Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Missile Defense Agency											Date: February 2020	
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0604115C / *Technology Maturation Initiatives*							
COST ($ in Millions)	**Prior Years**	**FY 2019**	**FY 2020**	**FY 2021 Base**	**FY 2021 OCO**	**FY 2021 Total**	**FY 2022**	**FY 2023**	**FY 2024**	**FY 2025**	**Cost To Complete**	**Total Cost**
Total Program Element	228.020	312.074	264.520	67.389	-	67.389	73.214	97.454	60.156	56.076	Continuing	Continuing
MD98: *Directed Energy Demonstrator Development*	91.574	224.771	116.266	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
MD99: *Discrimination Sensor Demonstrator Development*	108.733	74.710	132.187	64.237	-	64.237	69.845	93.065	56.599	52.528	Continuing	Continuing
MT99: *Technology Maturation Initiatives Test*	11.892	0.502	6.324	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	18.718
MC98: *Cyber Operations*	0.633	5.430	0.475	0.475	-	0.475	0.464	0.470	0.479	0.489	Continuing	Continuing
MD40: *Program Wide Support*	15.188	6.661	9.268	2.677	-	2.677	2.905	3.919	3.078	3.059	Continuing	Continuing
Program MDAP/MAIS Code: 362												

Note

Decrease from FY 2020 to FY 2021 reflects the reduction and reallocation of funding for Directed Energy Demonstrator Development (Laser Scaling) to higher priority Department investments, the completion of passive Electro Optical/Infrared (EO/IR) missile tracking tests and demonstrations, and removal of advanced sensor participation from the Integrated Master Test Plan (IMTP).

The FY 2021 funding request was reduced by $109.0 million during DWR to cancel BMD specific Laser Development.

A. Mission Description and Budget Item Justification

Technology Maturation Initiatives (TMI) demonstrates the utility of directed energy for missile defense. Missile Defense Agency's directed energy plan incrementally demonstrates and improves the constituent components required to execute a directed energy kill chain; acquisition, tracking, and lethality. The efforts shape future MDS acquisition choice by advancing the technology readiness levels of emerging and developing technology, while simultaneously assessing the performance and contributions to the MDS architecture. TMI includes analysis, development, demonstration, systems engineering and test efforts to examine, develop, and improve directed energy systems, disruptive directed energy concepts, sensors, and future missile defense technologies.

MDA will develop cost effective demonstrators to address specific technology risks and will focus on the following:
- Conduct sensor and directed energy system and subsystem tests to validate performance against emerging advanced threats
- Integrate an advanced sensor into an airborne platform to provide discrimination of lethal objects and other advanced sensor applications
- Develop a compact, ruggedized advanced sensor testbed that evolves technologies matured in lab and ground testing to a host platform demonstrating potential applications for persistent overhead discrimination

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Missile Defense Agency	Date: February 2020
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*

Directed Energy Demonstrator Development (DEDD) addresses technology risk reduction and maturation for high powered strategic lasers, beam control, lethality, and related technologies. The efforts are tightly coupled with OUSD(R&E) High Energy Laser Development Road Map, and are essential to mature strategic laser technology. Beginning in FY 2021 this effort transitions from TMI to OUSD(R&E).

Discrimination Sensor Demonstrator Development (DSDD) includes the development of an advanced sensor to discriminate lethal objects beginning with airborne platforms to introduce sensors into the MDS, followed by integration of the sensor on other platforms in the future. The advanced sensor incorporates incrementally developed, integrated, and tested next-generation sensors and electronics to demonstrate Launch-on-Remote, Engage-on-Remote, discrimination and handover improvements for missile defense. These advanced sensors improve the probability of engagement success for stressing threats, expand the MDS battle space and increase the ability to negate larger raid sizes. They also help develop the associated concept of operations and provide the basis for a quick reaction precision tracking capability to augment radar. MDA may use this sensor to address emerging advanced threats.

Cyber Operations will make investments to provide enabling capabilities and asset protection to support all sensor and directed energy technical maturation initiatives.

MDA collaborates with the Combatant Commands, Defense Advanced Research Projects Agency, Department of Energy, Directed Energy Joint Transition Office, Military Departments, National Laboratories and OUSD(R&E) in a systems engineering based strategy to research, analyze, develop and test directed energy weapons technology.

B. Program Change Summary ($ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	316.822	303.458	336.139	-	336.139
Current President's Budget	312.074	264.520	67.389	-	67.389
Total Adjustments	-4.748	-38.938	-268.750	-	-268.750
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-38.938			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-3.268	0.000			
• Missile Defeat and Defense Enhancement	0.000	0.000	0.000	-	0.000
• Other Adjustment	-1.480	0.000	-268.750	-	-268.750

Change Summary Explanation

Decrease in FY 2020 reflects the Congressional reduction for Neutral Particle Beam and flight test.

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Missile Defense Agency	Date: February 2020
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604115C *I Technology Maturation Initiatives*

Decrease in FY 2021 reflects the reduction and reallocation of funding for Directed Energy Demonstrator Development (Laser Scaling) to higher priority Department investments, the cancellation of the Neutral Particle Beam (NPB), and removal of advanced sensor participation from the Integrated Master Test Plan (IMTP).

Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency			Date: February 2020
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604115C / *Technology Maturation Initiatives*	Project (Number/Name) MD98 / *Directed Energy Demonstrator Development*	

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
MD98: *Directed Energy Demonstrator Development*	91.574	224.771	116.266	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Decrease from FY 2020 to FY 2021 reflects the reduction and reallocation of Directed Energy Demonstrator Development (Laser Scaling) funding to higher priority Department investments.

A. Mission Description and Budget Item Justification

The Directed Energy Demonstrator Development (DEDD) project develops, integrates, and tests the component technologies required to scale electric lasers to hundreds of kilowatts. Laser scaling focuses on maturing laser capability to levels sufficient to enter into the OUSD(R&E) High Energy Laser Road Map efforts. The DEDD project provides the necessary technology, test data, and operations familiarity to successfully transition to a higher power directed energy weapon.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
Title: Directed Energy Demonstrator Development	224.771	116.266	0.000
Articles:	-	-	-

Description: Laser scaling develops, integrates, and tests the component technologies required for scaling electric lasers while maintaining excellent size, weight, and power metrics and near diffraction limited beam quality. MDA will maintain partnerships with OUSD(R&E), Industry, and National Laboratories to focus on directed energy capabilities.

Specific and/or unique planned accomplishments to each FY are as follows:

FY 2020 Plans:

Continue to develop scalable, efficient, and compact high-energy laser components for integration into high power systems
- Maintain partnerships with Industry and National Laboratories to focus on laser scaling.
- Perform component and sub-assembly testing, including pump diode integration design and test
- Finish detailed engineering drawing for components
- Verify Diode Pumped Alkali Laser (DPAL) power maturation, while maintaining beam quality demonstrated in the prior year
- Conduct DPAL preliminary design review (PDR)
- Verify Fiber Combined Laser (FCL) power maturation, while maintaining beam quality demonstrated in the prior year
- Conduct FCL PDR
- Conduct FCL laboratory demonstration

Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD98 / *Directed Energy Demonstrator Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
- Perform Beam Control component development and Lethality testing ***FY 2021 Plans:*** - No funding is requested in FY 2021 for this effort. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Decrease from FY 2020 to FY 2021 reflects a reduction and reallocation of funding to higher priority Department investments.			
Accomplishments/Planned Programs Subtotals	224.771	116.266	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• 0603176C: *Advanced Concepts and Performance Assessment*	12.720	46.201	14.910	-	14.910	15.178	16.205	16.879	17.300	Continuing	Continuing
• 0603180C: *Advanced Research*	42.100	27.674	18.687	-	18.687	18.883	18.975	19.720	20.222	Continuing	Continuing
• 0604181C: *Hypersonic Defense*	132.612	390.204	206.832	-	206.832	107.521	111.084	115.487	118.333	Continuing	Continuing

Remarks

D. Acquisition Strategy

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD98 / *Directed Energy Demonstrator Development*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Directed Energy Demonstrator Development - Beam Control and Lethality Demonstration	C/CPFF	TBD : TBD	0.000	0.000		41.884	Jun 2020	0.000		-		0.000	0.000	41.884	0.000
Directed Energy Demonstrator Development - Industry Laser Scaling	C/CPFF	Boeing : CA	0.000	0.000		15.800	Jan 2020	0.000		-		0.000	0.000	15.800	0.000
Directed Energy Demonstrator Development - LPLD Preliminary Design A	C/CPFF	Lockheed Martin : CA	24.138	16.356	Nov 2018	0.000		0.000		-		0.000	0.000	40.494	0.000
Directed Energy Demonstrator Development - LPLD Preliminary Design B	C/CPFF	General Atomics : CA	23.728	13.113	Nov 2018	0.000		0.000		-		0.000	0.000	36.841	0.000
Directed Energy Demonstrator Development - LPLD Preliminary Design C	C/CPFF	Boeing : CA	23.261	13.100	Nov 2018	0.000		0.000		-		0.000	0.000	36.361	0.000
Directed Energy Demonstrator Development - LPLD System Critical Design A (CPU)	C/CPFF	Lockheed Martin : CA	0.000	26.000	Feb 2019	0.000		0.000		-		0.000	0.000	26.000	0.000
Directed Energy Demonstrator Development - LPLD System Critical Design B (CPU)	C/CPFF	General Atomics : CA	0.000	26.000	Feb 2019	0.000		0.000		-		0.000	0.000	26.000	0.000
Directed Energy Demonstrator Development - LPLD	C/CPFF	Boeing : CA	0.000	26.000	Feb 2019	0.000		0.000		-		0.000	0.000	26.000	0.000

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD98 / *Directed Energy Demonstrator Development*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
System Critical Design C (CPU)															
Directed Energy Demonstrator Development - Laser Lethality Demonstration	C/CPFF	General Atomics, AFRL, Redstone Testing Center, White Sands Missile Range : CA, AL, NM	3.089	1.089	Dec 2018	0.000		0.000		-		0.000	0.000	4.178	0.000
Directed Energy Demonstrator Development - Laser Scaling	C/Various	MIT LL, LLNL : MA, CA	0.000	85.000	Feb 2019	50.000	Feb 2020	0.000		-		0.000	0.000	135.000	0.000
Directed Energy Demonstrator Development - Performance Analysis	MIPR	MIT LL, Aviation and Missile Research Development and Engineering Center (AMRDEC),Combat Capabilities Development Command - Aviation and Missile Center (CCDC-AMC) : MA, AL	2.204	3.163	Dec 2018	1.978	Jan 2020	0.000		-		0.000	0.000	7.345	0.000
Directed Energy Demonstrator Development - Technology Transfer/Component Development	MIPR	MIT LL, LLNL, AF : MA, CA, NM	10.302	5.907	Feb 2019	3.457	Feb 2020	0.000		-		0.000	0.000	19.666	0.000
		Subtotal	86.722	215.728		113.119		0.000		-		0.000	0.000	415.569	N/A

