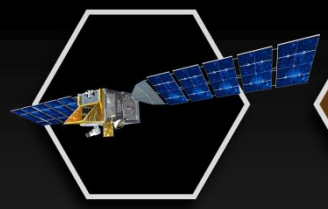
Missile Defense Agency
Advanced Research Overview

Today's Ballistic Missile Defense System

Sensors



Satellite Surveillance

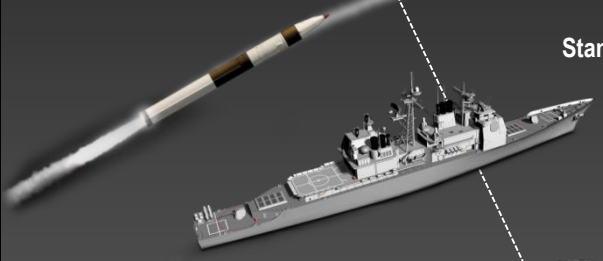
Forward-Based Radar

Upgraded Early Warning Radar

AEGIS BMD SPY-I Radar

Sea-Based X-Band Radar

BOOST / ASCENT Defense Segment



Aegis
Ballistic Missile Defense

SM-3
Standard Missile-3

Aegis Ashore

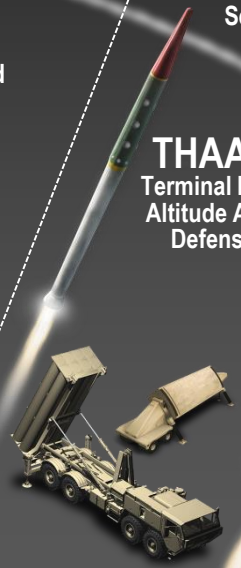
MIDCOURSE Defense Segment

GBI
Ground-Based Interceptor

TERMINAL Defense Segment

Aegis
Sea-Based Terminal

THAAD
Terminal High Altitude Area Defense



PAC-3
Patriot Advanced Capability-3

The System Of Elements

C2BMC Command Control, Battle Management and Communications

NMCC USSTRATCOM USNORTHCOM USPACOM USEUCOM USCENTCOM

MDA Advanced Research

- **Pursue a broad range of high-risk technologies**
  - Capitalize on the innovation and creativity of the Nation's small businesses and universities
  - Develop and transform cutting edge technologies into actual applications for insertion into the BMDS
- **Technology insertion into the BMDS is critical**
- **Advanced Research utilizes the following research vehicles:**
  - Small Business Innovation Research / Small Business Technology Transfer (SBIR/STTR) program
    - 4th largest SBIR/STTR program in the Department of Defense
  - Rapid Innovation Funding (RIF)
  - Broad Agency Announcements (BAA)
    - Missile Defense Science & Technology Advanced Research (MSTAR)
    - Advanced Technology Innovation (ATI)

Technology Interest Areas

- **Interceptor Technology**
  - Guidance, navigation, & control
  - Batteries & power systems
  - Advanced materials
    - High temperature
    - Light weight
  - Seeker technology
  - Rad-Hard technology
  - Deployment systems
  - Lightweight composites
  - Propulsion & control technologies
    - Improved specific impulse

- **C2BMC**
  - Advanced tracking & discrimination algorithms
  - Command & control algorithms
  - Low latency and secure communications
  - Battlespace management
  - Data fusion
  - Warfighter training

