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Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Missile Defense Agency **Date:** March 2014

Appropriation/Budget Activity 0400: <i>Research, Development, Test & Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	R-1 Program Element (Number/Name) PE 0603175C / <i>Ballistic Missile Defense Technology</i>
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COST (\$ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
Total Program Element	67.921	69.438	9.321	-	-	-	-	-	-	-	-	146.680
MD25: <i>Advanced Technology Development</i>	67.484	66.024	-	-	-	-	-	-	-	-	-	133.508
MD40: <i>Program Wide Support</i>	0.437	3.414	9.321	-	-	-	-	-	-	-	-	13.172

MDAP/MAIS Code: 362

The FY 2015 OCO Request will be submitted at a later date.

Note

Beginning in FY 2014, the following efforts transferred from the Ballistic Missile Defense Technology Program Element 0603175C, per the FY 2014 Consolidated Appropriations Act (P.L. 113-76).

- Advanced Concepts and Performance Assessment moved to Advanced Concepts and Performance Assessment Program Element 0603176C
- Discrimination Sensor Technology moved to Discrimination Sensor Technology Program Element 0603177C
- Weapons Technology moved to Weapons Technology Program Element 0603178C
- Advanced Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) moved to Advanced C4ISR Program Element 0603179C
- Advanced Research moved to Advanced Research Program Element 0603180C
- Common Kill Vehicle Technology moved to Common Kill Vehicle Technology Program Element 0603294C

A. Mission Description and Budget Item Justification

The Ballistic Missile Defense (BMD) Technology Program Element develops future Ballistic Missile Defense System (BMDS) capabilities to out-pace emerging and evolving threats. Advanced Technology is the program execution arm of MDA's Architecture and Engineering thrusts. Advanced Technology identifies, develops, and readies for transition in association with the Chief Architect and the Director of Engineering the technical solutions that meet BMDS shortfalls identified by the Combatant Commanders. Advanced technology maintains a robust modeling and simulation environment to ensure emerging technology, cost-effectively increases performance when inserted into the BMDS architecture.

MD40 Program-Wide Support (PWS) consists of essential non-headquarters management costs in support of the MDA functions and activities across the entire Ballistic Missile Defense System (BMDS). MD40 PWS transfers to the new Technology Program Elements, 0603176C, 0603177C, 0603178C, 0603179C, 0603180C beginning in FY 2015.

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Appropriation/Budget Activity 0400: <i>Research, Development, Test & Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	R-1 Program Element (Number/Name) PE 0603175C / <i>Ballistic Missile Defense Technology</i>
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B. Program Change Summary (\$ in Millions)	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO	FY 2015 Total
Previous President's Budget	79.975	309.203	212.715	-	212.715
Current President's Budget	69.438	9.321	-	-	-
Total Adjustments	-10.537	-299.882	-212.715	-	-212.715
• Congressional General Reductions	-0.100	-			
• Congressional Directed Reductions	-4.000	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-299.882			
• Reprogrammings	0.600	-			
• SBIR/STTR Transfer	-0.657	-			
• Other Adjustment	-6.380	-	-212.715	-	-212.715

Change Summary Explanation

The FY 2014 and FY 2015 reductions in this Program Element are the net result of the transfer of all efforts, per the FY 2014 Consolidated Appropriations Act (P.L. 113-76), to the following Program Elements:

- Advanced Concepts and Performance Assessment moved to Advanced Concepts and Performance Assessment Program Element 0603176C
- Discrimination Sensor Technology moved to Discrimination Sensor Technology Program Element 0603177C
- Weapons Technology moved to Weapons Technology Program Element 0603178C
- Advanced Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) moved to Advanced C4ISR Program Element 0603179C
- Advanced Research moved to Advanced Research Program Element 0603180C
- Common Kill Vehicle Technology moved to Common Kill Vehicle Technology Program Element 0603294C

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Exhibit R-2A, RDT&E Project Justification: PB 2015 Missile Defense Agency **Date:** March 2014

Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603175C / <i>Ballistic Missile Defense Technology</i>	Project (Number/Name) MD25 / <i>Advanced Technology Development</i>
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COST (\$ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
MD25: <i>Advanced Technology Development</i>	67.484	66.024	-	-	-	-	-	-	-	-	-	133.508

The FY 2015 OCO Request will be submitted at a later date.