Remarks

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Missile Defense Agency			Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD98 / *Directed Energy Demonstrator Development*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Directed Energy Demonstrator Development - Advisory and Assistance Services	C/CPFF	MDA Multi : AL, NM	0.000	7.413	Oct 2018	0.000		0.000		-		0.000	0.000	7.413	0.000
Directed Energy Demonstrator Development - Engineering and Technical Services	MIPR	Aviation and Missile Research Development and Engineering Center (AMRDEC), Combat Capabilities Development Command - Aviation and Missile Center (CCDC-AMC) : AL	2.221	0.000		0.000		0.000		-		0.000	0.000	2.221	0.000
Directed Energy Demonstrator Development - FFRDC	MIPR	Aerospace : AL, NM	1.450	0.000		1.664	Nov 2019	0.000		-		0.000	0.000	3.114	0.000
Directed Energy Demonstrator Development - Facility Support	Various	377th ABW, Phoenix : NM	0.150	0.118	Dec 2018	0.141	Nov 2019	0.000		-		0.000	0.000	0.409	0.000
Directed Energy Demonstrator Development - Facility Sustainment	C/CPFF	TBD : AL, NM	0.000	0.548	May 2019	0.000		0.000		-		0.000	0.000	0.548	0.000
Directed Energy Demonstrator Development - Information Technology	C/CPFF	Northrop Grumman, Jacobs Technology : CO	1.031	0.964	Nov 2018	0.957	Nov 2019	0.000		-		0.000	0.000	2.952	0.000
Directed Energy Demonstrator Development - Travel	Allot	MDA Multi : AL, NM	0.000	0.000		0.385	Oct 2019	0.000		-		0.000	0.000	0.385	0.000
		Subtotal	4.852	9.043		3.147		0.000		-		0.000	0.000	17.042	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD98 / *Directed Energy Demonstrator Development*

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Remarks N/A															

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	91.574	224.771		116.266		0.000		-		0.000	0.000	432.611	N/A

Remarks

Decrease from FY 2020 to FY 2021 reflects a realignment of DoD priorities.

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD98 / *Directed Energy Demonstrator Development*

Significant Event Complete ▲ Significant Event Planned △ | Milestone Decision Complete ★ Milestone Decision Planned ☆ | Element Test Complete ◆ Element Test Planned ◇ | System Level Test Complete ● System Level Test Planned ○ | Complete Activity ✦ Planned Activity ✧

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
Laser Scaling Development - Fiber Combined Laser (FCL)	✧	✧	✧	✧	✧	✧	✧	✧																				
Laser Scaling Development - Diode Pumped Alkali Laser (DPAL)	✧	✧	✧	✧	✧	✧	✧	✧																				
Industry Laser Scaling Critical Design Review				▲																								
Laser Scaling DPAL Beam Quality Measurement				▲																								
Industry Laser Scaling Technology Design Review - Phase I						△																						
Laser Scaling FCL Beam Quality and Power Demonstration							△																					
Laser Scaling DPAL Preliminary Design Review								△																				
Industry Laser Scaling Technology Design Review - Phase II								△																				

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD98 / *Directed Energy Demonstrator Development*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Laser Scaling Development - Fiber Combined Laser (FCL)	1	2019	4	2020
Laser Scaling Development - Diode Pumped Alkali Laser (DPAL)	1	2019	4	2020
Industry Laser Scaling Critical Design Review	4	2019	4	2019
Laser Scaling DPAL Beam Quality Measurement	4	2019	4	2019
Industry Laser Scaling Technology Design Review - Phase I	2	2020	2	2020
Laser Scaling FCL Beam Quality and Power Demonstration	3	2020	3	2020
Laser Scaling DPAL Preliminary Design Review	4	2020	4	2020
Industry Laser Scaling Technology Design Review - Phase II	4	2020	4	2020

Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency			Date: February 2020
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604115C / *Technology Maturation Initiatives*	Project (Number/Name) MD99 / *Discrimination Sensor Demonstrator Development*	

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
MD99: *Discrimination Sensor Demonstrator Development*	108.733	74.710	132.187	64.237	-	64.237	69.845	93.065	56.599	52.528	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Decrease from FY 2020 to FY 2021 reflects completion of passive Electro Optical/Infrared (EO/IR) missile tracking tests and demonstrations; objectives met in FY 2020.

A. Mission Description and Budget Item Justification

Areas of concentration include tracking lasers, advanced detectors, infrared sensors, and precision tracking and discrimination algorithms. Discrimination Sensor Demonstrator Development (DSDD) demonstrates precision track of advanced threats at extended ranges, simple scene discrimination, and then complex scene discrimination through ground, flight, and space demonstrations.

Develops and tests high-precision advanced sensors that improve incoming threat identification, acquisition, tracking, and discrimination; specifically addressing U.S. Strategic Command's Prioritized Capabilities List requirements. DSDD activities and software maturation enhances the MDS capability to discriminate lethal objects in a threat cluster, and track and hand over the threat object with Aegis Launch on Remote and Engage on Remote precision. The increased kinematics envelope of the SM-3 Block IIA, when combined with Engage on Remote capability, will expand battlespace and increase the number of threats engaged.

