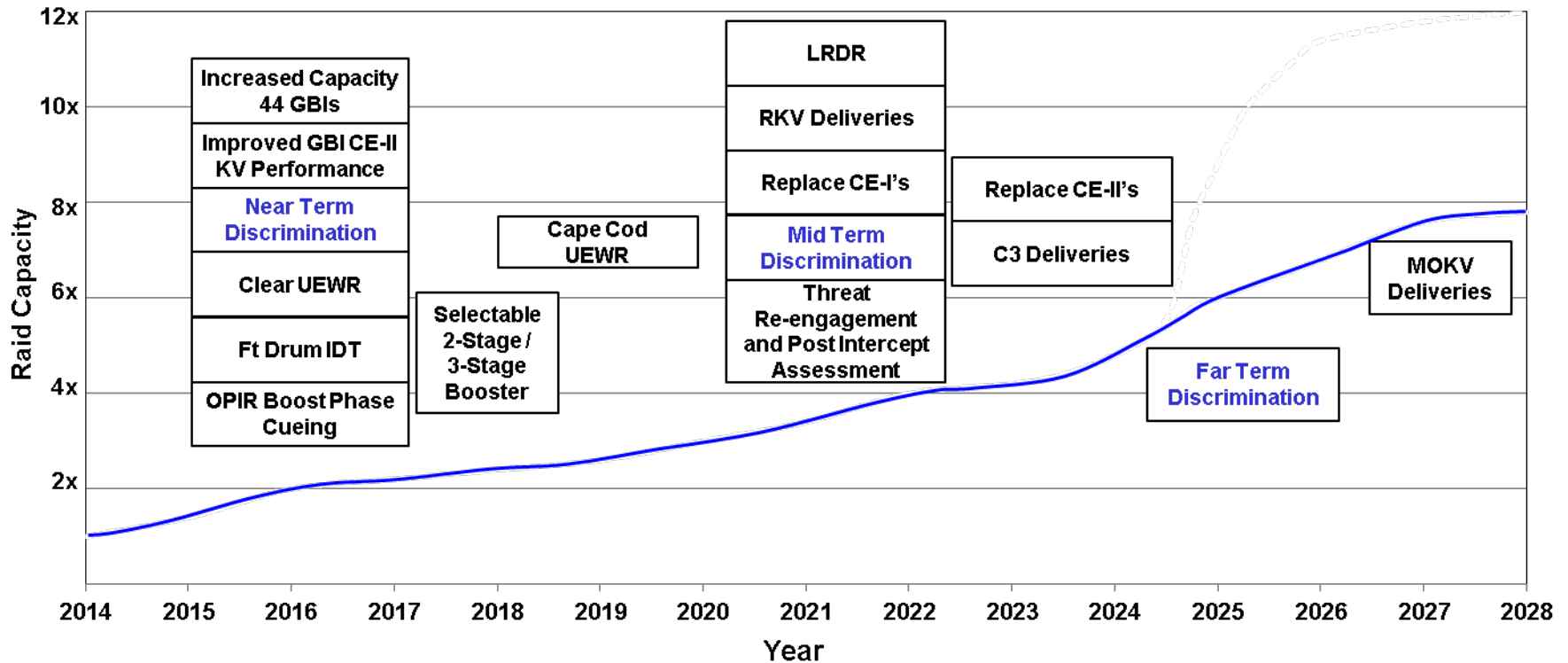
USCENTCOM



Improving Homeland Defense Capabilities

Multiple factors influence U.S. Northern Command Shot Doctrine and the number of GBIs used to prosecute an engagement. Missile Defense Agency is addressing the following factors:

- **GBI Reliability:** Improved Interceptor Reliability and Redesigned Kill Vehicle
- **Discrimination:** New / Improved Sensors, Battle Management, Fire Control, and Kill Vehicle Improvements
- **Battlespace:** Re-engagement Firing Strategy



C3 – Configuration 3 Boost Vehicle	KV – Kill Vehicle	OPIR – Overhead Persistent Infrared
CE – Capability Enhancement	LRDR – Long Range Discrimination Radar	RKV – Redesigned Kill Vehicle
GBI – Ground Based Interceptor	MOKV – Multiple Object Kill Vehicle	UEWR Upgraded Early Warning Radar
IDT – In-Flight Interceptor Communications System (IFICS) Data Terminal		