Note

N/A

A. Mission Description and Budget Item Justification

Beginning in FY 2014, the following efforts transferred from the Ballistic Missile Defense Technology Program Element 0603175C, per the FY 2014 Consolidated Appropriations Act (P.L. 113-76).

- Advanced Concepts and Performance Assessment moved to Advanced Concepts and Performance Assessment Program Element 0603176C
- Discrimination Sensor Technology moved to Discrimination Sensor Technology Program Element 0603177C
- Weapons Technology moved to Weapons Technology Program Element 0603178C
- Advanced Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) moved to Advanced C4ISR Program Element 0603179C
- Advanced Research moved to Advanced Research Program Element 0603180C
- Common Kill Vehicle Technology moved to Common Kill Vehicle Technology Program Element 0603294C.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2013	FY 2014	FY 2015
Title: Enhanced Command, Control, Battle Management and Communication	44.735	-	-
Description: Beginning in FY 2014, the Enhanced Command, Control, Battle Management and Communication effort transferred from the Ballistic Missile Defense Technology Program Element 0603175C.			
FY 2013 Accomplishments:			
-Completed maturation and testing of new Ballistic Missile Defense System (BMDS) Overhead Persistent Infrared (OPIR) Architecture (BOA) baseline release (BBR 5.1 Spiral 2) to support Spiral 8.2 integration and testing.			
-Conducted System Requirements Review and established technical baseline requirements for advanced Command, Control, Battle Management and Communication (C2BMC) technology to support European Phased Adaptive Approach (EPAA) Phase 3.			
-Completed remote sensor technology and Space Tracking and Surveillance System (STSS) integration prototype development and evaluation and successfully demonstrated the technology during a live fire event.			

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Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603175C / <i>Ballistic Missile Defense Technology</i>	Project (Number/Name) MD25 / <i>Advanced Technology Development</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2013	FY 2014	FY 2015
<p>-Continued University research on an agent-based architecture construct and incorporated independent assessments of prototype framework.</p> <p>-Investigated advanced sensor resource management, remote optical characterization, real-time missile classification algorithms, battle management, data fusion, and threat typing through Small Business Innovative Research Phase 1, Phase 2, and Rapid Integration Fund efforts.</p> <p>-Utilized a small business developed advanced sensor resource management prototype to support (OPIR) planning/tasking analysis.</p> <p>-Initiated the Simultaneous Correlation of Unambiguous Tracks (SCOUT) prototype and continued discrimination functionality exploitation within an advanced C2BMC prototype to support object attribute determination.</p> <p>-Completed integration and began utilization of GEO Scanner satellite data feeds into a track generation prototype to expand the Radio Frequency (RF) sensor cueing ability of the BMDS OPIR Architecture (BOA) thereby improving the raid capacity of the RF sensors.</p> <p>-Developed architecture concepts to support a robust infrared sensor cueing capability through the Joint OPIR Ground initiative.</p> <p>-Initiated algorithm development for hit assessment and continued mid-course tracking algorithm improvements and boost phase tracking algorithm enhancements.</p> <p>-Initiated engineering design and development for BMDS OPIR Architecture (BOA) 6.1 to address EPAA Phase 3 requirements.</p> <p>FY 2014 Plans:</p> <p>- FY 2014 plans and accomplishments are captured in the Advanced Command and Control, Battle management & Communication Program Element, 0603896C.</p> <p>FY 2015 Plans:</p> <p>N/A</p>			
<p>Title: Advanced Concepts & Performance Assessment</p> <p>Description: Beginning in FY 2014, the Advanced Concepts and Performance Assessment effort transferred from the Ballistic Missile Defense Technology Program Element 0603175C to the Advanced Concepts and Performance Assessment Program Element 0603176C, per the FY 2014 Consolidated Appropriations Act (P.L. 113-76).</p> <p>FY 2013 Accomplishments:</p> <p>-Beginning in FY 2013, Advanced Technology Modeling and Simulation was centralized in this accomplishment area for efficiencies and budget clarity</p> <p>- Defined realistic parameters for the Standard Missile-3 Block IIB and Common Kill Vehicle (CKV) efforts using common modeling and simulation infrastructure</p>	1.920	-	-