This effort includes the development of next-generation General Atomics' advanced sensor systems to include tracking lasers, specialized detectors, unique processors and the corollary ground, airborne and space subsystems. These advanced sensors operate at strategic ranges required to augment MDS radar, improve MDS discrimination capability and provide precision track of large raids. They have the potential for tracking multiple targets simultaneously, substantially reducing the number of sensor assets required for large raids. The program leverages technology demonstrated from the ground and in the air to develop Massachusetts Institute of Technology/Lincoln Laboratory's (MIT/LL) compact ruggedized advanced sensor technology. This effort includes cost-effective focal plane arrays and advanced sensor components to inform future MDS layer decisions for persistent tracking and discrimination. MIT/LL will develop and test sensors to advance technology and assess system performance from the ground and on host platforms.

The Project includes sensor integration to test in operationally relevant environments and demonstrations. Platforms equipped with a sensor could provide the MDA a viable quick reaction capability to augment MDS radar. MDA is exploring options to partner with the Services and develop concepts for cost effective integration of sensor, radio frequency, and radar technologies into limited fielding prototypes, which may inform follow-on development decisions.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
Title: Discrimination Sensor Demonstrator Development	74.710	132.187	49.239
Articles:	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD99 / *Discrimination Sensor Demonstrator Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
Description: Discrimination Sensor Demonstrator Development (DSDD) project develops an advanced sensor system (tracking laser, advanced detector, infrared sensor, and precision tracking and discrimination algorithms) for participation in MDS tests under operationally relevant conditions and at operationally relevant ranges. The sensors upgrade will provide capability for tracking and discrimination of lethal objects. In addition, it provides passive stereo tracking and discrimination algorithms for the same. The sensors provide capability for tracking and discrimination of missile representative objects. Specific and/or unique planned accomplishments for each FY are as follows: ***FY 2020 Plans:*** - Continue airborne advanced sensor design maturation to incorporate advanced threat and discrimination -- Begin test design for active flight tests -- Begin ground test for next generation advanced sensor - Integrate FY 2019 ground test results into follow-on technology transfer for next generation advanced sensor - Develop Technology Design Review criteria for a compact ruggedized advanced sensor for future space application - Award compact ruggedized advanced sensor contract - Continue passive EO/IR missile tracking tests and demonstrations to complete data gathering for model baselining ***FY 2021 Plans:*** - Integrate advanced sensor into an aircraft mounted pod in alignment with Combatant Command requirements - Integrate ruggedized advanced sensor into an aircraft mounted pod in alignment with Combatant Command requirements - Conduct CONUS advanced sensor active ground and flight tests with new beam director - Continue fabrication and testing of ruggedized advanced sensor subsystems - Conduct CONUS ruggedized advanced sensor active ground and flight tests ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Decrease from FY 2020 to FY 2021 reflects completed passive EO/IR missile tracking tests and demonstrations; objectives met in FY 2020. Additionally, change from FY 2020 to FY 2021 separates program operation activities into distinct program accomplishments to provide greater visibility.			
Title: Program Operations	0.000	0.000	14.998
Articles:	-	-	-
Description: Program Operations provides strategic planning, program integration, acquisition, contracting, engineering, financial management, internal reviews and audits, and program assessments for the Technology Maturation Initiatives Program. Recurring activities include:			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD99 / *Discrimination Sensor Demonstrator Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
- Provide technical and business management support activities to deliver critical program status and decision quality data - Ensure program compliance with internal and external direction, policies, and regulations to deliver critical capability within a consistent and disciplined process - Conduct internal program reviews to measure program progress - Continue a mission assurance and engineering program to include quality, configuration management, manufacturing, systems engineering, and safety in all phases of the system life cycle - Provide Quality Safety and Mission Assurance operations to ensure compliance with Agency requirements for design, test, manufacturing, quality, safety and reliability to ensure high quality products are delivered to the Warfighter ***FY 2020 Plans:*** N/A ***FY 2021 Plans:*** See recurring activities above. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Increase from FY 2020 to FY 2021 separates program operation activities into distinct program accomplishments to provide greater visibility.			
Accomplishments/Planned Programs Subtotals	74.710	132.187	64.237

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• 0603176C: *Advanced Concepts and Performance Assessment*	12.720	46.201	14.910	-	14.910	15.178	16.205	16.879	17.300	Continuing	Continuing
• 0603180C: *Advanced Research*	42.100	27.674	18.687	-	18.687	18.883	18.975	19.720	20.222	Continuing	Continuing
• 0603884C: *Ballistic Missile Defense Sensors*	382.759	352.288	281.957	-	281.957	576.699	656.539	574.703	593.592	Continuing	Continuing
• 0603890C: *BMD Enabling Programs*	614.855	634.449	599.380	-	599.380	552.815	544.582	560.863	582.675	Continuing	Continuing
• 0603896C: *Ballistic Missile Defense Command and Control, Battle Management & Communication*	500.965	549.756	593.353	-	593.353	593.330	546.471	581.376	543.971	Continuing	Continuing

Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD99 / *Discrimination Sensor Demonstrator Development*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost

