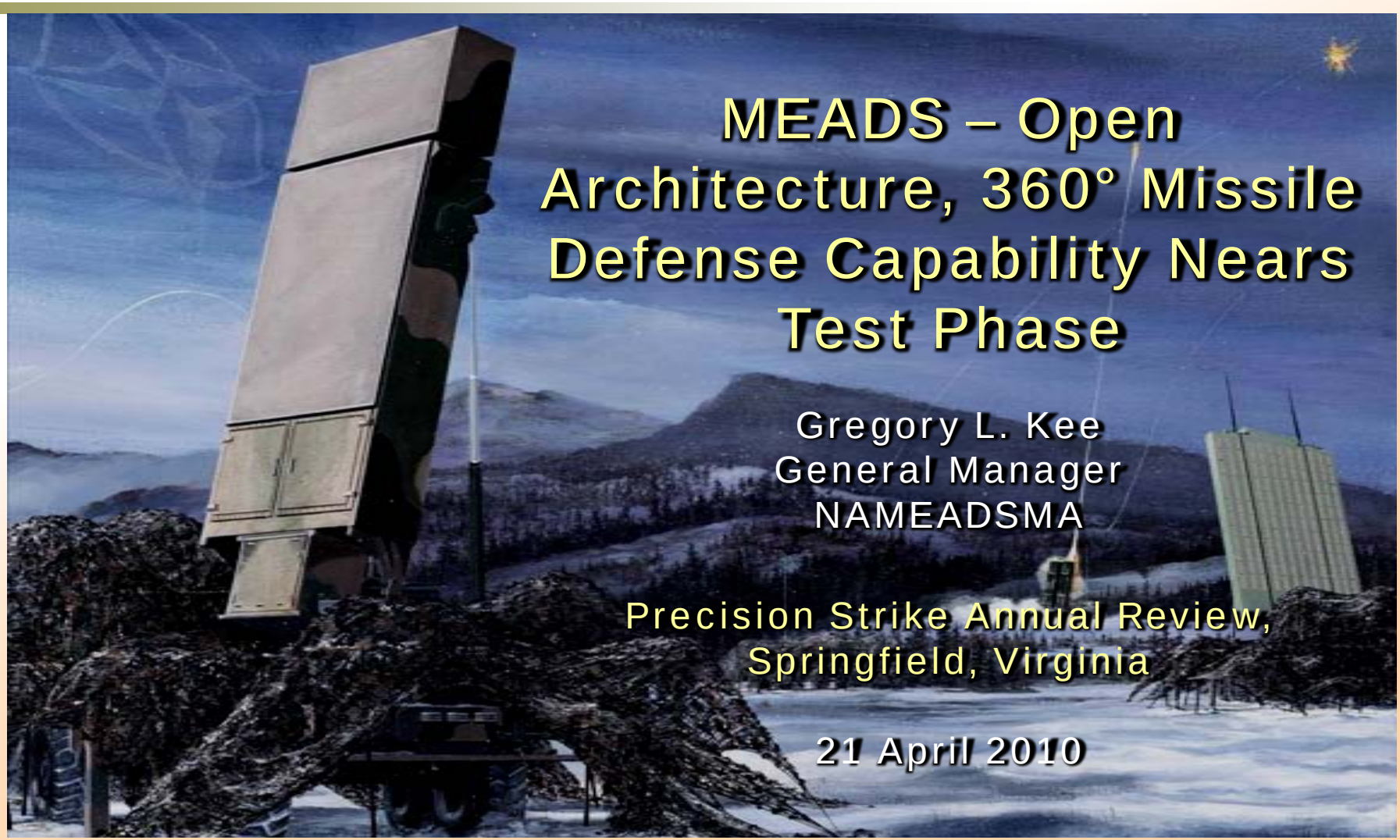


MEADS – Open Architecture, 360° Missile Defense Capability Nears Test Phase

Gregory L. Kee
General Manager
NAMEADSMA

Precision Strike Annual Review,
Springfield, Virginia

21 April 2010

What Is MEADS?

