# NDIA
# MDA SBIR/STTR Industry Day

*07 August 08*

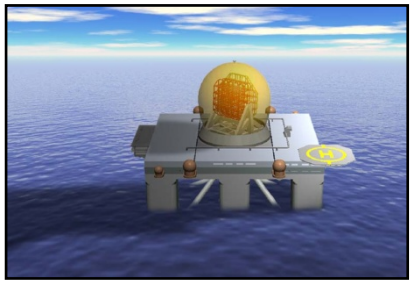
## Innovative Manufacturing Process Improvements

**Dr. Doug Deason  MDA/DEP**

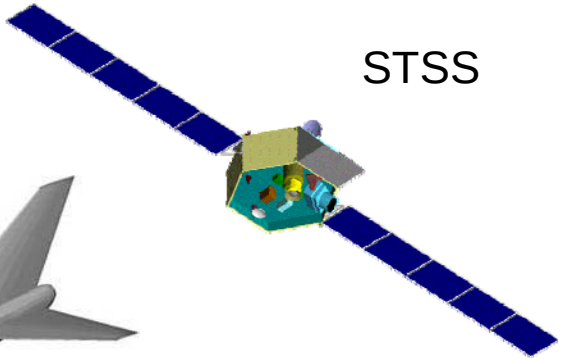
# Agenda

- MDA/DEP Focus
- Topic Being Published
- Key Issues
- Summary of Topic
- Contact Information
- Questions?

# BMDS Elements

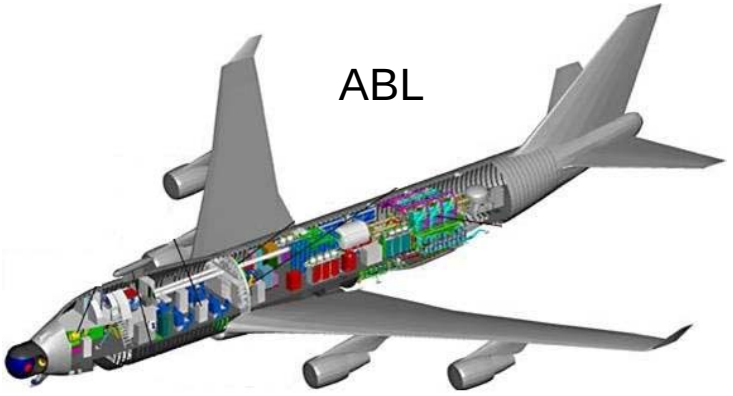


RADAR & RF
(Sensors)

