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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Missile Defense Agency **Date:** March 2023

Appropriation/Budget Activity 0400: <i>Research, Development, Test & Evaluation, Defense-Wide / BA 3: Advanced Technology Development (ATD)</i>	R-1 Program Element (Number/Name) PE 0603176C / <i>Advanced Concepts and Performance Assessment</i>
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COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	164.955	39.678	39.737	17.825	-	17.825	18.301	18.752	19.134	19.596	Continuing	Continuing
MD71: <i>Advanced Concepts and Performance Assessments</i>	99.132	22.001	31.446	13.386	-	13.386	13.732	14.007	14.291	14.579	Continuing	Continuing
MD40: <i>Program-Wide Support</i>	4.221	0.607	0.608	0.634	-	0.634	0.659	0.758	0.776	0.869	Continuing	Continuing
MC71: <i>Cyber Operations</i>	61.602	17.070	7.683	3.805	-	3.805	3.910	3.987	4.067	4.148	Continuing	Continuing

Program MDAP/MAIS Code: 362

Note

The decrease from FY 2023 to FY 2024 reflects Congressional add of \$23.0 million enacted in FY 2023.

A. Mission Description and Budget Item Justification

The Advanced Concepts and Performance Assessment (ACPA) Program Element delivers a government concept that integrates concept definition, simulation, analysis, and testbed capability. ACPA's focus is on the exploration of novel and/or emerging capabilities that may have the potential to enhance the Missile Defense System. ACPA centralizes assessment of advanced missile defense technology and delivers insight into the performance of proposed concepts extending the Missile Defense Agency's (MDA) ability to address evolving threats for the Warfighter. Working with national laboratories and industry, MDA will invest in the analysis and assessment of directed energy system components to determine their effectiveness and capability for missile defense.

Subject Matter Experts provide independent assessments of government, university, and industry technology concepts, used in concert with systems engineering requirements, to support acquisition strategy decisions and define technology focus areas. The innovative structured concept definition and assessment methodology enables MDA to quickly validate focus areas, verify contractor technology solutions, and evaluate promising concepts in future Missile Defense System architectures. This methodology significantly enhances MDA's ability to assess technology concepts while decreasing the cost of development by:

- Delivering Independent model-based simulations of industry technology concepts to inform the systems engineering process
- Quantifying expectations through algorithms, digital simulation, hardware-in-the-loop, and/or demonstration events prior to expensive live fire test events
- Executing end-to-end testing of technology concepts integrated with weapon systems through Command and Control network architectures
- Maturing and conducting assessments of new technologies to evaluate their readiness for transition to the future Missile Defense System
- Supports early coordination with the program elements to promote efficient integration into the Missile Defense System and provide additional capability to meet the Warfighter needs

Performance assessment of advanced concepts is the key enabler for government evaluation of technology in the earliest stages of development and maximizes the efficiency of technology investments. Performance assessment is used to quantify capability expectations of innovative concepts to counter the expanding regional and homeland missile threats, including ballistic and cruise missiles, and hypersonic vehicles.

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B. Program Change Summary (\$ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	40.000	16.737	17.265	-	17.265
Current President's Budget	39.678	39.737	17.825	-	17.825
Total Adjustments	-0.322	23.000	0.560	-	0.560
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	23.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.322	0.000			
• Other Adjustment	0.000	0.000	0.560	-	0.560

Change Summary Explanation

Congressional Adds Details

FY 2023 Congressional Adds Total \$23.0 million

Project: MD71 Advanced Concepts and Performance Assessments
 - Hypersonic kill vehicle Hardware-in-the-Loop upgrades (\$15 million)
 - Generic left/right of launch architecture system simulation (GLASS) (\$4 million)

Project: MC71 Cyber Operations
 - Cyber Operations (\$4 million)

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Missile Defense Agency										Date: March 2023		
Appropriation/Budget Activity 0400 / 3					R-1 Program Element (Number/Name) PE 0603176C / <i>Advanced Concepts and Performance Assessment</i>				Project (Number/Name) MD71 / <i>Advanced Concepts and Performance Assessments</i>			
COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
MD71: <i>Advanced Concepts and Performance Assessments</i>	99.132	22.001	31.446	13.386	-	13.386	13.732	14.007	14.291	14.579	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The decrease from FY 2023 to FY 2024 reflects Congressional add of \$19.0 million enacted in FY 2023.

A. Mission Description and Budget Item Justification

Advanced Concepts and Performance Assessments (ACPA) centralizes advanced technology concept modeling, simulation, software, and analysis. Integrating models of promising disruptive technical solutions into Missile Defense System system-level simulations enables leadership to make data driven acquisition and technology investment decisions. Assess concepts that improve or adapt existing systems, that incorporate mobile sensors and interceptors that can be surged into zones of crisis or conflict are also deemed disruptive. Examples of efforts required to quantify the contribution of disruptive technologies may include, but not be limited to environmental experimentation and phenomenological characterization required for new sensor concepts, advanced weapon technologies, and emerging directed energy concepts. Using a technology development testbed approach, ACPA enables assessment and characterization of incremental technology improvements to inform requirements and evaluate missile defense elements, components, and/or sub-component technologies and to assess maturity as it relates to readiness for transition to the future Missile Defense System. ACPA promotes informed decision making early in the acquisition life-cycle to maximize investments and successful transition into the Missile Defense System.

