Missile Defense Agency
20th Annual Small Business Programs Conference

Sensors Directorate (MDA/SN)
Breakout Session

Sensors Directorate (SN)

The impossible often has a kind of integrity which the merely improbable lacks.

Douglas Adams

Sensors Directorate (SN)

- **Sensor Programs are seeking innovative technologies from Small Business that are applicable to the Sensors Portfolio and the Element's contribution to the Ballistic Missile Defense System**
- **Sensors expects to invest in key technologies using SBIR/STTR Programs for future solicitation topics**
  - **Sensors will continue to pursue advanced technologies in support of the Ballistic Missile Defense System Phased Implementation Plan and System Specifications**
  - **Advanced technology development must complement the agency's high operations tempo and minimize exposure to obsolete technologies**
  - **Areas of interest**
    - **Advanced Discrimination**
    - **Advanced Threat Tracking and Targeting**
    - **Multi-Band Radar**
    - **Multi-Static Radar**
    - **Mid-Range Discrimination Radar**

Why we're here today

- **Recognize small business obstacles in the defense market place**
  - **How to incentivize the Prime to embrace government SBIR developed technologies**
  - **How to marry innovative technologies to emerging capability challenges**
    - **Small business technical solutions (supply) must address the development contractors need (demand)**
  - **Fielded software is Classified**
    - **Limits our ability to define & award Phase I contracts**
    - **Every SBIR Vendor faces a steep learning curve the first time their software, or hardware, is tested in a representative environment and/or integrated with the baseline components**
- **Response**
  - **Current radar contracts include requirements for:**
    - **Architectural development to Modular Open System Architecture (MOSA) standards**
    - **Assessing 3rd Party Technologies for integration into current systems**
  - **Utilizing System Test & Evaluation Labs to mature early software releases (Technology Readiness Level 0-3) prior to integration and assessment in a ballistic missile defense representative environment; levels the field for emerging technologies**
  - **Support technical interchange fora to stimulate dialog between primes and small business**

Technical Challenges

- **Sustain Deployed Radars and Remediate Obsolescence Issues**
- **Expand Global Sensor Coverage**
  - Deploy LRDR to Clear, Air Force Station
  - Complete HDR-H and Pacific Radar design and manufacture hardware
  - Increase SBX operational deployment time
- **Improve Sensor Discrimination, Electronic Protection, and Debris Mitigation**
  - Software upgrades to maintain & improve performance against evolving threats
  - Deploy upgraded processor hardware
  - Hardware/software upgrades to improve Object Classification
- **Improve Sensor Reliability**
  - Add robustness to deployed radars: additional spares, hardware/software improvements, float components
- **Support Robust BMDS Flight and Ground Testing**
- **Support Hypersonic Threat Defense**
  - Improve sensor performance against hypersonic threats
  - Sensor rapid prototype development effort to augment deployed radars

MDA Goals


CHARTING THE COURSE FOR OUR FUTURE
MDA GOALS
MISSION:
To develop and deploy a layered BMDS to defend the United States, its deployed forces, allies, and friends from ballistic missile attacks of all ranges in all phases of flight.
VISION:
Earn our Nation's confidence in developing effective homeland and regional missile defense.
CORE VALUES
• RESPECT
- Mutual for each other with dignity
• TEAMWORK
- We accomplish more helping each other than as individuals
• DEDICATION
- To our nation and our missile defense mission
• INTEGRITY
- In all things, all the time
• PROFESSIONALISM
- Strive for it in all you do
1. Support the warfighter
2. Prove the power of missile defense through testing
3. Continue development and fielding of the integrated BMDS for Homeland and Regional Defense
4. Team approach to Agency operations
5. Optimize available resources
6. Inspire professional excellence
7. Foster a supportive environment for a diverse and professional workforce
8. Implement National Security Strategy through international cooperation
9. Capitalize on the creativity and innovation of the Nation's universities and small business community
Flight tests define our legitimacy.
Delivery of capability defines our legacy.

