MDA Strategic Vision

MDA Chief Architect
Missile Defense Agency
MDA’s Future Architecture
- Issue, Need, Objective -

• Issue: Rapid Threat development challenges future architecture

• Need: Future architecture is agile and omnidirectional that deters, denies and defeats future threats

• Objective:
  • Develop an updated MDA Strategic Vision and Future Architecture Roadmap
    • Chart the path for MDA to deliver capabilities to the Warfighter
    • Enable the U.S to defend ourselves, allies and friends out to 2035
  • Advance our technical capabilities in order to outpace and defeat our potential adversaries

MDA’s Mission: To develop and deploy a layered Missile Defense System to defend the United States, its deployed forces, allies, and friends from missile attacks in all phases of flight
Adversaries are fielding diverse and expansive ranges of modern offensive missile systems

- Developing new missiles & improving existing systems
  - Precision strike
  - Penetration aids (e.g. decoys, jamming devices)
- Capable of maneuvering in midcourse or terminal phase
  - Maneuvering Reentry Vehicle (MaRV)
  - Multiple Independent Reentry Vehicle (MIRV)
  - Hypersonic glide vehicles and cruise missiles

Ref: 2019 Missile Defense Review
Approved for Public Release
21-MDA-10713 (25 Feb 21)
• Address most critical deficiencies in currently deployed weapons and sustain/increase current capability

• Maximize space sensor capabilities

• Focus resources on sensors and discrimination for more effective use of available interceptors
  - Invest in new capability for sensors, interceptors and Command and Control, Battle Management, and Communications (C2BMC)
  - Develop and field Long Range Discriminating Radar; increase Sea-Based X-Band Radar availability
  - Use multi-mission sensors to increase capabilities

• Integrate international partners' BMD sensors and weapon systems to
  - Extend sensor coverage and BMDS raid capacity
  - Reduce burden on the United States

  - Improve regional weapons capability and capacity

  - Enable improved C2BMC efficiency and flexibility

  - Invest in demonstrations of promising technologies to move to more effective architecture

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**Today’s Complex Threats Challenge the BMD Architecture**
National Level Guidance in Response to Threat Advances

The MDR, in line with the NSS and NDS, focuses the Department's efforts on improving U.S. Missile Defense capabilities to defend the U.S. Homeland, our deployed forces, and our Allies and partners.

- Strategic vision for protecting the American people and preserving peace through strength
- Renew America's Competitive Advantages (Military, Defense Industrial base, Nuclear Forces, Space, Cyber Space, Intelligence, Competitive Diplomacy, Economic Diplomacy, Information Statecraft)
- Includes a layered missile defense system to defend the homeland against missile attacks, and integrated air and missile defense capabilities with friends and allies

National Defense Strategy

- Re-emergence of Great Power Competition
- Technology and the Changing Character of War
- Empowered Non-Stat Actors
- Allies and Partners – Evolving Opportunities

Nuclear Posture Review

- Deterrence of nuclear and non-nuclear attack
- Assurance of allies and partners
- Achievement of U.S. objectives if deterrence fails
- Capacity to hedge against an uncertain future

Missile Defense Review

- Comprehensive approach to prevent and defeat adversary missile attacks through:
  - Deterrence
  - Active and passive defense
  - Attack Operations

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Today’s Missile Defense System 1.0
Characteristics of New Architecture

• Global ability to see, track and engage the threat supported by multi-spectral, real-time, persistent survivable sensor capacity and capability
• Challenge the threat in all phases of flight
• Multi-mission capabilities
• Real-time, Joint all-domain Global C2
• Flexible, agile, and resilient architecture
• Incorporate cyber defense throughout the MDS
• Integrated layered defenses
• Optimize resources ($, people, tests, .....)
• Integration of global partner assets
• Utilize Left-of-Launch assets

Enable the Right Sensor to Communicate with the Right Shooter at the Right Time
Tomorrow’s Missile Defense System 2.0
• Integrate US and international partners’ sensors and weapon systems to extend coverage and increase raid capacity, reducing the burden on the US

• Accelerate development, testing, and fielding of an HGV defense architecture solution with Glide and Terminal Defeat solutions

• Address most critical deficiencies in deployed weapons and sustain / increase capability

• Field a missile defense architecture that stresses all three phases of flight for the Adversary: boost, midcourse / glide, terminal

• Partner with DoD and International Community to develop, test, and field a Cruise Missile Defense architecture solution

We Must Plan to Defeat Our Adversaries in Any Environment
Opportunities for Applied Research that Supports MDA’s Strategic Vision

- Universities are encouraged to respond to the Missile Defense Science & Technology Advanced Research (MSTAR) broad agency announcement (BAA), found on beta.SAM.gov
  - Awards typically include a 1 year base period, plus up to two 1-year option periods; funding levels vary

- White papers can include applied research across a wide range of topics, all of which align with the MDA Strategic Vision:

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<tr>
<th>Applied Research Topics</th>
<th>Examples Where Applied Research Supports MDA’s Strategic Vision</th>
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<tr>
<td>Mathematics, Probability and Decision Theory</td>
<td>• Flexible, agile, resilient command and control (C2) systems that can adapt to optimize performance of US and international partners’ assets, asserting configurable levels of control</td>
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<tr>
<td>Computer Science, Signal and Data Processing</td>
<td>• Data and sensor fusion in the presence of disparate levels of trust</td>
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| Artificial Intelligence, Machine Learning, and Big Data      | • Algorithms for advanced threat identification, discrimination, and flight predictions; launch and impact point determination for advanced threats
  • Data mining, pattern recognition, and decision support for cyber resilience |
| Phenomenology                                                | • Rapid modeling of plumes, wake, and reentry physics                                                                        |
| Modeling and Simulation                                      | • Reliable, resilient interceptor control systems, avionics, and electronics                                                  |
| Interceptor and Space Systems                                | • Innovative materials for HGV and CMD interceptors                                                                          |
| Materials and Processing                                     | • Lightweight, efficient, mobile directed energy systems                                                                    |
| Directed Energy Systems                                      | • Low-cost, modular, adaptable, efficient sensors                                                                           |
| Radars and RF Communication Systems                          | • Flexible, agile communications systems that detect attacks and respond accordingly, to ensure resilience                    |
| EO/IR Sensors and Communication Systems                      |                                                                                                                             |

Universities Are Well-Positioned to Perform Applied Research that Supports MDA’s Strategic Vision