Coupled with characterization efforts, ACPA develops innovative left-through-right-of-launch modeling capabilities including physics-based representations in the areas of cyber, sensor technologies, lethality and survivability, communications, and sensor support. ACPA is focusing on Science and Technology initiatives which increase interoperability and leverages expertise with allied and service partners.

ACPA capitalizes on the innovation of small businesses, universities, Federally Funded Research and Development Centers (FFRDCs), and University Affiliated Research Centers (UARCs) to pursue a broad range of hardware, software, models, algorithms, trade studies, and analysis. These innovations bring together government developed models representing existing and future missile defense architectures, technology concepts, and advanced algorithms to provide detailed assessments of concept performance and inform investment decisions. These innovations, combined with a robust high performance computing infrastructure, provide a unique in-house government capability to demonstrate and assess technology concepts for emerging technology risk reduction, to mature concepts with laboratory, ground, and flight test data, and where possible, apply concepts in simulated exercises with weapon systems across representative communication architectures.

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024
Title: Advanced Concepts and Performance Assessment	12.001	16.446	13.386
Articles:	-	-	-

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Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603176C / <i>Advanced Concepts and Performance Assessment</i>	Project (Number/Name) MD71 / <i>Advanced Concepts and Performance Assessments</i>		
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2022	FY 2023	FY 2024
<p>Description: Provide quantitative assessments that define the benefits of technology investments and inform requirements using an integrated concept definition, simulation, and performance analysis capability. A staff of diverse Subject Matter Experts (SMEs) delivers independent government performance evaluations which exercise kinetic and non-kinetic missile defense concept representations against the broad spectrum of evolving threats.</p> <ul style="list-style-type: none"> - Assess electro-optical infrared and advanced sensor technologies and quantify impacts on Missile Defense System - Provide independent government assessments of industry sensor, directed energy and weapon system technology concepts, and the ability of these systems to be integrated for a more effective Missile Defense System - Evaluate lethality impacts and weapons effectiveness of emerging concepts - Examine pathfinder solutions and demonstrate the utility of directed energy for missile defense - Study on-orbit satellite capabilities and contribution to defense against advanced threats - Assess and identify promising intercept capabilities across all phases of flight - Perform concept performance against emerging advanced threats including hypersonic threat testing scenarios - Mature advanced technology concepts in a testbed environment and through lab, ground, and flight demonstrations - Apply concepts in simulated exercises with weapon systems - Work with the Missile Defense System Architect and Missile Defense Agency (MDA) Systems Engineer to design concepts, build models and assess technology concepts' contributions to future Missile Defense System architectures - Develop and extend modeling techniques, including incorporation of artificial intelligence - Focus research and engineering activities from university and small business partners to identify suitable technology and concepts that improve Missile Defense System performance through a rapid innovation model based on an engineering test bed - Assess multi-domain data fusion concept for current or future weapon systems <p>Specific and/or unique accomplishments to each FY are as follows:</p> <p>FY 2023 Plans: Congressional Add: Generic left/right of launch architecture system simulation (GLASS) (\$4 million) - Examine Left-through-Right-of-Launch tactics, techniques, procedures, and benefits</p> <p>- SEE ABOVE</p> <p>FY 2024 Plans: - SEE ABOVE</p> <p>FY 2023 to FY 2024 Increase/Decrease Statement:</p>				

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Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603176C / <i>Advanced Concepts and Performance Assessment</i>	Project (Number/Name) MD71 / <i>Advanced Concepts and Performance Assessments</i>
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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024
Decrease from FY 2023 to FY 2024 reflects the FY 2023 Congressional add.			
<p>Title: Hypersonic Hardware-in-the-Loop</p> <p align="right">Articles:</p> <p>Description: Develop an independent government hypersonic testbed supporting assessment and maturation of industry and/or government technology approaches. Leverage existing facilities and extend ballistic/hypersonic kill vehicle hardware-in-the-loop (HWIL) by integrating with evolving hypersonic sensor HWIL capabilities. Provide a prototype platform consisting of technologies necessary to evaluate the potential of new kill vehicle concepts to identify, track, and engage emerging threats; including vehicles with dynamically changing aerothermal signatures. Assess, mature, and integrate high-fidelity environmental truth models and/or representations for aerothermal, aero-optics and/or jet interaction for hypersonic flight environments to provide accurate simulations for digital scene injections into kill vehicle concept representations in HWIL facilities. Bolster prototype development and maturation by upgrading hypersonic HWIL capabilities through pathfinder process integrating agile continuous integration/continuous delivery capabilities.</p> <p>FY 2023 Plans: Congressional Add: Hypersonic kill vehicle Hardware-in-the-Loop upgrades (\$15 million) - Develop digital hypersonic kill vehicle performance assessment test environment</p> <p>FY 2024 Plans: N/A</p> <p>FY 2023 to FY 2024 Increase/Decrease Statement: Decrease from FY 2023 to FY 2024 reflects the FY 2023 Congressional add.</p>	10.000	15.000	0.000
	-	-	-
Accomplishments/Planned Programs Subtotals	22.001	31.446	13.386

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

<u>Line Item</u>	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
• 0603180C: <i>Advanced Research</i>	51.270	85.323	21.461	-	21.461	22.024	22.571	23.031	23.591	Continuing	Continuing

Remarks

D. Acquisition Strategy
Utilize various contracting strategies with small businesses, Federally Funded Research and Development Centers, University Affiliated Research Centers, and other Government Agencies to maximize the contribution to MDA and inform Better Buying Power acquisition decisions.