Remarks

D. Acquisition Strategy

The acquisition strategy for DSDD consists of a contract(s) to industry via the Advanced Technology Innovation Broad Agency Announcement and competitive procurements and agreements with Federally Funded Research and Development Centers to develop and demonstrate an advanced sensor system in realistic test environments. MDA will leverage agency partner subject matter experts and use government model based assessments for better acquisition decisions.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD99 / *Discrimination Sensor Demonstrator Development*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Discrimination Sensor Demonstrator Development - Advanced Sensor - FFRDC	MIPR	Aerospace : CA	0.000	0.000		0.000		1.529	Nov 2020	-		1.529	Continuing	Continuing	Continuing
Discrimination Sensor Demonstrator Development - Advanced Sensor Flight Demonstrator	Various	General Atomics, MIT/LL, TBD : C, MA, TBD	33.679	19.975	Jan 2019	51.447	Nov 2019	26.628	Nov 2020	-		26.628	Continuing	Continuing	Continuing
Discrimination Sensor Demonstrator Development - Advanced Sensor Ground Test	MIPR	MIT LL, Aerospace : MA, CA	20.783	11.700	Oct 2018	2.000	Nov 2019	0.000		-		0.000	0.000	34.483	0.000
Discrimination Sensor Demonstrator Development - Advanced Sensor Performance Analysis Aegis Engage on Remote Hardware in the Loop (HWIL)	MIPR	MIT LL, Aviation and Missile Research, Development, Engineering Center (AMRDEC), and Combat Capabilities Development Command - Aviation and Missile Center (CCDC-AMC) : MA, AL	10.235	5.779	Dec 2018	5.900	Dec 2019	4.980	Dec 2020	-		4.980	Continuing	Continuing	Continuing
Discrimination Sensor Demonstrator Development - Compact Ruggedized Advanced Sensor	Various	MIT LL, Industry (TBD) : MA, TBD	0.000	11.595	May 2019	14.715	Jan 2020	16.102	Nov 2020	-		16.102	Continuing	Continuing	Continuing
Discrimination Sensor Demonstrator Development - EO/IR Flight Tests	C/CPFF	General Atomics : CA	20.423	15.889	Sep 2019	44.100	Nov 2019	0.000		-		0.000	0.000	80.412	0.000
		Subtotal	85.120	64.938		118.162		49.239		-		49.239	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD99 / *Discrimination Sensor Demonstrator Development*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract

Remarks

N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Discrimination Sensor Demonstrator Development - Advisory and Assistance Services	C/CPFF	Various : NM, AL	5.494	0.000		3.049	Nov 2019	0.000		-		0.000	0.000	8.543	0.000
Discrimination Sensor Demonstrator Development - Civilian Salaries and Travel	Allot	MDA Multi : AL, NM	7.804	4.698	Oct 2018	6.283	Oct 2019	0.000		-		0.000	0.000	18.785	0.000
Discrimination Sensor Demonstrator Development - Engineering and Technical Services	MIPR	Aviation and Missile Research, Development, and Engineering Center (AMRDEC), Combat Capabilities Development Command - Aviation and Missile Center (CCDC-AMC), Aerospace Aerospace : AL, CA	2.269	1.847	Dec 2018	0.844	Oct 2019	0.000		-		0.000	0.000	4.960	0.000
Discrimination Sensor Demonstrator Development - Facility Support	MIPR	377th ABW : NM	0.311	0.000		0.470	Oct 2019	0.000		-		0.000	0.000	0.781	0.000
Discrimination Sensor Demonstrator Development - Information	C/CPAF	Northrop Grumman, Jacobs Technology : CO	7.735	3.227	Oct 2018	3.379	Oct 2019	0.000		-		0.000	0.000	14.341	0.000

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD99 / *Discrimination Sensor Demonstrator Development*

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Management and Technology															
Program Operations - Advisory and Assistance Services	C/CPFF	Various : NM, AL	0.000	0.000		0.000		5.793	Nov 2020	-		5.793	Continuing	Continuing	Continuing
Program Operations - Civilian Salaries	Allot	MDA Multi : NM, AL	0.000	0.000		0.000		5.493	Nov 2020	-		5.493	Continuing	Continuing	Continuing
Program Operations - Facility Support	MIPR	377th ABW : NM	0.000	0.000		0.000		0.310	Oct 2020	-		0.310	Continuing	Continuing	Continuing
Program Operations - Information Management and Technology	C/CPAF	Northrop Grumman, Jacobs Technology : CO	0.000	0.000		0.000		3.402	Oct 2020	-		3.402	Continuing	Continuing	Continuing
		Subtotal	23.613	9.772		14.025		14.998		-		14.998	Continuing	Continuing	N/A

Remarks

N/A

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	108.733	74.710		132.187		64.237		-		64.237	Continuing	Continuing	N/A

Remarks

Award Date reflects date of first obligation. Additional obligations may incrementally occur throughout the year.