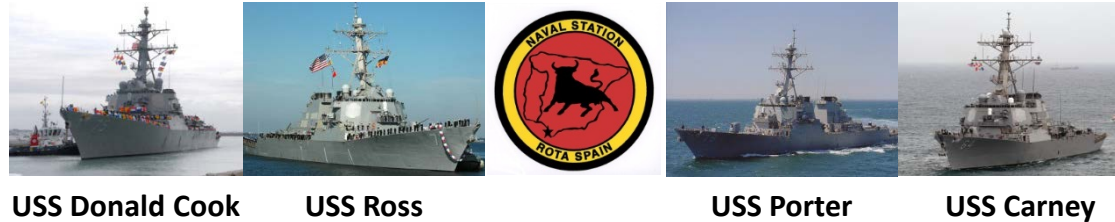


European Phased Adaptive Approach Update

Turkey, AN/TPY-2 Radar Deployment



Rota Spain



Moorestown, New Jersey



Deveselu, Romania (EPAA Phase II) (2015)



Pacific Missile Range Facility (PMRF) HI

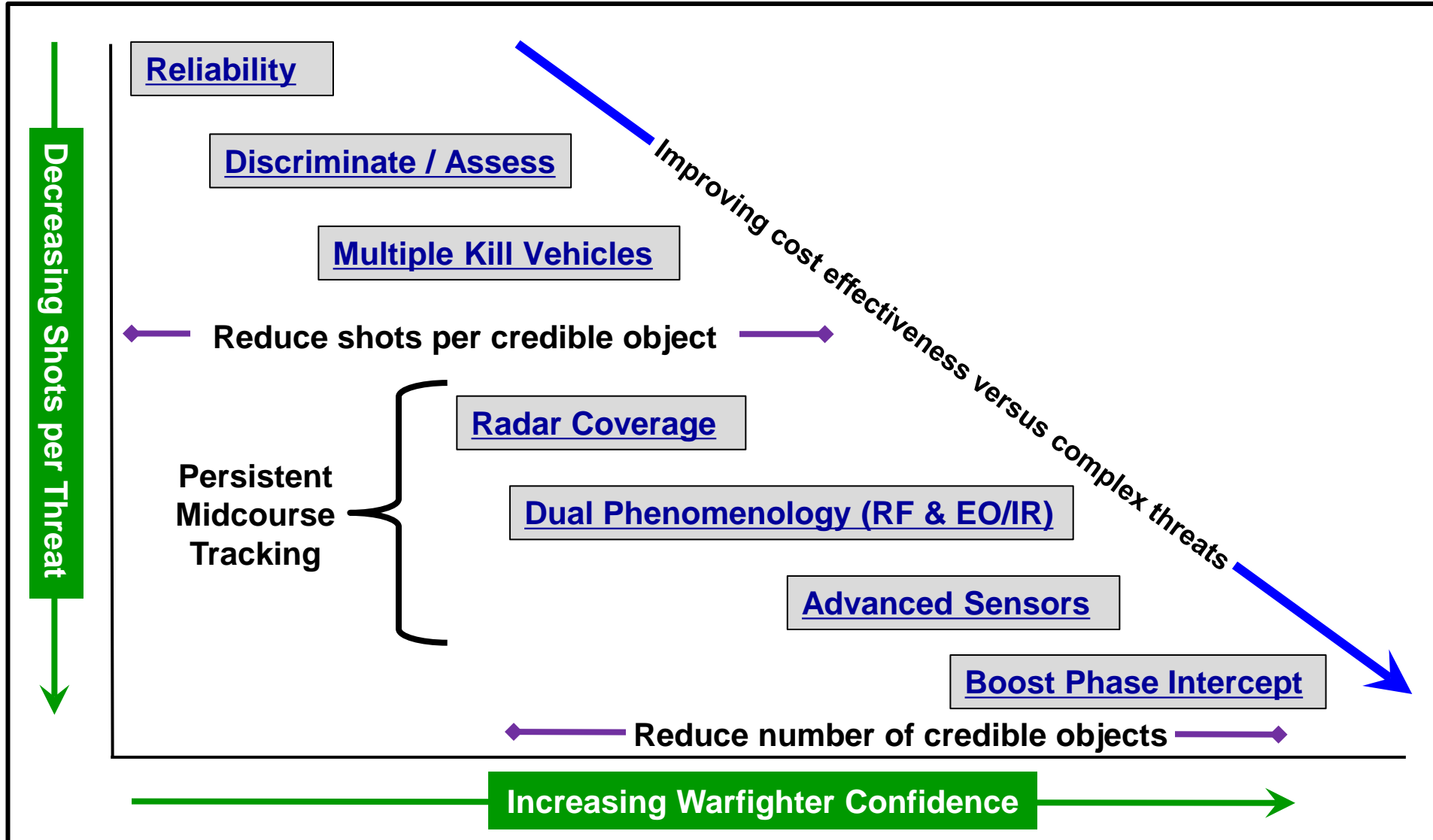


Redzikowo, Poland (EPAA Phase III) (2018)



