Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Missile Defense Agency											Date: March 2019	
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603176C *I Advanced Concepts and Performance Assessment*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	43.305	17.683	13.017	14.208	-	14.208	14.904	15.142	16.262	16.574	Continuing	Continuing
MD71: *Advanced Concepts and Performance Assessments*	41.702	13.958	11.628	11.552	-	11.552	11.768	12.016	12.243	12.488	Continuing	Continuing
MD40: *Program-Wide Support*	1.603	0.816	0.605	0.605	-	0.605	0.699	0.673	0.802	0.805	Continuing	Continuing
MC71: *Cyber Operations*	-	2.909	0.784	2.051	-	2.051	2.437	2.453	3.217	3.281	0.000	17.132
Program MDAP/MAIS Code: 362												

Note

N/A

A. Mission Description and Budget Item Justification

The Advanced Concepts and Performance Assessment (ACPA) Program Element delivers an integrated government concept definition, simulation, and analysis capability. It also centralizes assessment of advanced missile defense technology. Delivering insight into the performance of proposed concepts extends the Missile Defense Agency's (MDA) ability to address evolving threats for the warfighter.

Subject Matter Experts (SMEs) 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 Ballistic Missile Defense System (BMDS) architectures. This methodology significantly enhances MDA's ability to assess technology concepts while decreasing the cost of development through:

- Independent model-based simulations of industry technology concepts to inform the systems engineering process
- Digital simulation and hardware-in-the-loop performance assessments of algorithms and hardware concepts prior to expensive live fire test events
- End-to-end testing of technology concepts integrated with weapon systems and Command, Control, Battle Management and Communications (C2BMC)

Performance assessment of advanced concepts incorporates Better Buying Power philosophy in the earliest stages of technology development to maximize the efficiency of technology investments. Performance assessment supports evaluation of advanced threats and analysis of capabilities left through right of launch integration.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Missile Defense Agency	Date: March 2019
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603176C *I Advanced Concepts and Performance Assessment*

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	12.996	13.017	14.267	-	14.267
Current President's Budget	17.683	13.017	14.208	-	14.208
Total Adjustments	4.687	0.000	-0.059	-	-0.059
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	2.375	0.000			
• SBIR/STTR Transfer	-0.287	0.000			
• Missile Defeat and Defense Enhancement	0.000	0.000	0.000	-	0.000
• Other Adjustment	2.599	0.000	-0.059	-	-0.059

Change Summary Explanation

Increase in FY 2018 from PB19 to PB20 of $2.375M reflects the Above Threshold Reprogramming for compliance with cyber security requirements as required in the Department of Defense (DoD) Instruction Number 8510.01 which establishes Risk Management Framework (RMF) requirements for DoD information technology (IT).

Increase in FY 2018 from PB19 to PB20 of $2.599M reflects the investment in artificial intelligence (AI) infrastructure to develop, test, and demonstrate machine learning solutions.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Missile Defense Agency			Date: March 2019
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603176C / *Advanced Concepts and Performance Assessment*	**Project (Number/Name)** MD71 / *Advanced Concepts and Performance Assessments*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
MD71: *Advanced Concepts and Performance Assessments*	41.702	13.958	11.628	11.552	-	11.552	11.768	12.016	12.243	12.488	Continuing	Continuing

Note

N/A

A. Mission Description and Budget Item Justification

ACPA centralizes advanced technology concept modeling, simulation, software, and analysis. Integrating models of promising technical solutions into BMDS system-level simulations enables leadership to make data driven acquisition and technology investment decisions. This funding 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)	FY 2018	FY 2019	FY 2020
Title: Advanced Concepts and Performance Assessment	13.958	11.628	11.552
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) deliver independent government performance evaluations which exercise kinetic and non-kinetic missile defense concept representations against the broad spectrum of evolving threats. - Assess forward-based airborne electro-optical infrared and advanced sensors - Provide independent government assessments of industry sensor (e.g. Advanced Sensor), directed energy (e.g. Low Power Laser Demonstrator), and kill vehicle technology concepts - Examine directed energy pathfinder solutions - Study low earth orbit satellite capabilities - Assess and identify promising boost phase intercept capabilities - Perform concept performance against emerging advanced threats including hypersonic threat testing scenarios - Mature advanced technology concepts through lab, ground, and flight test data - Apply concepts in simulated exercises with weapon systems			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Missile Defense Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603176C / *Advanced Concepts and Performance Assessment*	**Project (Number/Name)** MD71 / *Advanced Concepts and Performance Assessments*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
- Work with the BMDS Architect and MDA Systems Engineer to design concepts, build models and assess technology concepts for the future BMDS - Develop and extend modeling techniques - Focus research and engineering activities from university and small business partners to identify suitable technology and concepts that improve BMDS performance through a rapid innovation model based on an engineering test bed Specific and/or unique accomplishments to each FY are as follows: ***FY 2019 Plans:*** In addition to efforts identified above, FY 2019 concept assessment activities will focus on development of key technology areas including: - Hypersonic Defense - AI and Machine Learning Initiatives - Left through Right of Launch Integration ***FY 2020 Plans:*** Due to the evolving nature of the threat, ACPA's diverse staff of SMEs develop advanced concepts across a broad spectrum of missile defense technology initiatives. FY 2019 concept assessment initiatives identified above will be matured and coupled with increased emphasis on the following: - Quantify the contribution of emerging concepts by integrating representative performance with C2BMC networks (eg. MDA C2BMC, Integrated Air and Missile Defense, Cooperative Engagement Capability, AI enabling end-to-end capability demonstrations with weapon systems) - Develop the computing infrastructure for AI Testbed and the development of deep neural networks to exercise advanced algorithms and assess potential applications to machine learning - Extend the Government's capability to evaluate engagement decision timelines and evaluate concept of operations that could possibly expand engagement opportunities - Develop an initial integrated modeling and analysis capability to assess new technology concepts associated with the complex interactions between left through right of launch integration - Address the capability gap in testing/simulation of advanced sensors in a credible environment by developing an advance photonics testbed capable of providing foundational truth for advanced sensor performance assessment of industry concepts ***FY 2019 to FY 2020 Increase/Decrease Statement:***			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Missile Defense Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603176C / *Advanced Concepts and Performance Assessment*	**Project (Number/Name)** MD71 / *Advanced Concepts and Performance Assessments*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
N/A			
Accomplishments/Planned Programs Subtotals	13.958	11.628	11.552