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Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603176C / <i>Advanced Concepts and Performance Assessment</i>	Project (Number/Name) MD40 / <i>Program-Wide Support</i>
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COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
<i>MD40: Program-Wide Support</i>	4.221	0.607	0.608	0.634	-	0.634	0.659	0.758	0.776	0.869	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

PWS contains non-headquarters management costs in support of MDA functions and activities across the entire Missile Defense System. These functions include Government Civilians and Contract Support Services. This effort provides integrity and oversight of the Missile Defense System as well as supports MDA in the development and evaluation of technologies that will respond to the changing threat. Additionally, PWS includes personnel to support global deployments performing deployment site preparation and activation, and provides facility capabilities for MDA Executing Agent locations worldwide. Other MDA wide costs include: physical and technical security; civilian drug testing; audit readiness; the Science, Technology, Engineering, and Mathematics (STEM) program; legal services and settlements; travel and agency training; office, equipment, vehicle, and warehouse leases; utilities and base operations across multiple geographic locations; commercial and ancillary facility services; management of all facility aspects regardless of lifecycle stage; supplies and maintenance; compliance with statutory environmental requirements; data and unified communications support; materiel and readiness and central property management of equipment; Facilities Sustainment, Restoration and Modernization (FSRM) program (formerly Real Property Maintenance) to keep the Department's inventory of facilities in good working order; and similar operating expenses. PWS is allocated on a pro-rata basis across most Agency PEs and therefore fluctuates per PE by fiscal year based on the total Agency budget in that fiscal year.

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COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
MC71: <i>Cyber Operations</i>	61.602	17.070	7.683	3.805	-	3.805	3.910	3.987	4.067	4.148	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The decrease from FY 2023 to FY 2024 reflects Congressional add of \$4.0 million enacted in FY 2023.

A. Mission Description and Budget Item Justification

This project supports the monitoring and tracking of Cybersecurity mitigations as required in the Department of Defense (DoD) Instruction Number 8510.01, as amended which establishes Risk Management Framework (RMF) requirements for DoD Information Technology (IT). Funds in this project implement and sustain DoD-required RMF and associated Controls Validation Testing activities, analysis of validation results, risk assessments and reviews of proposed Program Manager/Information Assurance System Security Manager Plans of Action and Milestones (POAMs) for enabling modeling and simulation mission systems. This project captures the RMF documentation (artifacts, validation results, Information Assurance (IA) risk assessment results, and the Missile Defense Agency (MDA) authorizing official and chief information officer accreditation decisions) into the Defense Information Systems Agency's Enterprise Mission Assurance Support Service system. Hardware and software upgrades required to meet DoD standards are supported by funding in this project. Independent verification and validation team actions ensure the availability, integrity, authentication, confidentiality and non-repudiation of the MDA mission, test and administrative systems. Activities in the project are necessary to comply with the Federal Information Security Management Act.

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)

	FY 2022	FY 2023	FY 2024
Title: Information Assurance / Cyber Network Defense	17.070	7.683	3.805
Articles:	-	-	-
<p>Description: Funds RMF, network defense, and information technology requirements including:</p> <ul style="list-style-type: none"> - Conduct cybersecurity/IA engineering and architecture planning - Maintain hardware/software currency to meet DoD-mandated cybersecurity requirements - Support monitoring and tracking of Cybersecurity mitigations detailed in IT security POAM - Develop DoD RMF certification and accreditation packages - Conduct controls validation testing of systems and to provide POAM to mitigate IA deficiencies - Conduct annual IA reviews to assess compliance in implementing and maintaining IA controls <p>Specific and/or unique accomplishments to each FY are as follows:</p> <p>FY 2023 Plans:</p> <ul style="list-style-type: none"> Congressional Add: Cyber Operations (\$4 million) - Conduct a multi-player wargame to support the Defense of Guam desired architecture 			

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024
- SEE ABOVE			
FY 2024 Plans: - SEE ABOVE			
FY 2023 to FY 2024 Increase/Decrease Statement: Decrease from FY 2023 to FY 2024 reflects the FY 2023 Congressional add.			
Accomplishments/Planned Programs Subtotals	17.070	7.683	3.805

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
• 0604102C: <i>Guam Defense Development</i>	110.611	393.201	397.578	-	397.578	291.301	272.227	238.348	232.115	Continuing	Continuing

Remarks

D. Acquisition Strategy

N/A