- Tri-national air and missile defense (AMD) program for German, Italian, and US forces
- Replaces Patriot, Hawk, and Nike Hercules
- $3.4B EUSD contract signed 28 September 2004
- 110-month Design and Development (D&D) program
- Tri-national contractor team includes Lockheed Martin, LFK, and MBDA Italia
  - Operations at six primary locations
  - Workforce of over 1800 skilled personnel

Key System Requirements

TARGET SET

- Next-generation threats
- Tactical ballistic missiles/UAVs
- Cruise missiles and aircraft
- Conventional/unconventional

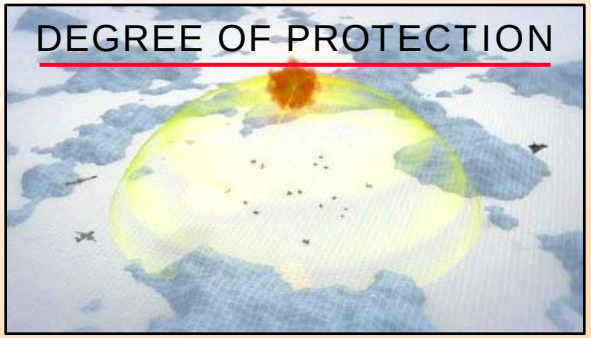
TRANSPORTABILITY & MOBILITY

- Strategic and tactical airlift
- Continuous air and missile defense coverage for maneuver force
- Cross-country mobility

OPERATING CONCEPTS

- Maneuver force protection
- Area defense
- Homeland defense
- Weighted asset protection

DEGREE OF PROTECTION



- 360-degree coverage
- Defended area – ABTs, TBMs

INTEROPERABILITY

- Designed for coalition warfare
- Operational with a range of systems
- Dramatic improvement in combat effectiveness and situational awareness

NETTED DISTRIBUTED ARCHITECTURE

- Plug-and-fight
- Open architecture
- Non-proprietary software
- Operational flexibility

MEADS is the solution for challenging requirements not addressed in any single previous AMD system

G:/BMIT/PRESENTATIONS/M059-2367 per T-POF-3613-28295-OL 22 September 2009 and POF-2505-28440-OL 15 October 2009

MEADS System Elements

Surveillance Radar (SR)

- 360-degree coverage
- Pulse Doppler radar
- Active phased array antenna
- Digital beamforming
- IFF subsystem
- 0 and 7.5 rpm rotation

BMC4I Tactical Operations Center (TOC)

- Single-shelter TOC
- Real-time battle monitor links Engagement and Force Operations
- Coalition warfare
- Nation-specific features in common software package
- Tailorable workspace for Higher Echelon Unit operations

Multifunction Fire Control Radar (MFCR)

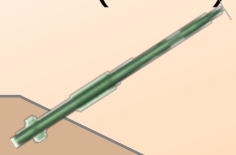
- 360-degree coverage
- Pulse Doppler radar
- Active phased array antenna
- Digital beamforming
- 0, 15, and 30 rpm rotation
- IFF subsystem
- Interceptor communication link

Launcher/ Reloader

Launcher
- High firepower
- 8 missiles full load
- Near-vertical launch angle
- Can self-load flatracks

Reloader
- Full or partial reload
- Subsystem commonality
- Comm equipment
- Pallet Load Handling and Erection System
- Crane

Certified Missile Round (CMR)