Today's Ballistic Missile Defense System

C2BMC Command and Control, Battle Management and Communications

NMCC USSTRATCOM USNORTHCOM USINDOPACOM USEUCOM USCENTCOM

BOOST / ASCENT
Defense Segment

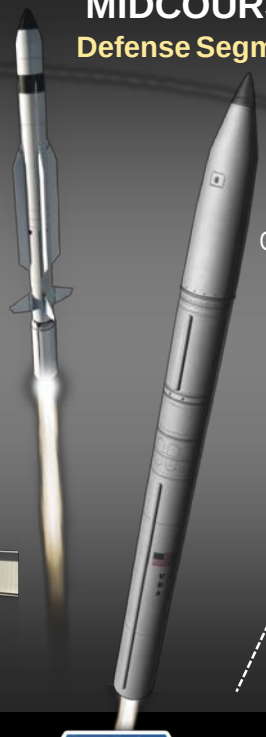
MIDCOURSE
Defense Segment

TERMINAL
Defense Segment

The System Of Elements

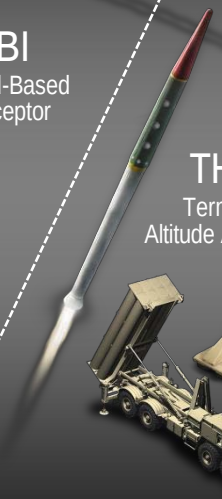
Aegis
Ballistic Missile Defense

SM-3
Standard Missile-3



GBI
Ground-Based Interceptor

Aegis
Sea-Based Terminal

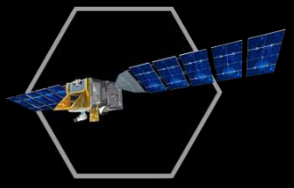


THAAD
Terminal High Altitude Area Defense

Aegis Ashore

PAC-3
Patriot Advanced Capability-3

Sensors



Satellite Surveillance

Forward-Based Radar

Upgraded Early Warning Radar

AEGIS BMD SPY Radar

Sea-Based X-Band Radar

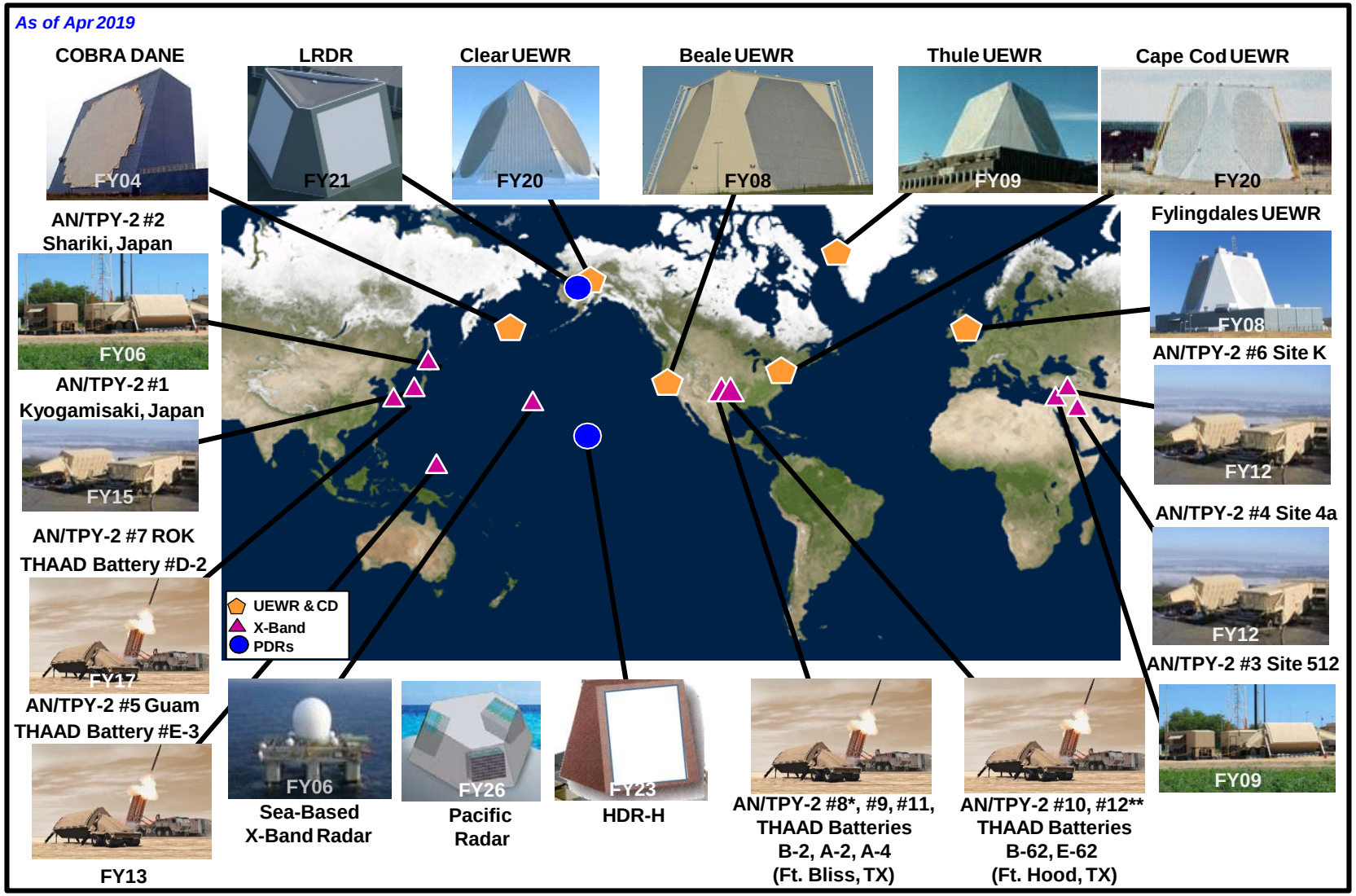
HQ-G-0371-18

How Sensors are Graded

- **Performance Measures:**
  - **Availability:** Our sensors must be ready when called upon, with sufficient capacity to support the mission