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Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603175C / <i>Ballistic Missile Defense Technology</i>	Project (Number/Name) MD25 / <i>Advanced Technology Development</i>

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2013	FY 2014	FY 2015
<p>- Examined the performance of seeker alternatives for an EKV redesign against a complex multi-object scenario. For CKV Phase II activities, completed development/testing of models to evaluate multi-KV functionality and an imaging seeker with onboard discrimination algorithms</p> <p>-Initiated development of a government-owned Modular open Kill Vehicle Architecture (MoKVA) in the Rational Rhapsody framework. Making it easier to develop and integrate advanced component systems; effectively and affordably improving missile system performance for advanced KV's</p> <p>-Continued developing the Simitar framework, focused on implementing the contractor models enabling government system-level analysis of the competing concepts</p> <p>-Stimulated CKV and other advanced technology concepts by producing a suite of Simitar framework generic tracker models, including a generic infrared sensor model, C2BMC cue generator model, and enhanced table driven platform models</p> <p>-Completed prototyping a Simitar to Single Stimulation Framework (SSF) integration</p> <p>-Developed and implemented analytic tools and mathematical models for advanced sensor performance assessment/expectations prior to Flight Test Mission (FTM) 20 and 21</p> <p>-Worked with and incorporated Small Business Innovative Research (SBIR) and University Research modeling and simulation products into assessment toolkits which integrated optimization and reduced model runtime, extended predictive tracking capabilities for future concept studies, and which addressed model replicability eventually leading to increased model reuse and improved validation</p> <p>-Conducted internal benchmarking simulation exercises and a yearly internal modeling and simulation review to update analysis and model requirements for emerging program concepts</p> <p>FY 2014 Plans:</p> <p>- FY 2014 plans and accomplishments are captured in the Advanced Concepts and Performance Assessment Program Element, PE 0603176C.</p> <p>FY 2015 Plans:</p> <p>N/A</p>			
<p>Title: Discrimination Sensor Technology</p> <p>Description: Beginning in FY 2014, the Discrimination Sensor Technology effort transferred from the Ballistic Missile Defense Technology Program Element 0603175C to the Discrimination Sensor Technology Program Element 0603177C, per the FY 2014 Consolidated Appropriations Act (P.L. 113-76).</p> <p>FY 2013 Accomplishments:</p> <p>FY 2013 Accomplishments are captured in the Advanced Remote Sensor Technology Program Element (0604886C).</p> <p>FY 2014 Plans:</p>	-	-	-

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Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603175C / <i>Ballistic Missile Defense Technology</i>	Project (Number/Name) MD25 / <i>Advanced Technology Development</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2013	FY 2014	FY 2015
- FY 2014 plans and accomplishments are captured in the Discrimination Sensor Technology Program Element, 0603177C. FY 2015 Plans: N/A				
Title: Weapons Technology Description: Beginning in FY 2014, the Weapons Technology effort transferred from the Ballistic Missile Defense Technology Program Element 0603175C to the Weapons Technology Program Element 0603178C, per the FY 2014 Consolidated Appropriations Act (113-76). FY 2013 Accomplishments: FY 2013 Accomplishments are captured in the Directed Energy Research Program Element (0603901C) and in the Standard Missile-3 Block IIB Program Element (0603902C). FY 2014 Plans: - FY 2014 plans and accomplishments are captured in the Weapons Technology Program Element, 0603178C. FY 2015 Plans: N/A		-	-	-
Title: Advanced Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance Description: Beginning in FY 2014, the Advanced Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) effort transferred from the Ballistic Missile Defense Technology Program Element 0603175C to the Advanced C4ISR Program Element 0603179C, per the FY 2014 Consolidated Appropriations Act, 2014 (P.L. 113-76). FY 2013 Accomplishments: N/A FY 2014 Plans: - FY 2014 plans and accomplishments are captured in the Advanced C4ISR Program Element, 0603179C. FY 2015 Plans: N/A		-	-	-
Title: Advanced Research		19.369	-	-