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD99 / *Discrimination Sensor Demonstrator Development*

Significant Event Complete ▲ Milestone Decision Complete ★ Element Test Complete ◆ System Level Test Complete ● Complete Activity ✦
Significant Event Planned △ Milestone Decision Planned ☆ Element Test Planned ◇ System Level Test Planned ○ Planned Activity ✧

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
Passive Flight Test	✧	✧	✧	✧	✧	✧	✧	✧																				
Advanced Sensor Development	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧
Passive Flight Test Contract Extension				▲																								
Passive Flight Software Maturation						△																						
Compact Ruggedized Advanced Sensor Development							✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧
Advanced Sensor Discrimination Development															✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD99 / *Discrimination Sensor Demonstrator Development*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Passive Flight Test	1	2019	4	2020
Advanced Sensor Development	1	2019	4	2026
Passive Flight Test Contract Extension	4	2019	4	2019
Passive Flight Software Maturation	2	2020	2	2020
Compact Ruggedized Advanced Sensor Development	3	2020	4	2026
Advanced Sensor Discrimination Development	3	2022	4	2026

Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency			Date: February 2020
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604115C / *Technology Maturation Initiatives*	Project (Number/Name) MT99 / *Technology Maturation Initiatives Test*	

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
MT99: *Technology Maturation Initiatives Test*	11.892	0.502	6.324	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	18.718
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Decrease from FY 2020 to FY 2021 reflects completion of passive Electro-Optical Infrared (EO/IR) missile tracking tests and demonstrations; objectives met in FY 2020. Beginning FY 2021, the advanced sensor is removed from Integrated Master Test Plan (IMTP) participation. Component and sub-system level test participation will continue and is funded in the MD99 Discrimination Sensor Demonstrator Development budget project.

A. Mission Description and Budget Item Justification

The TMI test project funds the management and execution of TMI system participation in MDS level tests, hardware-in-the-loop testing, and performance analysis costs for flight test data. This includes test asset shipment to test ranges, labor, travel, range support, C2BMC test support specific to TMI. No funding is requested for this project in FY 2021.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
Title: Technology Maturation Initiatives Test	0.502	6.324	0.000
Articles:	-	-	-
Description: The TMI Test project tests the systems developed under the DEDD and DSDD projects under realistic conditions in conjunction with on-going MDS testing and through dedicated live fire tests to inform continued testing, full development and limited fielding decisions. This effort also demonstrates potential sensors, systems, and architectures to integrate the MDS for left through right of launch.			
Specific and/or unique planned accomplishments to each FY are as follows:			
FY 2020 Plans: - Conduct system level hardware-in-the-loop testing in conjunction with Enterprise Sensor Laboratory and Experimental Laboratory for MDS level tests - Shipping, labor, travel, and range support for MDS level tests			
FY 2021 Plans: - No funding is requested in FY 2021 for the Technology Maturation Initiatives Test budget project.			
FY 2020 to FY 2021 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MT99 / *Technology Maturation Initiatives Test*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
Decrease from FY 2020 to FY 2021 reflects the completion of passive EO/IR missile tracking tests and demonstrations, and removes advanced sensor participation from the IMTP.			
Accomplishments/Planned Programs Subtotals	0.502	6.324	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• 0603176C: *Advanced Concepts and Performance Assessment*	12.720	46.201	14.910	-	14.910	15.178	16.205	16.879	17.300	Continuing	Continuing
• 0603180C: *Advanced Research*	42.100	27.674	18.687	-	18.687	18.883	18.975	19.720	20.222	Continuing	Continuing
• 0603884C: *Ballistic Missile Defense Sensors*	382.759	352.288	281.957	-	281.957	576.699	656.539	574.703	593.592	Continuing	Continuing
• 0603890C: *BMD Enabling Programs*	614.855	634.449	599.380	-	599.380	552.815	544.582	560.863	582.675	Continuing	Continuing
• 0603896C: *Ballistic Missile Defense Command and Control, Battle Management & Communication*	500.965	549.756	593.353	-	593.353	593.330	546.471	581.376	543.971	Continuing	Continuing
• 0603914C: *Ballistic Missile Defense Test*	510.292	399.738	378.302	-	378.302	385.910	396.524	394.949	417.261	Continuing	Continuing

Remarks

D. Acquisition Strategy

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Missile Defense Agency			Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MT99 / *Technology Maturation Initiatives Test*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	-	-		-		-		-		-	-	-	N/A

Remarks

N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	-	-		-		-		-		-	-	-	N/A

Remarks

N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Technology Maturation Initiatives Test - Command Control Battle Management and Communications/Aegis	Various	Northrop Grumman, Lockheed Martin, Space and Naval Warfare Center, National Air and Space Intelligence Center, Naval Surface Warfare Center Dahlgren Division : CO, CA, OH, VA	4.574	0.494	Jan 2019	1.324	Oct 2019	0.000		-		0.000	0.000	6.392	0.000
Technology Maturation Initiatives Test - Range Facility Test Prep	MIPR	Pacific Missile Range Facility, Edwards AFB : HI, CA	0.429	0.008	Jan 2019	0.600	Oct 2019	0.000		-		0.000	0.000	1.037	0.000

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Missile Defense Agency			Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MT99 / *Technology Maturation Initiatives Test*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Technology Maturation Initiatives Test - Reagan Test Site Prep	MIPR	Reagan Test Site : Kwajalein Atoll	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	0.000
Technology Maturation Initiatives Test - Transportation Costs	MIPR	US Air Force : CA	6.889	0.000		4.400	Oct 2019	0.000		-		0.000	0.000	11.289	0.000
		Subtotal	11.892	0.502		6.324		0.000		-		0.000	0.000	18.718	N/A

Remarks

N/A

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	11.892	0.502		6.324		0.000		-		0.000	0.000	18.718	N/A

Remarks

Award Date reflects date of first obligation. Additional obligations may incrementally occur throughout the year.