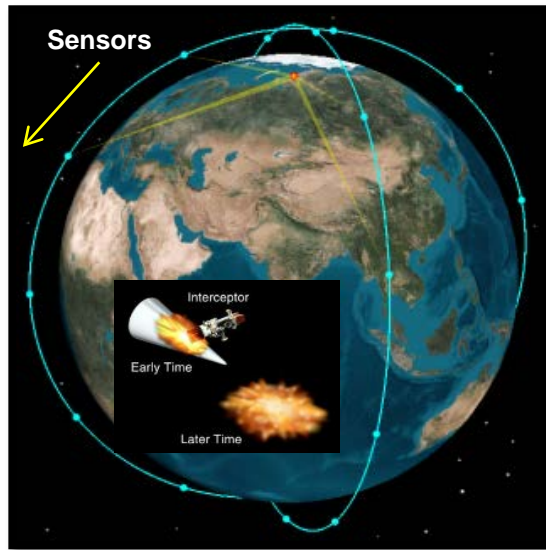


Building Warfighter Confidence

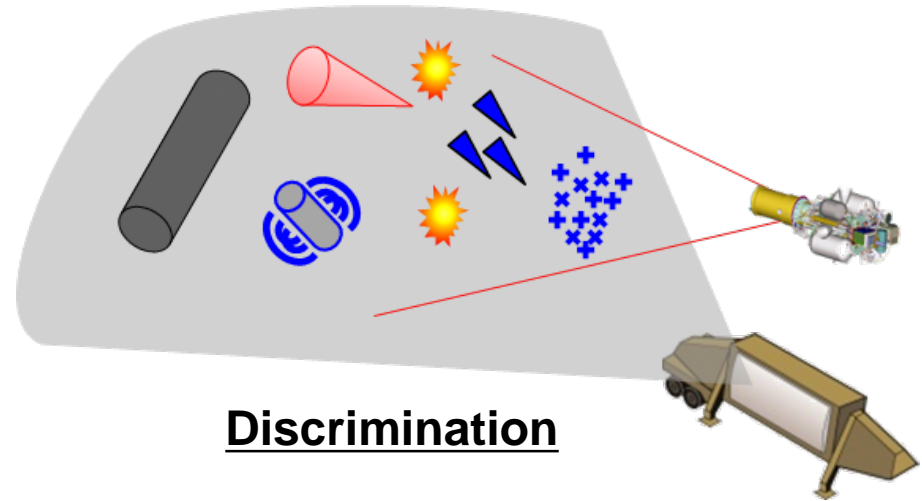




Missile Defense Future



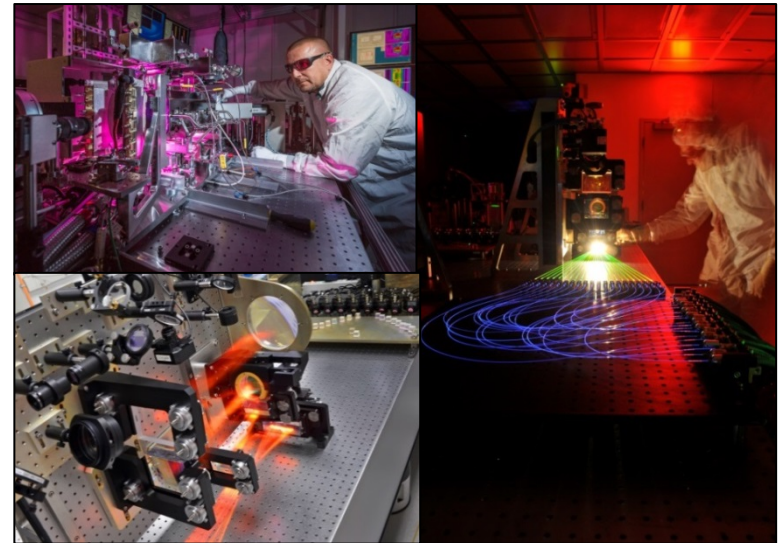
Space Operations



Discrimination



Multiple Object Kill Vehicle



Laser Experiments



International Partners





Summary

- **Balance of capabilities, requirements, and risks to deter aggression, project power, and protect U.S. and allied interests**
- **Deployment of capabilities ongoing to respond to warfighter requirements**
- **Developing, building and using a global C2 and sensor network**
- **Operationally realistic, integrated testing**
- **Continued cooperation with allies and partners for interoperable missile defense**

Missile Defense Capability – Globally Deployed



Questions