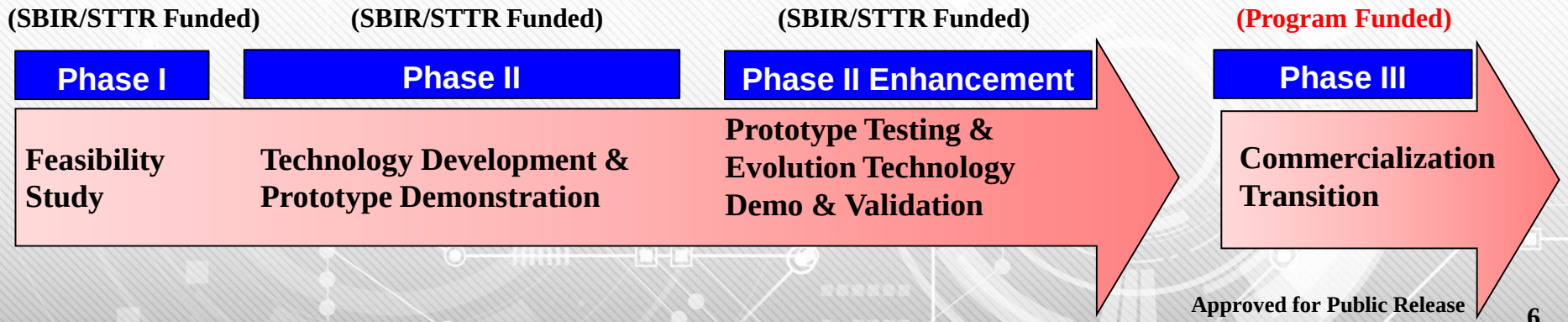
- **Modeling & Simulation**
  - Lethality
  - Battlespace environments
  - Engagement
  - Aerothermal environments
  - Technology investment evaluation
  - Test verification

- **BMDS Testing**
  - Affordable targets
  - Scene generation
  - HWIL
  - Rapid analysis SW toolkits
  - Predictive analysis & modeling
  - Range safety

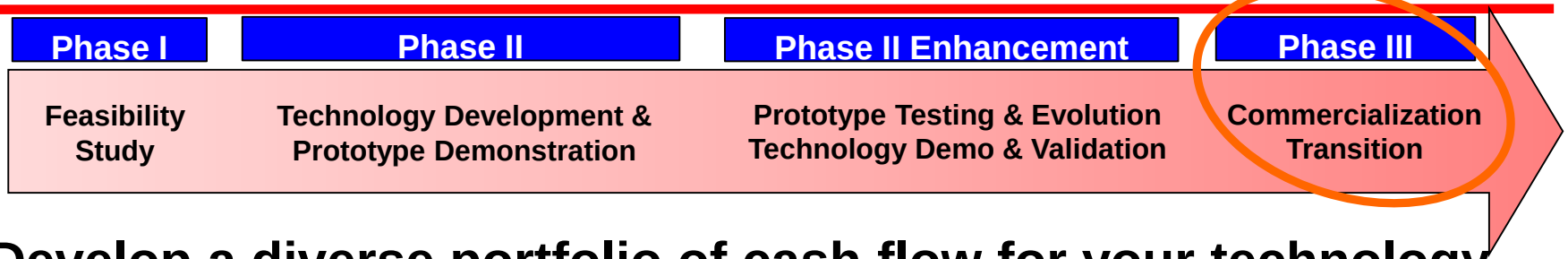
- **Sensors**
  - EO/IR and radar
    - T/R modules
    - FPAs
  - Signal & data processing algorithms
  - Rad-Hard technology
  - Telescopes & antennas
  - Windows & radomes

Solicitation Process

- **SBIR / STTR program is a four step process**
  - Phase I: feasibility and concept development ($ 100,000)
  - Phase II: technology and prototype development ($ 1,000,000)
    - Technology may receive one sequential Phase II
  - Phase II Enhancement: Prototype testing and technology demonstrations and validation ($500,000)
  - Phase III: Commercialization and Transition



Transition Planning



- **Develop a diverse portfolio of cash flow for your technology**
  - Government Contracting and Acquisition is a slow process
- **Lay the framework for transition of SBIR technology early**
  - Program Office Requirements List is defined 2 years out
  - Prime Contractors define sub-contracts and labor hours bid to the Government during contract negotiation
    - i.e. years before your technology will transition into production
- **Look for additional opportunities outside of the Program/Agency that your SBIR/STTR technology was developed**
  - A Phase I award qualifies your technology for a Phase II or Phase III with any SBIR/STTR Program