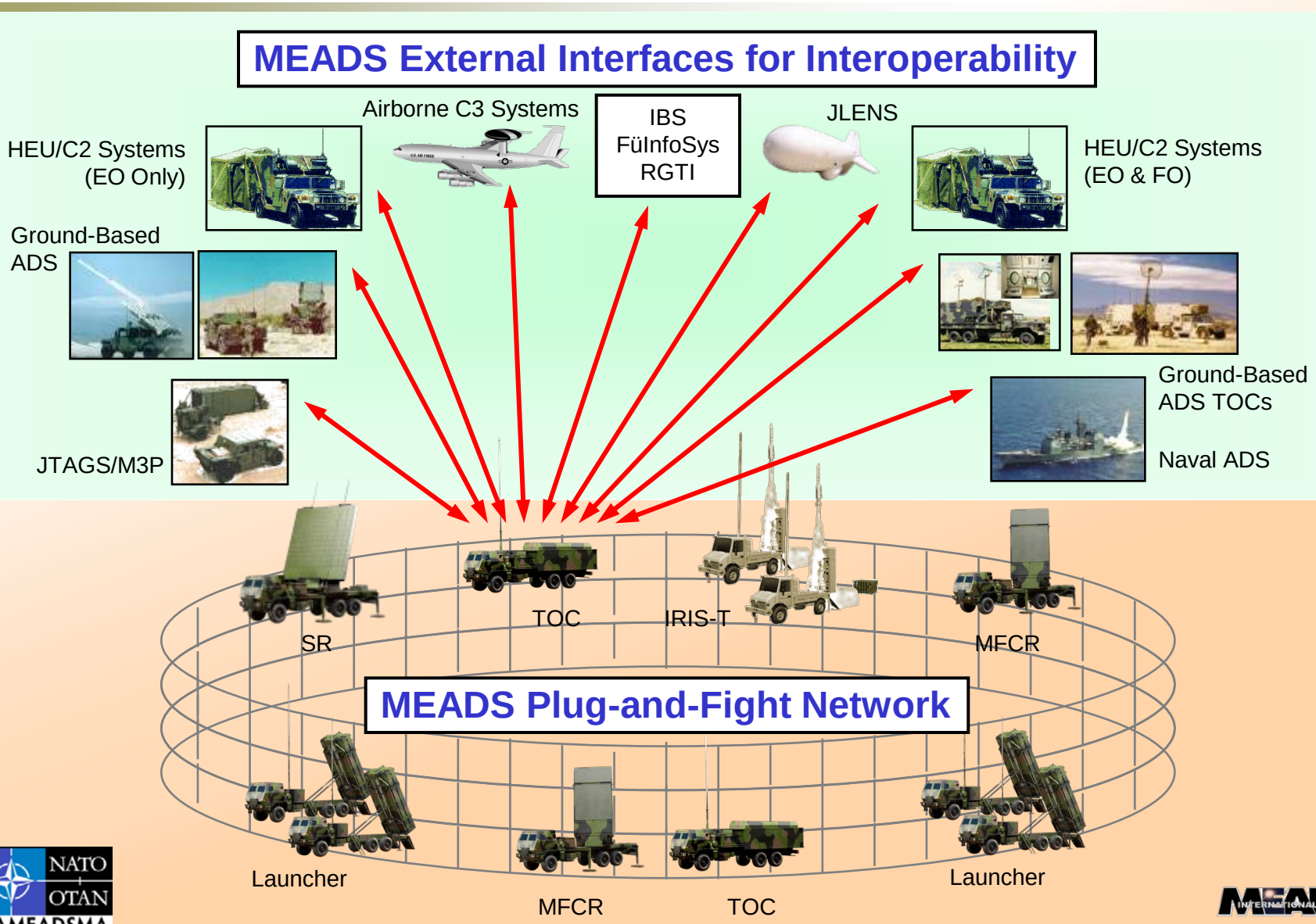


- Improved capability vs. PAC-3 CRI
- RF uplink and downlink

Highly mobile, force tailorable, System-of-Systems capable

MEADS Interfaces

MEADS External Interfaces for Interoperability



MEADS Interceptor Enhancements

PAC-3 MSE

- MEADS baseline missile
- Increased performance, greater altitude and range
- Threat-driven upgrades to defeat the advancing threat set
- Successful intercept test on 18 February at White Sands Missile Range

IRIS-T SL

- First use of MEADS open architecture design to integrate other sensors and shooters in a robust system-of-systems solution for national air defense
- Integration benefits from inherent MEADS plug-and-fight capabilities

MEADS is designed to defeat 21st Century threats

G:/BMIT/PRESENTATIONS/M030-2585, per T-POF-2505-26592-OL, 15 December 2008, Diehl website at http://www.diehl-bgt-defence.de and AMCOM PAO 135.2010, 22 February 2010

MEADS Program

01	02	03	04	05	06	07	08	09	10	11	12	13	14

Risk Reduction Effort (RRE)