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2013	FY 2014	FY 2015
<p>Description: Beginning in FY 2014, the Advanced Research effort transferred from the Ballistic Missile Defense Technology Program Element 0603175C to the Advanced Research Program Element 0603180C, per the FY 2014 Consolidated Appropriations Act (P.L. 113-76).</p> <p>FY 2013 Accomplishments:</p> <p>University Engagement</p> <ul style="list-style-type: none"> --Awarded Advanced Research contracts to domestic universities for innovative early intercept investigations: --Texas A&M University: Ignition of composite propellants with advanced additives --University of Alabama in Huntsville: Environmentally friendly oxidizer development --University of New Hampshire: Gas circulator for Diode Pumped Alkali Laser <p>--Managed advanced research of ongoing university contracts:</p> <ul style="list-style-type: none"> --Alabama A&M University: Computational algorithms using reconfigurable logic devices --Auburn University: Radar signal processing for multi sensor, multi target tracking --Clemson University: Power scaling capability of High Power Fiber Laser Research --John Hopkins University: Optical signature models --Texas A&M University: Solid Propellant Additives for Divert Attitude Control System (DACS) Applications --Texas A&M University: Hybrid Waveguide/Micro Electro Mechanical System Optical Signal Processor --U.S. Air Force Academy: Scaling Diode Pumped Alkali Lasers for higher power output --University of Alabama Huntsville: Computational studies of aero-optic effects of higher Reynolds numbers gas flows over sensor structures. --University of Connecticut: Radar signal process and sensor fusion --University of Illinois: Optimal engagement planning --University of Southern California: Algorithms for detection, track, and classification of objects in a high debris environment <p>International Research</p> <ul style="list-style-type: none"> --Leveraged University-to-University (UUR) International Research opportunities with allied nations to enhance BMDS Advanced Technology initiatives and build stronger relationships with North Atlantic Treaty Organization (NATO) partner countries and our allies: --Auburn University/Middle East Technical University, Turkey: Integrated framework for engineering replicability into high assurance Ballistic Missile Defense System (BMDS) simulations --University of Nebraska/University of Rouen, France: Polymer parts with tailored microstructure distribution --University of Nebraska/University of Bordeaux, France: Fast deposition of diamond films in open air 			

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2013	FY 2014	FY 2015
<p>-Completed negotiations with Denmark to assess the utility of the Weibel Frequency Modulated Continuous Wave Radar (FNCWR) Transitioned Research</p> <p>-Facilitated delivery of radome test units to the Israeli Program for use in David's Sling system</p> <p>-Facilitated delivery of two 24 inch silicon carbide mirrors, developed by TREX Enterprises Corporation under an Advanced Technology Innovation Broad Agency Announcement contract, to L3 for use on an airborne data collector for the Ballistic Missile Defense System</p> <p>-Transitioned nine SBIR developed technologies to the Rapid Innovation Funding program for accelerated development and transition to the Ballistic Missile Defense System.</p> <p>-Delivered a "Propulsion Stability Model for Small Thrusters", developed under a SBIR contract, to Terminal High Altitude Area Defense (THAAD) Program</p> <p>Other Efforts</p> <p>-Managed the Small Business Innovation Research (SBIR) and Technology Applications programs to assist MDA-funded technology developers in finding and entering technology transfer opportunities to missile defense applications</p> <p>-Conducted System Engineering to identify initiatives and technology to defend against current and future threats</p> <p>FY 2014 Plans: - FY 2014 plans and accomplishments are captured in the Advanced Research Program Element, PE 0603180C.</p> <p>FY 2015 Plans: N/A</p>			
Accomplishments/Planned Programs Subtotals	66.024	-	-

