# STATEMENT OF WORK
# FOR
# MISSILE DEFENSE AGENCY
# BALLISTIC MISSILE DEFENSE SYSTEM (BMDS)
# MISSILE DEFENSE SYSTEM ENGINEERING TEAM (MDSET)
# SYSTEM ENGINEERING AND TECHNICAL ASSISTANCE (SETA) TEAM
# REVISION 1

## 1.0 BACKGROUND

### 1.1 Objective

The Deputy for System Engineering and Integration (DEE), Missile Defense Agency (MDA), is responsible for the design, integration and verification of the Ballistic Missile Defense System (BMDS). Included in this responsibility are the planning and execution of system engineering and integration activities; delivery of the DEE products that define the BMD program's block-focused, capability based, spiral development acquisition approach; oversight of element and component engineering to verify compliance with BMDS parameters; and validation of BMDS block performance.

### 1.2 Scope

**1.2. a** This Statement of Work (SOW) defines the required support for System Engineering and Technical Assistance (SETA) to MDA Systems Engineering as part of the Missile Defense System Engineering Team (MDSET). The MDSET is currently composed of four (4) major communities: (1) Government, (2) Industry, (3) Federally Funded Research and Development Centers/ University Associated Research Centers (FFRDC/UARC), and (4) SETA organizations, plus numerous subcontractors and other agreements. Typically all communities provide some level of support in each functional area listed in section 4. Work share distribution among the team members may differ dependent upon task. An expanded explanation of the MDA systems engineering process is provided in the current version of the System Engineering Plan (SEP).

**1.2. b** The majority of the work is to be performed in the National Capital Region (NCR). Work locations include on-site at Federal Office Building 2, other MDA operating locations, on-site at the Boeing MDSET facility at Crystal Park five, and off-site analysis support at contractor provided facilities. It is anticipated that during the contract optional periods of performance, work will begin to transfer to a new contract vehicle for Huntsville-based systems engineering SETA support, and this transfer will occur in two or three phases as facilities are made available in the Huntsville area. As

contract options are exercised, the phasing/transition requirements will be specified and the Statement of Work (SOW) descoped as necessary.

**1.2.c** The incumbent contractors shall assist the government in the phased transition of work responsibility by transferring relevant technical documents and working files to the new contractor, by supporting technical interchange meetings, and by providing specialized training and instruction on the transitioning functional responsibilities as required. Each phased transition period will last approximately 30 days. During the transition period the incumbents will continue to provide support in that functional area as needed.

### 1.3 The Missile Defense System Engineering Team Role

The Missile Defense System Engineering Team (MDSET) supports the objective defined in Section 1.1 by providing an integrated and layered BMDS architecture; developing block technical definitions; developing block threat definitions, developing element requirements, schedules, and assessment strategies; and other products required to execute the BMDS program. Integration of the BMDS Elements into an integrated and layered BMDS architecture is based on designs from both inside and outside of the MDSET. Block technical definitions, analyses, and assessments of BMDS Block performance and the integration of each of the BMDS blocks are developed based on BMDS capability goals (Technical Objectives and Goals Document (TOG), Statement of Goals (SOG), and the Adversary Capability Document (ACD)). MDSET products are ultimately used to guide and enhance operational BMDS capabilities of the Elements including:

- Ground-based Midcourse Defense (GMD)
- Aegis Ballistic Missile Defense (Aegis BMD)
- Terminal High Altitude Area Defense (THAAD)
- Kinetic Energy Interceptors (KEI)
- Airborne Laser (ABL)
- Multiple Kill Vehicle (MKV)
- Space Tracking and Surveillance System (STSS)
- Sensors
- Command and Control, Battle Management, and Communications (C2BMC)

These are the primary MDSET customers.

### 1.4 Missile Defense System Engineering Team Concept of Operations and Structure

The Government provides both the overall management of the BMDS program and participates within the MDSET itself. Each Contractor will have a lead manager responsible for decisions not otherwise reserved by the Government, e.g. personnel actions, recruiting, parking, salary/benefits, etc. Contract authority for execution of work will flow through the Government, to prime Contractors. Consequently, the appropriate Government Program Office provides direction to all organizations and personnel. The MDSET will operate as an integrated high performance team drawing resources from the range of community contracts available to the MDSET.