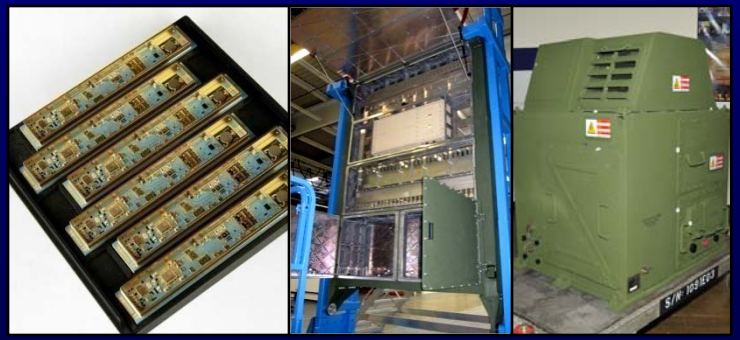
Risk Reduction Effort Modification (RREM)

System Demo

- Successful SRR in 2005
- Successful PDR in 2007
- MEI CDRs complete – July 2009
- System-level CDR – August 2010
- Flight tests in 2012

Design & Development (D&D)

SRR PDR System CDR 1st Flight



MEI CDRs complete – hardware designs approved

G:/BMIT/PRESENTATIONS/M037-1800 per NAMEADSMA Letter OC-2505-25122-OL, 3/10/2008 and cleared photos

Critical Design Review Progress

- Successfully completed final design reviews for all MEADS Major End Items and subsystems
- Engineering designs finalized for production of remaining hardware
- System-Level CDR events ongoing through August 2010
- System events permit final evaluation of MEADS survivability, logistics, safety, integration and test, life cycle cost, and performance

Significant progress toward final system design approval

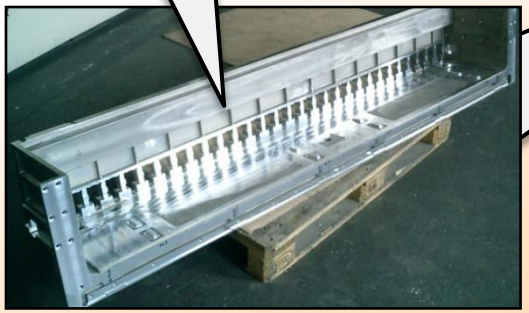
Integration and Test Summary

- Integration of Major End Item (MEI) emulators
- Integration with tactical MEI processors
- Integration with Unsheltered Tactical Operations Center
- Tactical software deliveries to support integration
- MEI integration
- Flight test facility development at White Sands Missile Range
- Integration of the MEADS System Stimulator for White Sands Missile Range operations

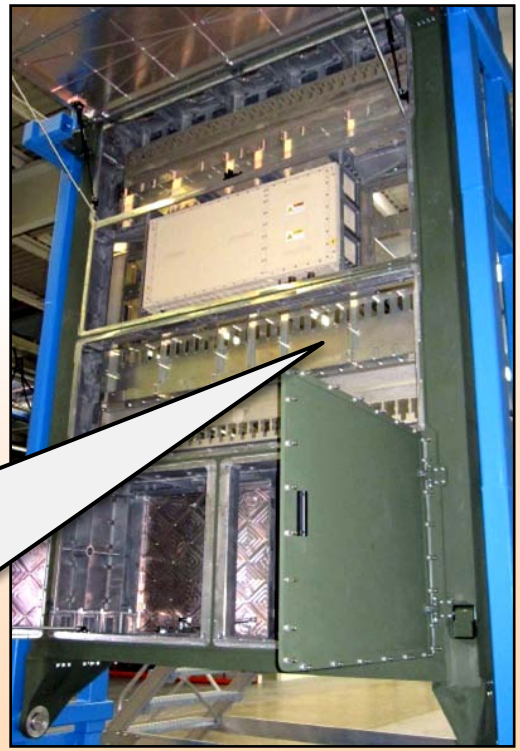
System integration has begun and continues with deliveries of tactical hardware and software