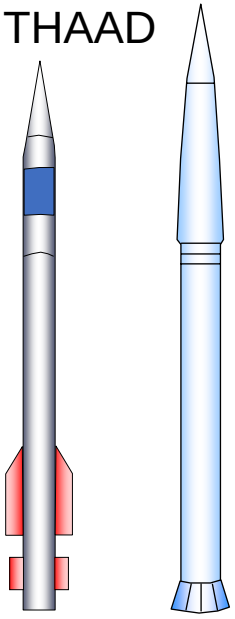


STSS

ABL

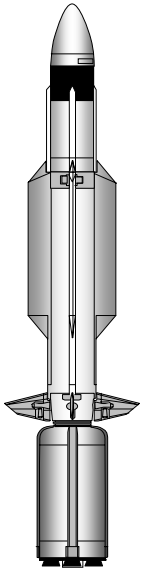


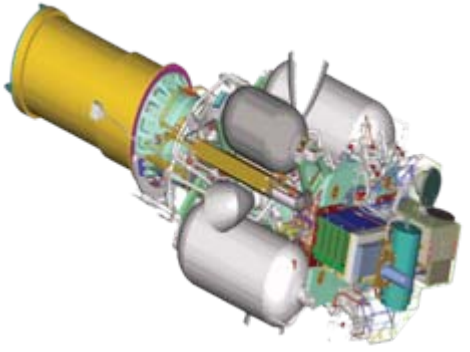
THAAD



PAC-3

SM-3 Aegis BMD





GMD/EKV

# MDA/DEP FOCUS

- BMD System/Element Near Term Spiral Development
  - Potential For Near-Term Insertion (1-3 Years)
  - EMRL Of 3 Or higher
  - Demonstrated Capabilities For Multiple Applications
  - Component Commonality
  - Modularity/Scalability
- Demonstrate Producibility
  - Best Industry Practices
  - Foster Tie-in With MDA Primes, 1st, 2nd, and 3rd Tier

**Focused On Leverage / Cost Sharing**

# Topics:
# Innovative Manufacturing Process Improvements

**Develop and apply innovative manufacturing processes that improve capabilities, sub-systems and component performance, product quality and reliability, reduce unit costs, reduce cycle time, reduce process variability, and enhance manufacturing yields in the following technical areas:**