The MDSET will operate as a collaborative integrated (Government, FFRDC, SETA and Industry) high performance team. The system engineering and integration of the BMDS shall be conducted using an "Alpha Engineering" process that leverages the Missile Defense System Engineering Team participants. Alpha Engineering is a collaborative effort among all participants in developing Missile Defense System Engineering Team products. It includes selecting the best product lead regardless of affiliation. Competition for development efforts will be at the Element level and will be focused on the success of different technical approaches.

The MDSET will operate under a set of guiding ground rules as. All activities will be collaborative rather than adversarial with open interaction across the entire Government and Industry Team. MDSET members (Government, FFRDC, SETA and Industry) will bring to bear key capabilities, process methodologies, tools and proprietary knowledge of the Missile Defense challenge. All MDSET members will be trusted advisors, providing an honest broker approach to this important work. Proprietary data will be shared freely within the MDSET and will be strictly protected from going outside the firewall. The MDSET will maintain a high performance, product oriented focus.

A "firewall" around the MDNTS, now the MDSET, was set up to prevent conflict of interest, to protect proprietary information, and to ensure the integrity of future competitions. All MDSET personnel are required to sign a non-disclosure agreement. The information infrastructure includes hardware protection and procedures to protect MDSET proprietary and sensitive information. Document marking and procedures for "MDNT Controlled Data" or "MDSET Controlled Data" provide additional protection and formal processes for distribution outside the firewall.

## 2.0 MDSET SETA Teams Inside and Outside the Firewall

The MDSET SETA Teams shall provide leadership and support both inside and outside the firewall. Inside the firewall the MDSET SETA will perform as an integral component of the collaborative MDSET. SETA products inside the firewall will be developed in collaboration with the MDSET Industry component and are designated as collaborative products (CP). Outside the firewall the SETA Team will support MDA/DEE in its MDA wide role, will execute the development of Government-provided BMDS level analysis and documentation and review and manage support of MDSET products and plans as directed by MDA/DEE. SETA products outside the firewall are designated as deliverable products (DP).

## 3.0 General Products

- Hourly Reporting
- Monthly Status Reports
- Funds & Labor Hour Expenditure Report
- Technical Reports, Studies/Services
- Presentation and Briefing Materials
- Draft executive level decision memorandum and guidance letters
- Transition Plan (as required by option)

## 4.0 Missile Defense System Engineering Team - SE&I SETA Objectives

### 4.1 Test Bed Planning

Tasks/Responsibilities

- Develop and maintain the BMDS Technical Objectives and Goals (TOG)
- Develop and maintain the BMDS Systems Engineering Plan (SEP) - (Concepts)
- Develop and maintain the BMDS Test Bed Descriptive Document (TBDD) Levels II & III
- Develop and maintain the technical baseline inputs for the BMDS Statement of Goals (SOG) – Levels II & III
- Develop and maintain the BMDS Concept Descriptions (CD's)
- Develop and maintain the Capability Needs Document (CND's)
- Develop and maintain the Engagement Sequence Groups (ESG's)
- Provide technical support in the development of the MDA Anti-Tamper Policy

- Provide technical input in the development of the Program Objectives Memorandum (POM)
- Support the Prioritized Capabilities List (PCL) Crosswalk development
- Technology Assessment Team (TAT) List support
- High Leverage Capability Needs (HLCN) List support
- Support the Discrimination (White & Blue Teams) briefings
- Support Budget R-DOCS development
- Provide technical support to DEE and BMDS Reviews (i.e. System-level Program and Technical Reviews, Block Architectures, Immersion Days)
- Provide technical support to the Element-level Tabletops
- Provide technical support for various MDA Working Groups, including: Discrimination Working Group (DWG), Response for Director's Memorandum (RDM) WG, Concept Description Working Group (CDWG), Technology Assessment Team (TAT) WG