  - **Reliability:** Our sensors must remain fully mission capable until the mission is complete
  - **Acquisition:** Our sensors perform surveillance and track initiation
  - **Tracking:** Our sensors provide engagement quality tracking
  - **Target Selection:** Our sensors support target selection
  - **Handover:** Our sensors maintain tracking responsibility across the field of regard and ensure successful chain of custody transfer to the next element

Sensors Directorate Radars

Supporting the BMDS Across 16 Time Zones

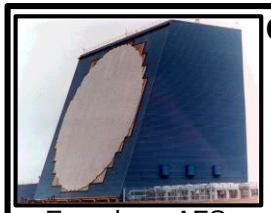


* Radar #8 currently at White Sands Missile Range

** Radar #12 currently on Wake Island

BMDS Radars
Missions

COBRA DANE Radar (CD)

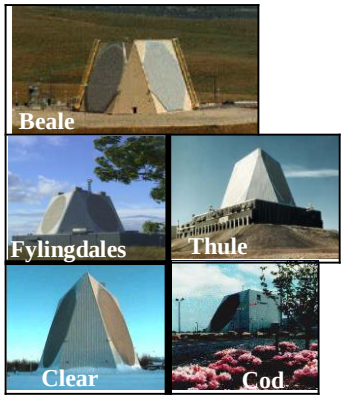


Eareckson AFS, Shemya AK

Missions

- GMD Midcourse Sensor
  - Acquisition
  - Tracking
  - Classification
- Space Surveillance: Detects, identifies, & tracks man-made objects in earth orbit

Upgraded Early Warning Radars (UEWR)