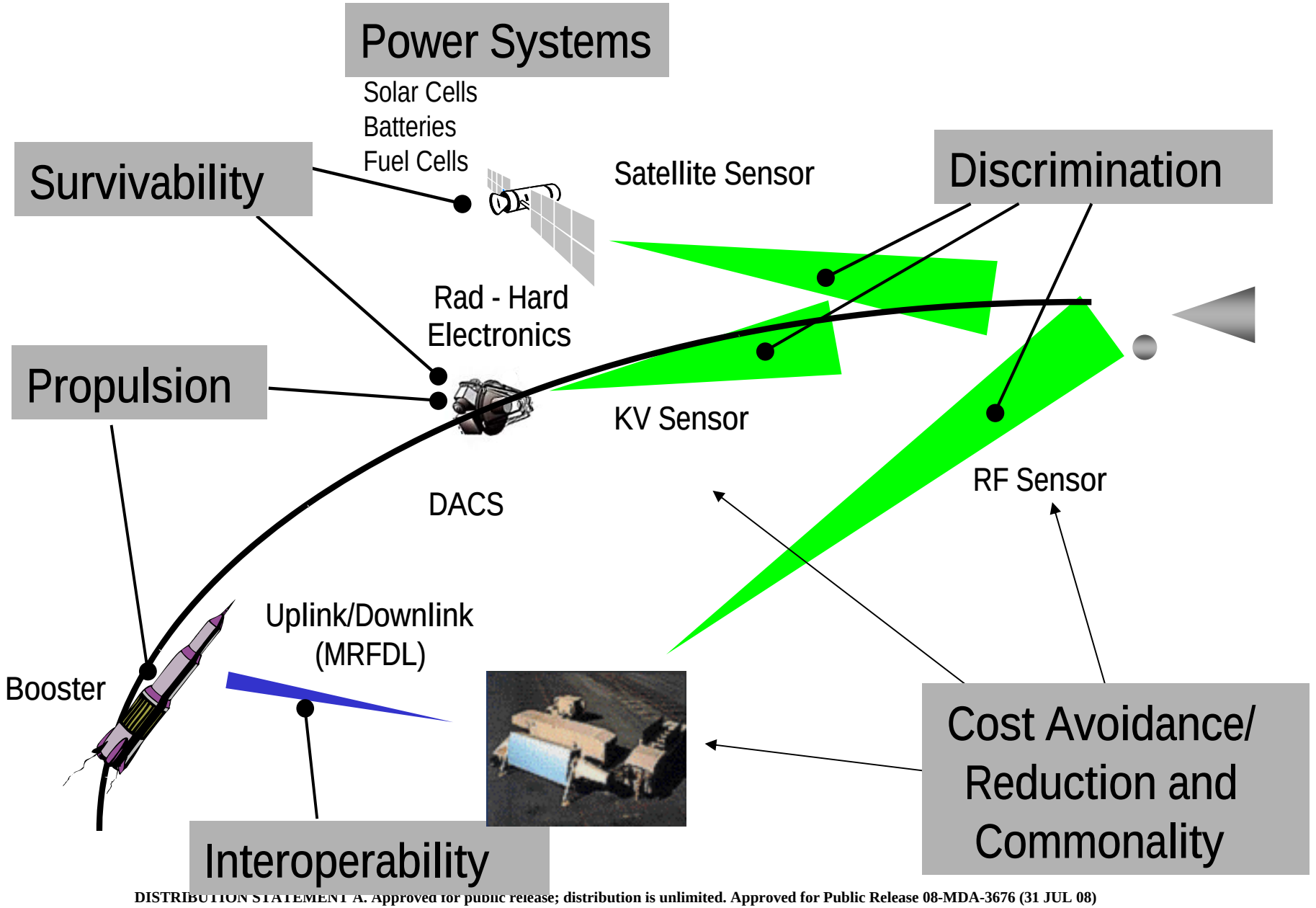
**SBIR**

- Interceptor Propulsion Technology
- Electo-optics
- Advanced Materials
- Continuous Process Improvement
- Power Systems
- Radiation Hardening
- Radar

**STTR**

- Interceptor Sensors
- Tin Whisker Mitigation Technologies
- Packaging and Thermal Management

# Key Issues



# SBIR

# Manufacturing Process Maturation for Propulsion Technology

- **Producibility and cost reduction improvements for low-cost, high-performance materials and components. Reliable performance in both lower and upper boost phases, as well as end game, requires innovative, mature, and reduced-cost manufacturing processes. Applications of interest include solid boost motors as well as solid and liquid propellant divert and attitude control systems.**
- **Areas of Interest:**
  - High temperature, ablation-resistant structural materials
  - Structural insulation materials
  - Non-Structural insulation materials
  - Actuator technology
  - Rayon-based ablatives

# Improved Performance, More Producible Long Wave IR Integrated Dewar Assemblies

- **Demonstrate the use of new materials and processes, to improve mission assurance, while reducing cost and schedule for more radiation tolerance and efficient Long Wave IR ( 8-12 micron ) transmission via more producible integrated dewar assembly designs.**

- **Areas of Interest:**
  - Lower cost materials and processes
  - Reduction in fabrication schedules
  - Alternative ( mechanical, optical and electronic ) design for manufacturing processes

# Advanced Missile Materials and Process Technologies

- **Enhance the performance and/or producibility of missile body structures, components and thermal protection systems for implementation into ballistic missile defense (BMD) systems through development or utilization of novel materials and processes.**
- **Areas of Interest:**
  - Kill Vehicles: Components that optimize composite performance to achieve material properties approximating those of beryllium while maintaining or enhancing producibility, reliability, cost effectiveness, and volume/mass efficiency
  - Aerostructures: Lightweight integrated heat shield and airframe designs which enhance the current thermal protection system (TPS) designs and improve insulative performance of the TPS, lightning strike performance and rain erosion performance

# A Risk Reduction Process for Enhanced Mission Assurance

- **Component reliability is a key element of Mission Assurance. Ensuring that these systems are capable of meeting these high standards for reliability will require a uniquely proactive and continuous approach to identifying potential reliability and material focused effort to continuously survey and assess advanced materials and manufacturing practices.**
- **Areas of Interest:**
  - Improved reliability and vulnerability assessments
  - Monitoring, extrapolation and modeling of future solution scenarios

# Ballistic Missile Defense System
# Innovative Power

- **Improve the quality, reliability and producibility of batteries and related power sources through innovative ideas applied in creative ways to accommodate unique MDA system, subsystem and component requirements.**

- **Areas of Interest:**
  - Improved Manufacturing & Production
  - Primary Reserve Batteries for Missile Applications
  - Aerospace-grade Secondary Lithium Batteries
  - Aerospace Grade Nickel-based Batteries