Broad Agency Announcement (BAA)

- **A competitive research and development contracting approach in the form of a general agency announcement:**
  - Identifies areas of research interest
  - Includes criteria for selecting proposals
  - Solicits participation from all offers capable of satisfying the Government need
- **Primary objective is to encourage participation by science and technology firms and educational institutions in meeting general research and development goals for innovative ideas and approaches**
- **Meet full and open competition requirements "The Competition in Contracting Act of 1984"**
- **Evaluates proposals based on peer or scientific reviews against individual merits rather than against each other**

Missile Defense Science & Technology Advanced Research (MSTAR) BAA Program

- **Technical Objectives**
  - Fund relevant, advanced research and development at domestic universities and academic institutions
  - Build portfolio of revolutionary technology to support and enhance BMDS
  - Develop holistic partnerships
  - Educate future scientists and engineers
- **Open continuously for proposals from universities**
  - Broad Agency Announcement (http://www.fbo.gov)
  - Research topics revised annually
  - MDA is seeking strategic alliances with universities
  - One year base period with two one year options
    - Base period up to $200,000
    - Option years $200,000 (each)

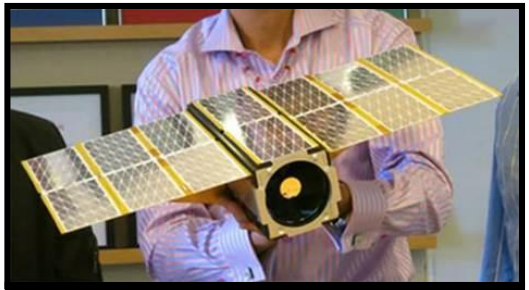
Advanced Technology Innovation (ATI) BAA Program

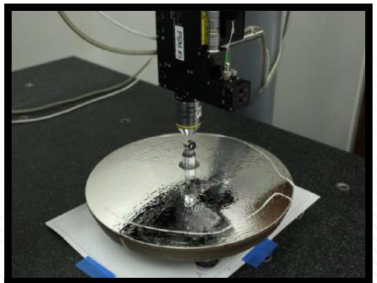
- **Technical Objectives**
  - Fund relevant cutting edge technology from industry, small business and universities
  - Build portfolio of revolutionary technology to support and enhance BMDS

- **Advanced Technology Innovation Broad Agency Announcement**
  - Open continuously to university and commercial vendors
  - Contract value not limited

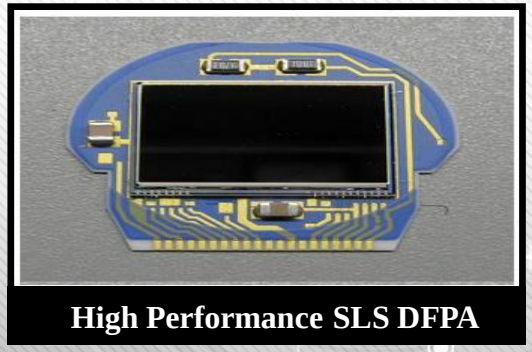
Recent SBIR / RIF / BAA Sponsored Research Accomplishments

- Inaugurated a nanosat testbed program to demonstrate notional Kill Vehicle communication architecture
- Executed structural test series to validate SBIR developed lightweight unitary nosecone
- Conducted nosecone deployment tests of the unitary nosecone
- Completed radiation testing on hardened mirrors
- Demonstrated a Long Wave strained layer superlattice FPA


Nanosat Satellite


Rad-hardened Mirror Technology


Unitary Nosecone


High Performance SLS DFPA


Deployment Test

For More Information

www.mda.mil

- Missile Defense News, Images, Videos, Fact Sheets
- BMDS Overview, BMD Basics
- MDA Business Opportunities (https://www.mda.mil/business/advanced_research.html)
- DoD SBIR/STTR website: https://sbir.defensebusiness.org
- SBA SBIR/STTR website: https://www.sbir.gov

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