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2013</u>	<u>FY 2014</u>	<u>FY 2015</u> <u>Base</u>	<u>FY 2015</u> <u>OCO</u>	<u>FY 2015</u> <u>Total</u>	<u>FY 2016</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• 0603294C: <i>Common Kill Vehicle Technology</i>	-	70.000	25.639	-	25.639	33.171	37.348	38.454	54.256	Continuing	Continuing
• 0603881C: <i>Ballistic Missile Defense Terminal Defense Segment</i>	267.396	255.918	299.598	-	299.598	221.008	288.405	286.421	273.365	Continuing	Continuing
• 0603884C: <i>Ballistic Missile Defense Sensors</i>	306.896	366.590	392.893	-	392.893	462.030	448.763	403.272	368.125	Continuing	Continuing

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Appropriation/Budget Activity 0400 / 3				R-1 Program Element (Number/Name) PE 0603175C / <i>Ballistic Missile Defense Technology</i>				Project (Number/Name) MD25 / <i>Advanced Technology Development</i>			

C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2013</u>	<u>FY 2014</u>	<u>FY 2015</u>	<u>FY 2015</u>	<u>FY 2015</u>	<u>FY 2016</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>Cost To</u>	
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	<u>Total Cost</u>
• 0603893C: <i>Space Tracking and Surveillance System</i>	45.420	40.347	31.346	-	31.346	33.697	34.542	35.317	36.316	Continuing	Continuing
• 0603896C: <i>Ballistic Missile Defense Command and Control, Battle Management & Communication</i>	344.431	405.319	443.484	-	443.484	456.182	462.525	452.937	465.638	Continuing	Continuing
• 0603907C: <i>Sea Based X-Band Radar (SBX)</i>	23.703	44.478	64.409	-	64.409	57.081	58.975	64.759	63.016	Continuing	Continuing

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2015 Missile Defense Agency **Date:** March 2014

Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603175C / <i>Ballistic Missile Defense Technology</i>	Project (Number/Name) MD40 / <i>Program Wide Support</i>
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COST (\$ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
MD40: <i>Program Wide Support</i>	0.437	3.414	9.321	-	-	-	-	-	-	-	-	13.172

The FY 2015 OCO Request will be submitted at a later date.

Note

MD40 PWS transfers to the new Technology Program Elements beginning in FY 2015 in accordance with the FY 2014 Consolidated Appropriations Act (P.L. 113-76).

A. Mission Description and Budget Item Justification

Program-Wide Support (PWS) contains non-headquarters management costs in support of Missile Defense Agency (MDA) functions and activities across the entire Ballistic Missile Defense System (BMDS). It includes Government Civilians, Contract Support Service, and Federally Funded Research and Development Center (FFRDC) providing integrity and oversight of the BMDS as well as, supporting MDA in enabling the development and evaluation of technologies that will respond to the changing threat. In addition, includes Global Deployment personnel and support performing deployment site preparation and activation. Other costs included provide facility capabilities for MDA Executing Agent locations, such as physical and technical security, legal services, travel and agency training, office and equipment leases, utilities, data and unified communications support, supplies and maintenance, materiel and readiness and central property management of equipment, and similar operating expenses. Also includes legal settlements. In keeping with congressional intent, Program Wide Support is allocated on a pro-rata basis and therefore, fluctuates by year based on the total MDA budget.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2013	FY 2014	FY 2015
Title: Program Wide Support	3.414	9.321	-
Description: N/A			
FY 2013 Accomplishments: See paragraph A: Mission Description and Budget Item Justification			
FY 2014 Plans: See paragraph A: Mission Description and Budget Item Justification			
FY 2015 Plans: N/A			
Accomplishments/Planned Programs Subtotals	3.414	9.321	-

C. Other Program Funding Summary (\$ in Millions)

N/A

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C. Other Program Funding Summary (\$ in Millions)

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A