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MT99 / *Technology Maturation Initiatives Test*

Significant Event Complete ▲ Significant Event Planned △ | Milestone Decision Complete ★ Milestone Decision Planned ☆ | Element Test Complete ◆ Element Test Planned ◇ | System Level Test Complete ● System Level Test Planned ○ | Complete Activity ✦ Planned Activity ✧

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
FTM-45 (AEGIS 5.1, DT Intercept Flight Test)	▲																											
FTI-03 (OTA, OT Intercept Flight Test)	▲																											
GT-228	▲																											
FTG-11 (OT) (GM, OT Intercept Flight Test)		▲																										
FTM-31 E1 (AEGIS SBT, DT/OT Intercept Flight Test)							△																					
FEX-01 (OTHER, DT Tracking Exercise FT)					✧	✧	✧	✧																				
FTM-44 (AEGIS 5.1, DT Intercept Flight Test)							△																					

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MT99 / *Technology Maturation Initiatives Test*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
FTM-45 (AEGIS 5.1, DT Intercept Flight Test)	1	2019	1	2019
FTI-03 (OTA, OT Intercept Flight Test)	1	2019	1	2019
GT-228	1	2019	1	2019
FTG-11 (OT) (GM, OT Intercept Flight Test)	2	2019	2	2019
FTM-31 E1 (AEGIS SBT, DT/OT Intercept Flight Test)	3	2020	3	2020
FEX-01 (OTHER, DT Tracking Exercise FT)	1	2020	4	2020
FTM-44 (AEGIS 5.1, DT Intercept Flight Test)	3	2020	3	2020

Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency			Date: February 2020
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604115C / *Technology Maturation Initiatives*	Project (Number/Name) MC98 / *Cyber Operations*	

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
MC98: *Cyber Operations*	0.633	5.430	0.475	0.475	-	0.475	0.464	0.470	0.479	0.489	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

N/A

A. Mission Description and Budget Item Justification

Cyber Operations sustains the Missile Defense Agency DoD Risk Management Framework (RMF) and Controls Validation Testing activities, analysis of validation results, risk assessments and reviews of proposed Program Manager/Information Assurance Manager Plans of Action and Milestones (POAM) for all Technology Maturation Initiative (TMI) mission systems. It maintains Certification and Accreditation data repository, capturing DoD Information Assurance Certification and Accreditation Program documentation (artifacts, validation results, and Information Assurance Risk Assessment results, and Designated Approving Authority accreditation decisions) and Plans of Action and Milestones on all MDA information systems.

This project monitors and tracks cybersecurity mitigations detailed in information technology security POAM. Activities include preparation of Certification and Accreditation documentation and accreditation recommendations to MDA Senior Information Assurance Officer /Certification Authority and Designated Approving Authority. Independent Verification and Validation team actions ensure the availability, integrity, authentication, confidentiality and non-repudiation of 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 2019	FY 2020	FY 2021
Title: Network / System Certification and Accreditation (C&A)	5.430	0.475	0.475
Articles:	-	-	-
Description: The Cyber Operations project sustains MDA DoD RMF certification and Controls Validation Testing activities for the TMI PE.			
Specific and/or unique planned accomplishments to each FY are as follows:			
FY 2020 Plans: - Conduct cyber security and information assurance engineering and architecture planning for TMI information technology systems - Plan and test the information assurance controls for MDS TMI systems - Develop TMI DoD RMF certification and accreditation packages - Conduct controls validation testing for TMI mission systems and provide Plan of Action and Milestones to mitigate information assurance deficiencies			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MC98 / *Cyber Operations*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
- Conduct annual information assurance reviews on the TMI enclaves to assess compliance in implementing and maintaining Information Assurance controls ***FY 2021 Plans:*** - Conduct cyber security and information assurance engineering and architecture planning for TMI information technology systems ***FY 2020 to FY 2021 Increase/Decrease Statement:*** N/A			
Accomplishments/Planned Programs Subtotals	5.430	0.475	0.475

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• 0603176C: *Advanced Concepts and Performance Assessment*	12.720	46.201	14.910	-	14.910	15.178	16.205	16.879	17.300	Continuing	Continuing
• 0603178C: *Weapons Technology*	13.400	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• 0603180C: *Advanced Research*	42.100	27.674	18.687	-	18.687	18.883	18.975	19.720	20.222	Continuing	Continuing

Remarks

D. Acquisition Strategy

The acquisition strategy for Cyber Operations, consists of using MDA civilian employees and the existing competitively awarded contractor support services.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MC98 / *Cyber Operations*

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Network / System Certification and Accreditation (C&A) - Cyber Development and Engineering	C/CPFF	Davidson Technologies, JHU, Raytheon : AL, MD, MA	0.000	5.000	Jan 2019	0.000		0.000		-		0.000	0.000	5.000	0.000
Network / System Certification and Accreditation (C&A) - Cybersecurity Management and Computer Network Defense	C/CPFF	TEAMS : AL, NM	0.000	0.270	Jan 2019	0.300	Oct 2019	0.315	Nov 2020	-		0.315	Continuing	Continuing	Continuing
Network / System Certification and Accreditation (C&A) - Network / System Certification and Accreditation (C and A) - Agency Operations – Civilian Salaries and Travel	Allot	Missile Defense Agency : NM	0.302	0.160	Oct 2018	0.175	Oct 2019	0.160	Oct 2020	-		0.160	Continuing	Continuing	Continuing
Network / System Certification and Accreditation (C&A) - Network / System Certification and Accreditation (C and A) - CDS Implementation	C/CPFF	Northrop Grumman : CO	0.331	0.000		0.000		0.000		-		0.000	0.000	0.331	0.000
		Subtotal	0.633	5.430		0.475		0.475		-		0.475	Continuing	Continuing	N/A