Multifunction Fire Control Radar Hardware Progress

Transmit/Receive Modules



Column Rack



Antenna Elevation Tests

Exciter

IFF Group Prototype Integrated with Cooling System Tool

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G:/BMIT/PRESENTATIONS/M128-2242, per POF-2505-27015-OL, 3 March 2009; POF-4370-29576-OL, 31 March 2010; and LTPO Control 545-2009, 15 September 2009

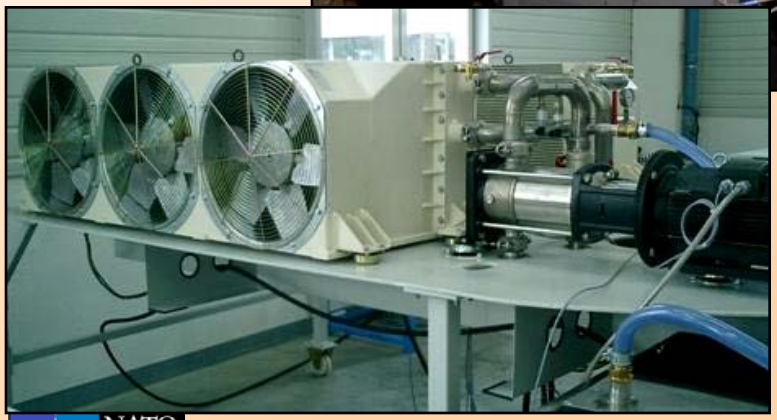
Surveillance Radar Hardware Progress

Partial Array under Test at Cazenovia Range

SprayCool® Chassis

Transmit/Receive Assembly under Test

Environmental Control Unit Heat Exchanger



Mechanics and Positioning System in Test Fixture

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M030-2585-11

G:/BMIT/PRESENTATIONS/M128-2242 per POF-2505-27015-OL, 3 March 2009 and CO-2505-26567-OL, 9 December 2008