Products

| | |
|---|---|
| • Technical baseline inputs for the TOG | DP |
| • Technical baseline inputs for SOG Level II & III | DP |
| • System Engineering Plan (SEP) | CP |
| • Test Bed Descriptive Document (TBDD) Levels II & III | CP |
| • Concept Descriptions (CD's) | CP |
| • Engagement Sequence Groups (ESG's) | CP |
| • Capability Needs Document | CP |

## 4.2 Threat System Engineering

### 4.2.1 Threat Systems Engineering Core

Tasks/Responsibilities

- Identify and define threat systems that will support the design, verification, and assessment of a BMDS Block
- Coordinate development of threat products with BMDS Element Program Offices, other MDA organizations and contractor organizations
- Consolidate and distribute threat products to support BMDS Block design, verification and assessment
- Develop and maintain BMDS Block specific vignettes/scenarios to support BMDS verification and assessment

- Support Threat System Engineering sub group to System Engineering and Integration Council (SEIC)
- Planning, execution, delivery, and user support of adversary characterization products
- Planning, execution, and administering of the MDA Corporate Lethality program (CLP)
- System analysis and assessment of Ballistic Missile Defense System (BMDS) lethality, consequence mitigation (collateral effects), kill assessment and warhead typing capabilities
- Chair Lethality Sub-Group (LSG) to the SEIC
- Technical and administrative support to the MDA international lethality programs with the United Kingdom, Germany and other nations as required

Products

| | |
|---|---|
| • Block Specific vignettes/scenarios | CP |
| • Adversary Capability Document (ACD) | CP |
| • Adversary Data Packages (ADP) | CP |
| • BMDS Lethality Program Plan | DP |
| • MDA Lethality Standard | DP |
| • BMDS Lethality Effectiveness Assessments | DP |
| • Lethality effects analyses | DP |

4.2.2 Threat Systems Engineering Program (TSEP)

Tasks/Responsibilities

- Map BMDS functions to threat properties
- Select Threat Systems and define parameter bounds for a given BMDS Build
- Develop Countermeasure Suite Description
- Administrate the Threat Systems Engineering Sub Group (TSESG)
- Conduct Quick Reaction Analysis
- Provide Threat data for BMDS Test
- Check Data Integrity
- Support Scenarios Development
- Maintain Knowledge of BMDS
- Maintain Threat System Engineering Library (TSEL)
- Ensure Proper Threat Product Classification
- Threat Systems Engineering Technical Exchange

Products

- Adversary Capability Document
- Build-specific Adversary Data Packages

Program Management

- Implement a disciplined management process to develop threat related documents such as, the Adversary Capability Document (ACD) and Build-specific Adversary Data Packages (ADP)
- Assume the responsibility to coordinate input from other MDA executing agencies to develop threat products
- Responsible for the production and distribution of threat documents on the direction of the MDA/DEE
- Coordinate the threat documents within MDA/DEE as well as other MDA organizations to ensure timely input and consistency with other system engineering related documents, such as the System Engineering Plan, BMDS Description Document, and BMDS System Specification
- Apply Configuration Management principles to mange product baselines
- Apply Risk Management processes to manage risks associated with program execution
- Develop Schedule to plan product deliveries and other milestones
- Develop Product Development Plans to manage resources and threat data input developed by other MDA executing agencies for incorporation into threat products
- Schedule and Present a Quarterly Program Review to provide detail presentation of the status of products under development and communicate the status of the aforementioned program management areas

## 4.3 Design and Specifications

Tasks/Responsibilities

- Develop and maintain the technical baseline inputs for the SOG - Level I
- Develop and maintain the Test Bed Description Document (TBDD) – Level I only
- Develop and maintain the BMDS Architecture Views: Functional, Technical, Information and Systems
- Develop and maintain the Test Bed System Specification (TBSS)
- Develop and maintain the Interface Control Documents (ICDs) Part 1
- Develop and maintain the Interface Expectations Document (IED)
- Develop and maintain the MDA Unique Core Standards:

- High Altitude Exo-Atmospheric Nuclear Survivability (HAENS) Standard, MDA-STD-001
- Nuclear, Biological, and Chemical Contamination Survivability (NBCCS) Standard, MDA-STD-003
- BMD Position, Navigation, and Time (PNT) Standard
- BMDS XML Standard