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• 0603178C: *Weapons Technology*	28.894	13.400	10.000	-	10.000	10.000	10.000	0.000	0.000	Continuing	Continuing
• 0603180C: *Advanced Research*	23.765	42.565	20.674	-	20.674	21.154	21.521	22.041	22.465	Continuing	Continuing
• 0603294C: *Common Kill Vehicle Technology*	55.562	56.753	13.600	-	13.600	13.475	16.187	18.232	22.949	Continuing	Continuing

Remarks

D. Acquisition Strategy

Employ various contracting strategies in a flexible manner to maximize the contribution to MDA. Execute through utilization of small businesses, leverage the Nation's engineering centers of excellence (FFRDCs and UARCs); generate cooperatives with other Government Agencies to provide concept modeling and assessment capability. This strategy uses agency and partner SMEs and government model-based assessments to inform Better Buying Power acquisition decisions.

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2020 Missile Defense Agency			Date: March 2019
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603176C / *Advanced Concepts and Performance Assessment*	**Project (Number/Name)** MD40 / *Program-Wide Support*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
MD40: *Program-Wide Support*	1.603	0.816	0.605	0.605	-	0.605	0.699	0.673	0.802	0.805	Continuing	Continuing

A. Mission Description and Budget Item Justification

Program Wide Support (PWS) contains non-headquarters management costs in support of MDA functions and activities across the entire BMDS. It Includes Government Civilians and Contract Support Services. This provides integrity and oversight of the BMDS 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. 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; data and unified communications support; supplies and maintenance; materiel and readiness and central property management of equipment; and similar operating expenses. PWS is allocated on a pro-rata basis across most Agency PEs and therefore, fluctuates by year based on the adjusted RDT&E profile.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Missile Defense Agency			Date: March 2019
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603176C / *Advanced Concepts and Performance Assessment*	Project (Number/Name) MC71 / *Cyber Operations*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
MC71: *Cyber Operations*	-	2.909	0.784	2.051	-	2.051	2.437	2.453	3.217	3.281	0.000	17.132

Note

The increase from FY 2019 to FY 2020 re-establishes the baseline requirement to meet Risk Management Framework (RMF) requirements which map to the Office of Management and Budget (OMB) and Office of the Secretary of Defense (OSD) vision of improved management of cybersecurity risk and on the ability to provide actionable and timely cybersecurity performance information. This provides resources to sustain and improve IT toolsets, maintain hardware currency, and sustain the IT and information assurance (IA) workforce.

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 which establishes RMF requirements for DoD IT. Funds in this project implement and sustain DoD-required RMF and associated Controls Validation Testing (CVT) activities, analysis of validation results, risk assessments and reviews of proposed Program Manager/Information Assurance System Security Manager (ISSAM) Plans of Action and Milestones for enabling modeling and simulation mission systems. This project captures the RMF documentation (artifacts, validation results, IA risk assessment results, and 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)	FY 2018	FY 2019	FY 2020
Title: Information Assurance/Cyber Network Defense	2.909	0.784	2.051
Description: Funds network defense and ISSAM activities including: - Conduct cybersecurity/IA engineering and architecture planning - Plan and test IA controls - Develop DoD RMF certification and accreditation packages - Conduct controls validation testing of systems and provide plan of action and milestones to mitigate IA deficiencies - Conduct annual IA reviews to assess compliance in implementing and maintaining IA controls Specific and/or unique accomplishments to each FY are as follows: ***FY 2019 Plans:*** In addition to baseline efforts identified above, primary emphasis in FY 2019 will be to sustain the IT and IA workforce. ***FY 2020 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Missile Defense Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603176C / *Advanced Concepts and Performance Assessment*	**Project (Number/Name)** MC71 / *Cyber Operations*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
In addition to baseline efforts identified above emphasis in FY 2020 will be expanded to: - Explore cyber effects on emerging technology concepts - Sustain and improve IT toolsets, maintain hardware currency, and sustain the IT and IA workforce ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase from FY 2019 to FY 2020 re-establishes the baseline requirement to meet RMF requirements which map to the OMB and OSD vision of improved management of cybersecurity risk and on the ability to provide actionable and timely cybersecurity performance information. This provides resources to sustain and improve IT toolsets, maintain hardware currency, and sustain the IT and IA workforce.			
Accomplishments/Planned Programs Subtotals	2.909	0.784	2.051

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A