Tactical Operations Center Hardware Progress

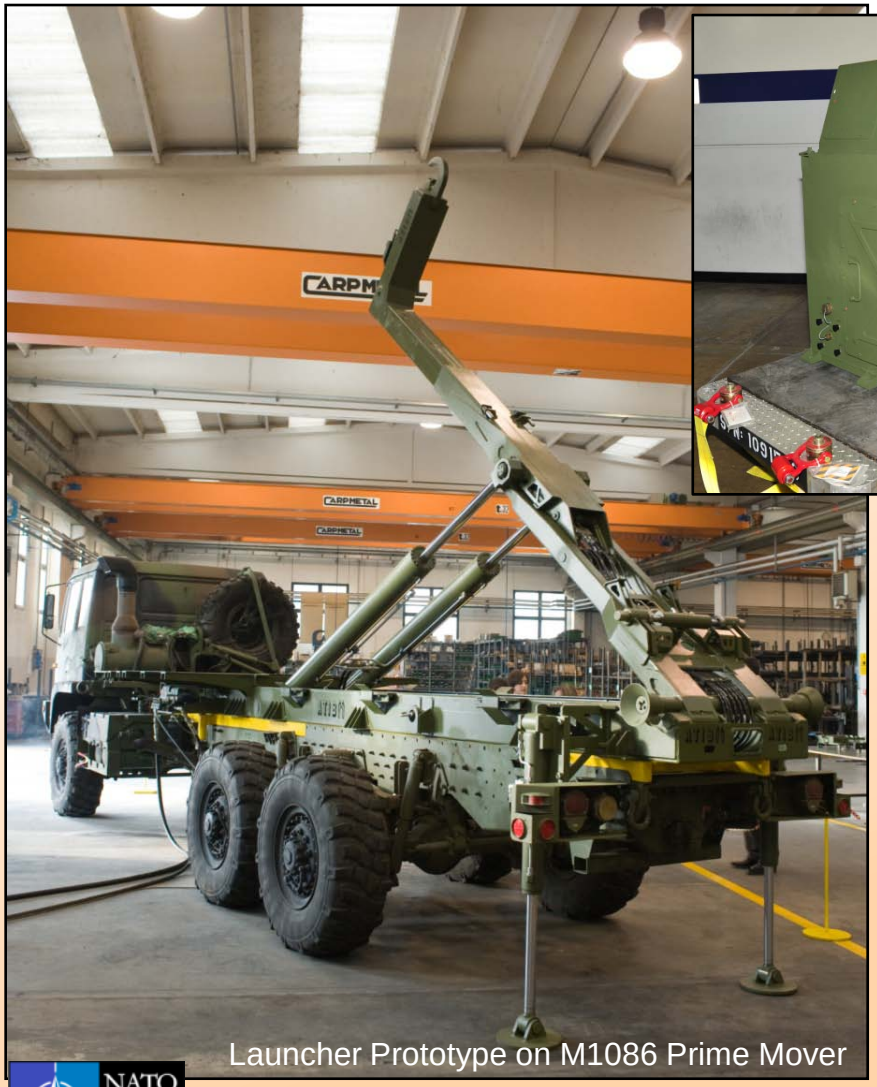
Operator Engagement Stations

Unsheltered Tactical Operations Center

Tactical Operations Center on Italian Prime Mover

German Air Force Operator during User Assessment

Launcher Hardware Progress



Launcher Prototype on M1086 Prime Mover

Integrated Launcher Electronics System

8-Missile Launch Emulator

Single-Missile Round Canisters

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M030-2585-13

G:/BMIT/PRESENTATIONS/M059-2367 per T-POF-3613-28295-OL, 22 September 2009, and POF-5100-29175-OL, 11 February 2010

Identification Friend or Foe (IFF)

- European IFF device selected for MEADS
  - Protects friendly aircraft from being engaged by air defenses
- First U.S. system ever to rely on a non-U.S. cryptographic device
  - Performs multiple identification modes
  - Interoperable with NATO forces
- MEADS radars have greater range and sensitivity than legacy radars
  - Part of a comprehensive solution to address fratricide

Improvements in IFF have always been a high design priority for MEADS

MEADS and the Phased Adaptive Approach for European Missile Defense

- US Ballistic Missile Defense Review sets priorities
  - Protect allies and enable them to defend themselves
  - Provide defensive flexibility to adapt
  - Expand international efforts
- MEADS satisfies PAA tenets
  - Relocatable, reconfigurable, interoperable
- MEADS addresses short- and medium-range ballistic missiles – the primary threat to Europe
- MEADS complements THAAD and SM-3 with 360-degree protection against threats upper-tier systems cannot defeat
  - Aircraft, UAVs, cruise missiles
- MEADS forward-based German and Italian units would be interoperable with arriving US MEADS elements
- MEADS provides an opportunity for Germany and Italy to contribute to the PAA and European missile defense