- Provide technical support to the Program Objectives Memorandum (POM) development
- Provide technical support to DEE and BMDS Reviews (i.e. System-level Capability and Design Reviews for Block design, Technical Reviews, Table Tops, Technical Interchange Meetings (TIMs), Coordination Meetings)
- Provide technical support for various MDA Working Groups including the System Engineering and Integration Council (SEIC), the BMDS Interface Control Working Group, and the Warfighter Involvement Process (WIP) Architecture and Engineering Focus Group

Products

| | |
|---|---|
| • TBDD Level I only | CP |
| • Technical program baseline inputs for SOG Level I | DP |
| • BMDS Architecture Views (Functional, Technical, Information and Systems) | CP |
| • TBSS | CP |
| • ICD's Part 1 | CP |
| • IED | CP |
| • Design Core Standards (HAENS, NBCCS, BMD PNT, and BMDS XML) | CP |

## 4.4 System Assessment and Analysis Engineering

Tasks/Responsibilities

- Provide BMDS focus and conduct cross system-block/element analyses to support development and balancing of an integrated layered defense
- Conduct effectiveness analysis to establish expected BMDS capability
- Conduct assessments to support annual system-block and element reviews
- Support U.S., U.K., NATO, Turkey, Germany and other Allies interoperability studies, assessments, and projects as directed

- Develop and maintain the MDA Effectiveness Metrics Standard, MDA-STD-002
- Define requirements for BMDS engineering level M&S

Products

| | |
|---|---|
| • Architecture Roadmap, Trade Studies and Capability Assessments | CP |
| • Element/Component Characterization Analyses | CP |
| • TOG analyses | DP |
| • TBDD/TBSS analyses | CP |
| • ACD/ADP parameter sensitivity analysis | DP |
| • Blue Team (CCM performance assessment) | CP |
| • MDA quick reaction analyses | DP |
| • Capability assessments | CP |
| • MDA Effectiveness Metrics Standard | DP |
| • Annual review support | CP |
| • M&S plan/ Catalog | CP |

## 4.5 Integration and Test Planning

Tasks/Responsibilities

- Develop BMDS long range test objectives
- Develop BMDS event specific test objective letters
- Develop requirements for collection/acquisition of phenomenology data
- Develop assessment and verification scenarios for each Block
- Develop, publish, and maintain the Master Integration Plan (MIP)
- Provide support to the MDA DFI and Integrated Support Group (ISG) as required
- Conduct weekly SEIWG meetings
- Lead Joint Analysis Group (JAG) for ESG expected performance prediction for those ESG's requiring multiple Elements to execute.
- Attend Element and Component technical design reviews to ensure compliance with BMDS system level specifications
- Conduct interim design reviews (IDRs) and system design reviews (SDRs) for the Director of Engineering (DE) and Deputy for Fielding (DF)

Products

| | |
|---|---|
| • BMDS Interface Summaries | CP |
| • BMDS Long Range Test Objectives | CP |

- BMDS Event Test Letters CP
- BMDS Master Integration Plan CP

## 4.6 Test Execution and Engineering Support

Task/Responsibilities

- Provide Engineering and Analysis support to MDA Director of Test (DT)
- Attend test design reviews
- Attend executive test and mission data reviews
- Participate in flight test, ground test, wargames and exercises as required
- Participate in joint analysis team to characterize test results
- Manage the system issues process to disposition test incident reports (as part of the SEIWG)
- Maintain, publish, and update the Integration Event Matrix (IEM)
- Publish the System Impact Assessment report (SIAR) following major test or analysis events
- Support DEE as co-chair of the Test Configuration Working Group
- Participate in the Test Requirement Working Group and the Integrated Master Test Plan (IMTP) Working Group
- Conduct test event scenario certification

Products

- System Impact Assessment Report CP
- Integration Event Matrix CP
- Test Event Scenario Certification CP