FY 20 FY20

Missions

- Ground-based Missile Defense (GMD) Midcourse Sensor
  - Acquisition
  - Tracking
  - Classification
- Integrated Tactical Warning & Attack Assessment (ITW/AA): Provides early warning of ballistic missile attack
- Space Surveillance: Detects, identifies & tracks man-made objects in earth orbit

Sea-Based X-Band Radar (SBX)

Mission

- GMD Midcourse Sensor
- Cued search, acquisition, track, discrimination, and hit assessment
- Performs precision track
- Provides data on all target complexes to GMD interceptors

AN/TPY-2 Radars

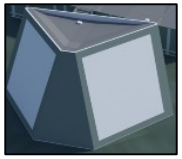
Terminal Mode (TM) Mission

- Sensor for Terminal High Altitude Area Defense (THAAD) Weapon System
- Detects, tracks, and discriminates
- Communicates with THAAD fire control and interceptor to destroy threat

Forward-Based Mode (FBM) Mission

- Detection close to threat origin, boosting ballistic missile
- Tracks, discriminates. and reports to C2BMC
- Data supports target destruction by Ground-Based Interceptor or Standard Missile

Long Range Discrimination Radar (LRDR)



FY21

Mission

- 24x7 persistent long range midcourse discrimination, precision tracking and hit assessment in BMDS Pacific architecture
- Raid handling performance over wide range of threat trajectories
- Support conservation of Ground Based Interceptor (GBI) inventory
- Support multi-mission areas (e.g., SSA)

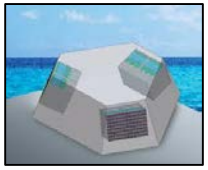
Homeland Defense Radar – Hawaii (HDR-H

FY23

Mission

- 24x7 persistent tracking/discrimination against PACOM threats in complex countermeasure environment
- Improve BMDS to defend Hawaii
- Support multi-mission areas (e.g. Space Situational Awareness)
- Data supports target destruction by Ground-Based Interceptor or Standard Missile

Pacific Radar



FY26

Mission

- 24x7 persistent tracking/discrimination against PACOM threats in complex countermeasure environment
- Improve BMDS to defend Homeland
- Support multi-mission areas (e.g. Space Situational Awareness)