Ideally matched to requirements of the PAA

Summary

MEADS provides superior battlefield capabilities with unprecedented flexibility

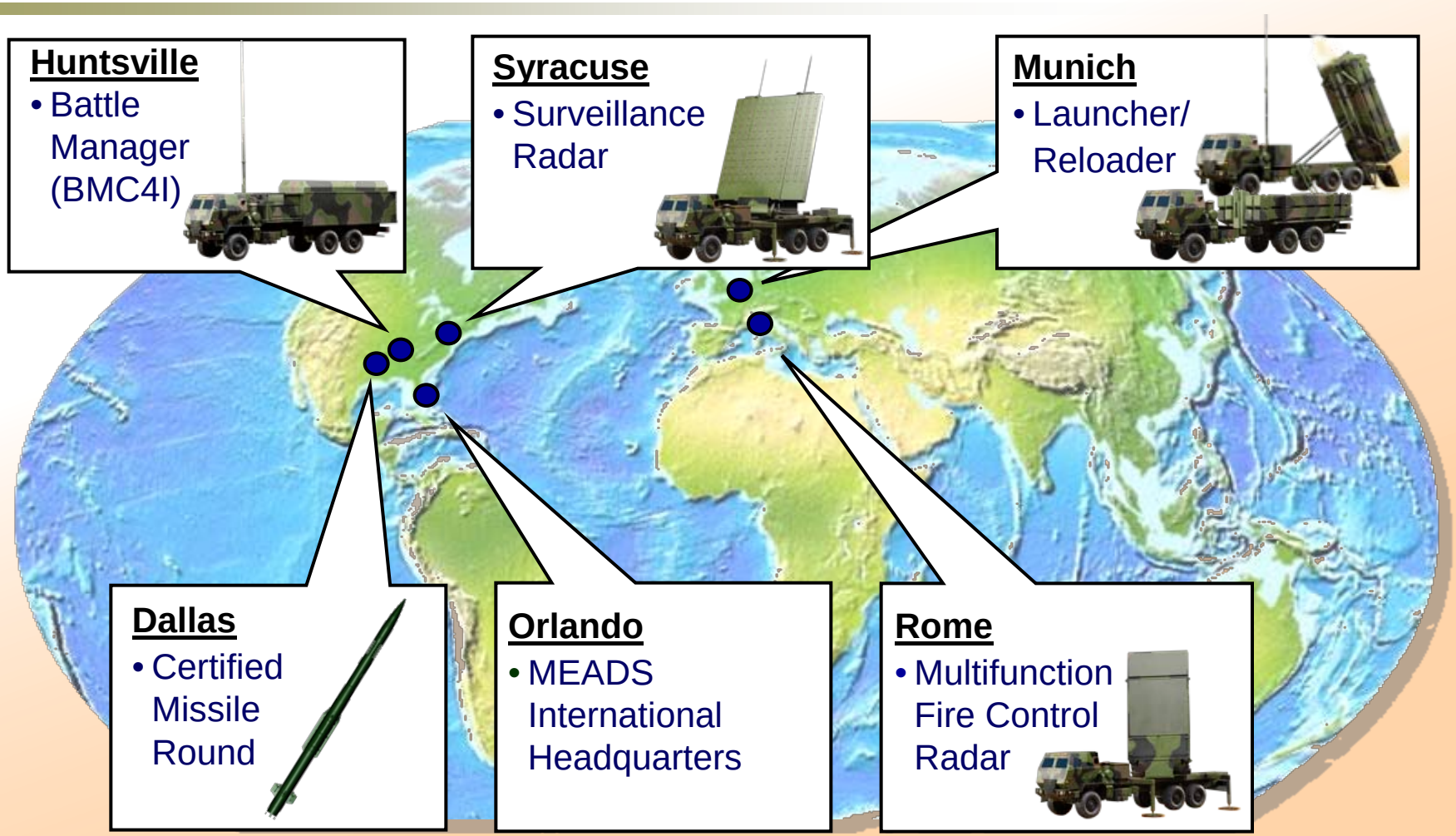
- 360-degree capability against entire threat suite
- Enhanced strategic transportability and tactical mobility
- Open architecture with plug-and-fight capability
- Tailored/scalable battle elements ensure coalition interoperability

MEADS program is making significant progress

- All hardware designs approved
- Production of radars, launchers, tactical operation centers, and reloaders is underway
- Program continues System-Level CDR; completion scheduled for August 2010
- Flight tests planned for 2012