## 4.7 Verification and Assessment

Tasks/Responsibilities

- Establish and maintain BMDS specification trace in DOORS to support development of test objectives, allocation of shalls to test events, and report verification results
- Track assessment and verification status of BMDS, report status at Operational Test Agency (OTA) Senior Leadership Meeting and BMDS Readiness Reviews (BRR)
- Publish BMDS Capability Assessment Plan (CAP) for BMDS Block assessment

- Develop Model and Simulation (M&S) Requirements for BMDS Verification/Assessment and provide to MDA DES
- Publish Interim Capability Assessment Report (ICAR)
- Provide engineering assessment to support partial Mission capability declaration of ESG's
- Support Incremental Capability reviews (ICR)
- Conduct BMDS Verification Working Group Meetings as needed

Products

- BMDS Verification/Assessment M&S requirements CP
- BMDS Capability Assessment Plan CP
- ICAR CP

## 4.8 Target Requirements

Tasks/Responsibilities

- Influence the creation of and conduct assessments concerning Target System Capability Documents (TSCDs)
- Develop requirements for physical targets –ground and flight test – that are traceable to test objectives
- Transfer information within the Adversary Capabilities Document (ACD), ADP, TBSS, TBDD, and CAP into required target capabilities
- Support target capabilities planning across BMDS blocks
- Support target forums to resolve Target Capability Specification (TCS), TSCD, and Target Program Baseline issues.

Products

- Target Capability Specification CP
- Target System Capability Documents CP

## 4.9 Operational Integration and Support

Tasks/Responsibilities

- Support the Integrated Support Group (ISG) and Program Change Board (PCB)
- Support the Change Assessment Group Processes
- Serve as a focal point for System Engineering (DEE) actions compiled by the MDA Operations Center (MOC)

- Support review of programmatic documentation (e.g., Concept of Operations (CONOPS) documents, BMDS Handbook, etc.)
- Support the WIP by participating in focus groups and integrated process teams (IPTs)
- Support warfighter surveys to collect and disseminate user input and feedback on the BMDS for incorporation into the collaborative SE process
- Communicate DEE concepts and analysis to users and stakeholders
- Develop and conduct Incremental Capabilities Reviews (ICRs)
- Maintain operational system configuration control
- Support implementation of the MDA System Engineering Process (SEP)
- Act as a DEE liaison for training tools
- Participate in the Joint Warfighter Support program and act as a DEE liaison for joint or service exercises, wargames, seminars, and immersion days

Products

| | |
|---|---|
| • Operational Configuration Baseline (OCB) | CP |
| • Prioritized Capabilities List (PCL) Response | CP |
| • Decision Memorandum 5 | CP |
| • Change Assessment Group (CAG) analyses | CP |

### 4.10 International

Tasks/Responsibilities:

- Represent the System Engineer in International Forums
- Perform and coordinate International Studies and Analysis
- Support and coordinate International Meetings
- Facilitate OCONUS / International Technical Interactions
- Perform International Disclosures Reviews
- Review contents of proposed Memorandum of Understanding (MOU) / Memorandum of Agreement (MOA)
- Provide International Tasker Support

Products

| | |
|---|---|
| • Technical Reports, Studies /Services | CP |
| • Presentation and Briefing Materials | CP |

### 4.11 Program Control

Tasks/Responsibilities

- Personnel management
- POM/budget preparation and current year execution
- Monitor/respond to congressional Questions For Record (QFR)
- Data management
- Provide PPBES support to DEE
- Provide support for external inquiries (to include Congress, Media)
- Provide logistics, security and information technology coordination
- Provide DEE Front Office support
- Provide MDA task support (E-Stars/E-Tasker)

Products

| | |
|---|---|
| • MDA/DEE work breakdown structure | DP |
| • Data library | DP |
| • Request for information to industry | DP |
| • Badge/space request | DP |
| • Personnel actions (EPRs, OPRs, Position Requisitions) | DP |
| • IMP/IMS | CP |
| • Life cycle cost ROMs | DP |

### 4.12 Focus Areas & Discipline Experts

Focus Areas

- Corporate Counter Measure (CM)/ Counter-counter Measure (CCM)
- BMDS Black Team
- Corporate Risk Support to DEA
- DEE Document Configuration Control

Tasks/Responsibilities

- Conduct a BMDS corporate CM/ CCM program
- Establish and execute the BMD system level risk management process
- Conduct black team assessments
- Establish and execute the DEE system level risk management process

Products

| | |
|---|---|
| • BMDS Risk Assessment and Management | CP |
| • System support plan | CP |
| • Red, Blue, White, and Black Team assessments | DP |

contract options are exercised, the phasing/transition requirements will be specified and the Statement of Work (SOW) descoped as necessary.