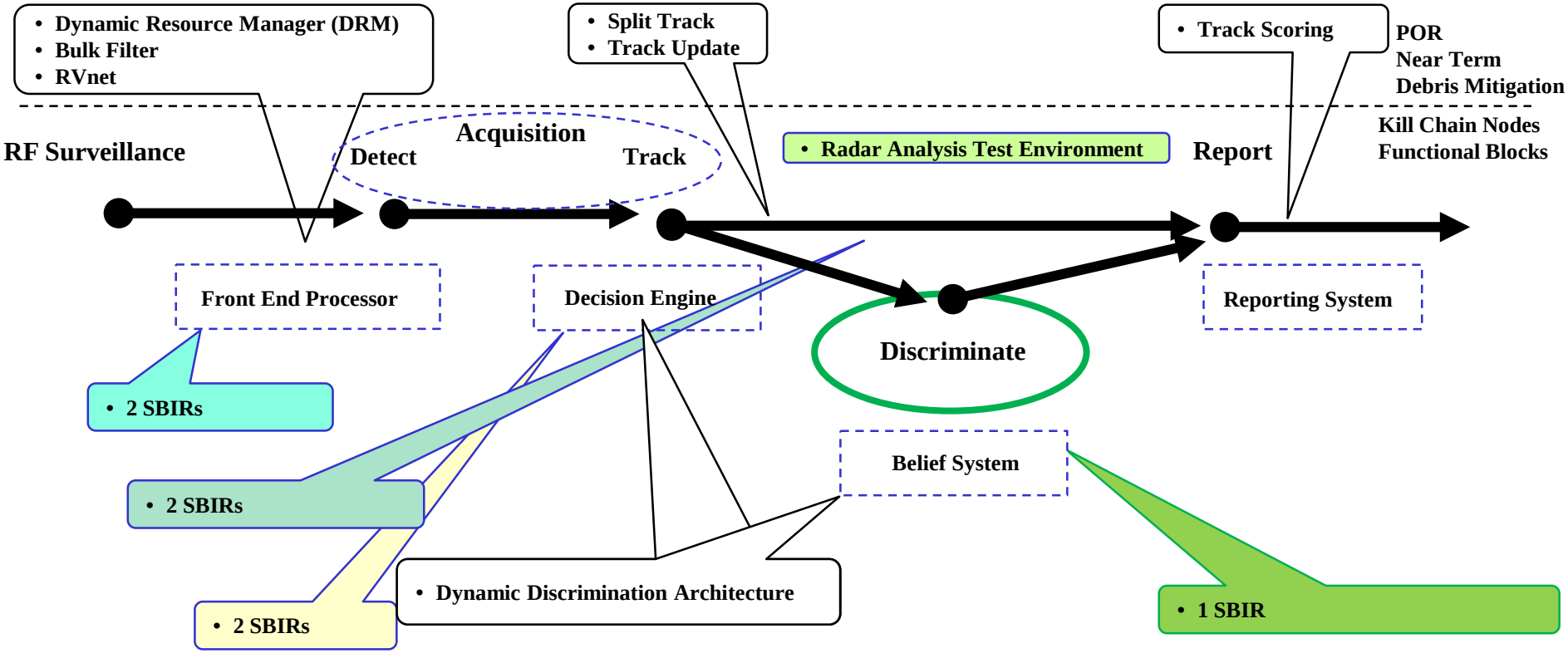
Sensor Solicitations

- **SN solicits SBIR technologies to maintain the Operational Readiness of deployed assets and to address particularly challenging capability needs**
  - **Hardware**
    - **Planned improvements to match Ballistic Missile Defense System Capability & Threat evolution**
    - **Obsolescence Remediation**
    - **Corrective Action driven design changes**
    - **Improvements in Lifecycle Operations & Maintenance Costs**
  - **Software**
    - **Planned updates to address capability evolution as directed in the Phased Implementation Plan and System Specifications**
    - **Planned updates to match s Capability & Threat evolution**
    - **Corrective Action driven updates (deficiencies, observations, etc)**
- **SN does not**
  - **Solicit SBIR technologies without an identified capability need, current or projected**
  - **Conduct research for research's sake**

Sensors Directorate (SN)

- **SBIR/STTR investments –**
  - Long term technical solutions to tactical issues
  - Issues likely to reoccur as the system capability & threat evolves
  - Current Phase II and Phase II+ investments
    - Objective Debris Mitigation
    - Improved Track Accuracy
    - Improved Object Discrimination and Target Selection
    - Next Generation RF Hardware
- **Opportunities**
  - Working with C2BMC (BC) and GMD (GM) to leverage complimentary technologies based on a processing continuum
    - Measureable → Meaningful → Actionable
  - Working with Targets & Countermeasures (TC) to leverage similar technologies

Current Algorithm Technology Investment Areas



How can the government help?

- **Prime contractors**
  - Government has a long reach to access Small Business, Universities, and FFRDCs
  - SBIR Program seeks high payoff and will consider high risk solutions
  - Government has greater flexibility to trade capabilities to overcome system limitations
- **Small Business**
  - Provide seed money for emerging technologies
  - Identify technical focus areas for small business to apply innovations
  - Match small business technology to prime contractor challenges
  - Provide representative text environment to analyze and mature software

Who to Contact?

For Technical Questions:

Leonard Halley

Sensors Research Area Lead

leonard.halley@mda.mil

(256) 450-5091

For SBIR/STTR Program Questions:

SBIRSTTR@mda.mil

SBIR Direct Line (256) 955-2020

Questions