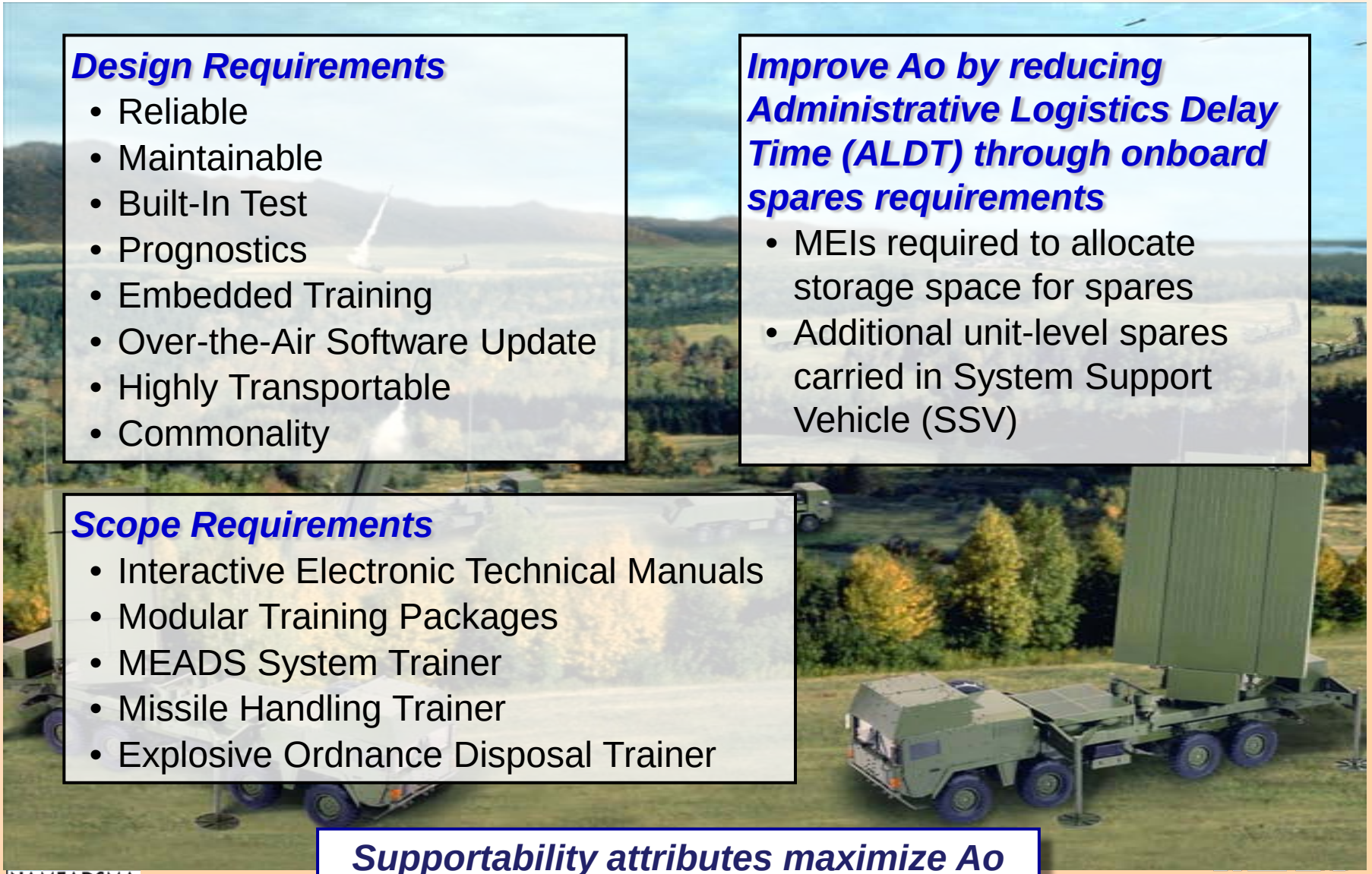
Joint NAMEADSMA/MEADS International team committed to providing a world-class theater AMD system

A Global Effort



Work distribution capitalizes on national expertise to minimize development risk

Key Supportability Features



Design Requirements

- Reliable
- Maintainable
- Built-In Test
- Prognostics
- Embedded Training
- Over-the-Air Software Update
- Highly Transportable
- Commonality

Improve Ao by reducing Administrative Logistics Delay Time (ALDT) through onboard spares requirements

- MEIs required to allocate storage space for spares
- Additional unit-level spares carried in System Support Vehicle (SSV)

Scope Requirements

- Interactive Electronic Technical Manuals
- Modular Training Packages
- MEADS System Trainer
- Missile Handling Trainer
- Explosive Ordnance Disposal Trainer

Supportability attributes maximize Ao

Summary from M101_443, per CO-42-13475-OL, 6 November 2002

MEADS Program Structure


25%


58%


17%

Germany | **United States** | **Italy**

MEADS Board of Directors

NAMEADSMA

General Manager – Gregory Kee (US)
Deputy GM/Director Business – Vincenzo Lops (Italy)
Director Technical Integration – Gerhard Brauer (Germany)

Lockheed Martin — 50% — **MEADS International** — 50% — **euroMEADS**

Formed by
- MBDA Italia
- MBDA Deutschland (LFK)

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