Remarks

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Missile Defense Agency			Date: February 2020
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604115C / *Technology Maturation Initiatives*	Project (Number/Name) MC98 / *Cyber Operations*	

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.633	5.430		0.475		0.475		-		0.475	Continuing	Continuing	N/A

Remarks

Award Date reflects date of first obligation. Additional obligations may incrementally occur throughout the year.

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MC98 / *Cyber Operations*

Significant Event Complete ▲ Significant Event Planned △ | Milestone Decision Complete ★ Milestone Decision Planned ☆ | Element Test Complete ◆ Element Test Planned ◇ | System Level Test Complete ● System Level Test Planned ○ | Complete Activity ✦ Planned Activity ✧

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
Cyber Security Support	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧
Cybersecurity Contract Award - 2	▲																											
Cybersecurity Contract Award - 1	▲																											
Cybersecurity Contract Award - 3		▲																										
Controls Validation Certification 1			▲																									
Controls Validation Certification FY 2022														△														
Controls Validation Certification FY 2025																										△		

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MC98 / *Cyber Operations*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Cyber Security Support	1	2019	4	2025
Cybersecurity Contract Award - 2	1	2019	1	2019
Cybersecurity Contract Award - 1	1	2019	1	2019
Cybersecurity Contract Award - 3	2	2019	2	2019
Controls Validation Certification 1	3	2019	3	2019
Controls Validation Certification FY 2022	3	2022	3	2022
Controls Validation Certification FY 2025	3	2025	3	2025

Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency			Date: February 2020
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604115C / *Technology Maturation Initiatives*	Project (Number/Name) MD40 / *Program Wide Support*	

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
MD40: *Program Wide Support*	15.188	6.661	9.268	2.677	-	2.677	2.905	3.919	3.078	3.059	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Program Wide Support (PWS) is allocated on a pro-rata basis across multiple Agency PE's each fiscal year based on the total Agency budget, and therefore fluctuates per PE by fiscal year.

A. Mission Description and Budget Item Justification

PWS contains non-headquarters management costs in support of MDA functions and activities across the entire MDS. These functions include Government Civilians and Contract Support Services. This effort provides integrity and oversight of the MDS 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.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
Title: Program Wide Support	6.661	9.268	2.677
Articles:	-	-	-
Description: PWS contains non-headquarters management costs in support of MDA functions and activities across the entire MDS. These functions include Government Civilians and Contract Support Services. This effort provides integrity and oversight of the MDS 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,			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD40 / *Program Wide Support*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
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. ***FY 2020 Plans:*** - SEE ABOVE. ***FY 2021 Plans:*** - SEE ABOVE. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Decrease from FY 2020 to FY 2021 reflects the PWS allocation on a pro-rata basis across multiple Agency PE's each fiscal year based on the total Agency budget, and therefore fluctuates per PE by fiscal year.			
Accomplishments/Planned Programs Subtotals	6.661	9.268	2.677

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD40 / *Program Wide Support*

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Wide Support - Agency Facilities and Maintenance	MIPR	Various : AL, CO, CA, VA	0.000	0.000		9.129	Nov 2019	1.262	Nov 2020	-		1.262	Continuing	Continuing	Continuing
Program Wide Support - Agency Operations Management	MIPR	Various : Multi: AL, VA	0.124	0.101	Jul 2019	0.139	Jul 2020	0.000		-		0.000	0.000	0.364	0.000
Program Wide Support - Agency Operations and Support Other Agency Services	MIPR	Various : Multi: AK, AL, CO, CA, HI, MD, VA	0.000	0.000		0.000		1.200	Nov 2020	-		1.200	Continuing	Continuing	Continuing
Program Wide Support - Agency Operations and Support Services	C/CPFF	Various : Multi: AK, AL, CA, CO, VA	15.064	6.560	Jun 2019	0.000		0.000		-		0.000	0.000	21.624	0.000
Program Wide Support - Agency Operations, Sustainment and GPC	C/FFP	Various : Multi: AK, AL, CA, CO, VA	0.000	0.000		0.000		0.215	Nov 2020	-		0.215	Continuing	Continuing	Continuing
		Subtotal	15.188	6.661		9.268		2.677		-		2.677	Continuing	Continuing	N/A

Remarks

N/A

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	15.188	6.661		9.268		2.677		-		2.677	Continuing	Continuing	N/A

Remarks

Award Date reflects date of first obligation. Additional obligations may incrementally occur throughout the year.

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD40 / *Program Wide Support*

Significant Event Complete ▲ | Milestone Decision Complete ★ | Element Test Complete ◆ | System Level Test Complete ● | Complete Activity ✦
Significant Event Planned △ | Milestone Decision Planned ☆ | Element Test Planned ◇ | System Level Test Planned ○ | Planned Activity ✧

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
MD40 Program-Wide Support	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD40 / *Program Wide Support*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
MD40 Program-Wide Support	1	2019	4	2025