**1.2.c** The incumbent contractors shall assist the government in the phased transition of work responsibility by transferring relevant technical documents and working files to the new contractor, by supporting technical interchange meetings, and by providing specialized training and instruction on the transitioning functional responsibilities as required. Each phased transition period will last approximately 30 days. During the transition period the incumbents will continue to provide support in that functional area as needed.

### 1.3 The Missile Defense System Engineering Team Role

The Missile Defense System Engineering Team (MDSET) supports the objective defined in Section 1.1 by providing an integrated and layered BMDS architecture; developing block technical definitions; developing block threat definitions, developing element requirements, schedules, and assessment strategies; and other products required to execute the BMDS program. Integration of the BMDS Elements into an integrated and layered BMDS architecture is based on designs from both inside and outside of the MDSET. Block technical definitions, analyses, and assessments of BMDS Block performance and the integration of each of the BMDS blocks are developed based on BMDS capability goals (Technical Objectives and Goals Document (TOG), Statement of Goals (SOG), and the Adversary Capability Document (ACD)). MDSET products are ultimately used to guide and enhance operational BMDS capabilities of the Elements including:

- Ground-based Midcourse Defense (GMD)
- Aegis Ballistic Missile Defense (Aegis BMD)
- Terminal High Altitude Area Defense (THAAD)
- Kinetic Energy Interceptors (KEI)
- Airborne Laser (ABL)
- Multiple Kill Vehicle (MKV)
- Space Tracking and Surveillance System (STSS)
- Sensors
- Command and Control, Battle Management, and Communications (C2BMC)

These are the primary MDSET customers.

### 1.4 Missile Defense System Engineering Team Concept of Operations and Structure

The Government provides both the overall management of the BMDS program and participates within the MDSET itself. Each Contractor will have a lead manager responsible for decisions not otherwise reserved by the Government, e.g. personnel actions, recruiting, parking, salary/benefits, etc. Contract authority for execution of work will flow through the Government, to prime Contractors. Consequently, the appropriate Government Program Office provides direction to all organizations and personnel. The MDSET will operate as an integrated high performance team drawing resources from the range of community contracts available to the MDSET.

The MDSET will operate as a collaborative integrated (Government, FFRDC, SETA and Industry) high performance team. The system engineering and integration of the BMDS shall be conducted using an "Alpha Engineering" process that leverages the Missile Defense System Engineering Team participants. Alpha Engineering is a collaborative effort among all participants in developing Missile Defense System Engineering Team products. It includes selecting the best product lead regardless of affiliation. Competition for development efforts will be at the Element level and will be focused on the success of different technical approaches.

The MDSET will operate under a set of guiding ground rules as. All activities will be collaborative rather than adversarial with open interaction across the entire Government and Industry Team. MDSET members (Government, FFRDC, SETA and Industry) will bring to bear key capabilities, process methodologies, tools and proprietary knowledge of the Missile Defense challenge. All MDSET members will be trusted advisors, providing an honest broker approach to this important work. Proprietary data will be shared freely within the MDSET and will be strictly protected from going outside the firewall. The MDSET will maintain a high performance, product oriented focus.

A "firewall" around the MDNTS, now the MDSET, was set up to prevent conflict of interest, to protect proprietary information, and to ensure the integrity of future competitions. All MDSET personnel are required to sign a non-disclosure agreement. The information infrastructure includes hardware protection and procedures to protect MDSET proprietary and sensitive information. Document marking and procedures for "MDNT Controlled Data" or "MDSET Controlled Data" provide additional protection and formal processes for distribution outside the firewall.