# Radiation Hardened Producible Manufacturing

- **Provide an increased level of nuclear radiation resistance from damage to integrated circuits that contain electronic semiconductor component feature sizes below 65 nanometer.**

## Areas of Interest:

- Advanced manufacturing design using resistless device processing
- Nanoelectronic materials with shielding capabilities
- Simulation and modeling for below 65 nanometer circuit devices
- Novel radiation mitigation techniques
- Single wafer production processes and prototyping capabilities

# Advanced Nitride Heterostructures for X-Band GaN HEMTs

- **Explore the development of lattice matched, strain free, AlInN/GaN HEMT epitaxial device structures. Initial research has shown that the inclusion of indium enables substantially improved high frequency-power-gain performance over current state of the art AlGaN/GaN.**

## Areas of Interest:

- Optimize growth processes and designs for GaN-based HEMT structures
- Develop growth parameters for Al1-xInxN films on 3-inch substrates
- Defect characterization and elimination
- Deliver epitaxial materials for Government evaluation

# STTR

# Science and Applications of Metamaterials to Interceptor Sensors

- **To investigate existing and potential materials and mechanisms that give rise to totally reflective (referred to as Zero index) and totally transmissive (referred to as negative) refractive index properties; conduct a comparative analysis of their performance; evaluate the transmission, reflection, and absorption characteristics of negative/zero refractive index materials (N/ZRIMs).**
- **Areas of Interest:**
  - Electronic and optical reflection, anti-reflection, and absorbing mechanisms for UV, Visible, Infrared and Radar applications
  - Manufacturing process, testing and qualification of materials

# Tin Whisker Mitigation Technologies for Sn-based Surface Finishes on Electronic Assemblies and Microelectronic Devices

- **Investigate the material properties of Sn-based electrodeposited surface finishes used in electronics fabrication and production that cause the spontaneous growth of "Tin Whiskers." Develop or modify existing test equipment that would enhance the ability to detect the formation of "Tin Whiskers" in electronic assemblies and microelectronic devices.**
- **Areas of Interest:**
  - Improved production processes that retard the formation of whiskers
  - Improved reliability of High Performance Electronics
  - Reduction of electronic failures caused by short circuits from Tin Whiskers

# Improved Packaging and Thermal Management for High Power Electronics and Solid State Lasers

- **Innovative manufacturing materials and processes for addressing MDA applications requiring advanced thermal management techniques to cope with very high thermal stresses associated with high power Wide Band Gap (WBG) amplifiers and power electronics, Traveling Wave Tube Amplifiers (TWTAs), and Solid State Laser Diodes.**
- **Areas of Interest:**
  - High-density packaging
  - Improved thermal management
  - Increased Reliability

# MDA/DEP Expectations

## What MDA/DEP Wants To See In SBIR Responses:

- Demonstration Of New And Innovative Process Technologies That:
  - Reduce Cost,
  - Reduce Manufacturing Cycle Time,
  - Improve Performance, And/Or
  - Improve Reliability
- Technology Roadmaps For Implementing Promising Manufacturing Technology Processes Into Current Or Future Supply Chain
- Plans For Near Term Insertion Into BMD Element Systems, Subsystems, Or Components

# Questions

- Questions after August 24, 2008 need to be submitted through the SBIR/STTR Interactive Topic Information System (SITIS) http://www.dodsbir.net/sitis/
- For reasons of competitive fairness, direct communication between proposers and topic authors is not allowed starting August 25, when DoD begins accepting proposals for this solicitation.
- However, proposers may still submit written questions about solicitation topics in which the questioner and respondent remain anonymous and all questions and answers are posted electronically for general viewing until the solicitation closes.
- All proposers are advised to monitor SITIS (08.3 Q&A) during the solicitation period for questions and answers, and other significant information, relevant to the SBIR 08.3 topic under which they are proposing.

# BACKUP