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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604200F / <i>Future Advanced Weapon Analysis & Programs</i>
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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	-	0.262	5.000	25.161	0.000	25.161	46.330	0.000	0.000	0.000	0.000	76.753
653133: <i>Armament Subsystems</i>	-	0.262	5.000	25.161	0.000	25.161	46.330	0.000	0.000	0.000	0.000	76.753
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

This program provides a responsive design and development engineering infrastructure to address emerging issues and technology insertion/technology application on legacy systems, and supports analysis to develop new capability systems, improve legacy systems, or determine feasibility of utilizing prototypes with advanced technology on fielded systems. Efforts will identify methods to improve system performance, develop potential future designs, mitigate evolving threats, reduce life cycle costs, develop/expand modeling/simulation and experimental platforms for weapon qualification activities, improve safety, and ensure both viability and durability of tactical missile systems. Results enable highly informed decisions on acquisition initiatives to develop, refine, and rapidly integrate emerging technologies into new weapons concepts or existing aircraft munitions which include, but are not limited to, multi-role missile development, advanced long-range weapons capabilities, advanced propulsion systems technologies, non-kinetic and directed energy technologies, warheads, fuzes, and tailkits to address warfighter, Air Staff and OSD initiatives and strategies.

In order to accomplish the above objectives, this program may accomplish pre-acquisition planning and systems engineering, risk reducing prototype missile design work, aircraft integration, prototype ground & flight tests, pre-planning and execution of Joint Capability Technology Demonstrations (JCTD), development and prototyping of threat emulations, simulations, presentation of evolving threat scenarios, target area environments to prepare for emerging weapons development activities, and program management support.

Finally, this program also conducts high fidelity Modeling, Simulation and Analysis (MS&A) to support the development, testing and evaluating of future concept and legacy weapons. The MS&A work includes physics-level, engineering-level, and engagement/mission-level modeling simulation and analysis.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Future Advanced Weapon Systems capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	39.602	246.200	169.400	0.000	169.400
Current President's Budget	0.262	5.000	25.161	0.000	25.161
Total Adjustments	-39.340	-241.200	-144.239	0.000	-144.239
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-241.200			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-37.963	0.000			
• SBIR/STTR Transfer	-1.377	0.000			
• Other Adjustments	0.000	0.000	-144.239	0.000	-144.239

Change Summary Explanation

FY 2019 reduction of \$37.963 for higher Air Force Priorities due to Extended Range Weapon (ERWn) termination

FY 2019 reduction of \$1.377M for SBIR

FY 2020 reduction of \$241.200 for Congressional Directed Reduction due to ERWn termination

FY 2021 reduction of \$144.239 for higher Air Force Priorities due to ERWn termination

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>Title: Capability Development</p> <p>Description: Plan and execute early Systems Engineering, concept studies, trade space analyses, modeling & simulation, portfolio acquisition planning, agile acquisition strategies, and risk reduction activities for future advanced weapon systems to defeat evolving threat scenarios and environments. Provides security, temporary work space/seating, and information technology capabilities to support mission needs.</p> <p>FY 2020 Plans: Collaborate with Next Generation Munitions Cross Functional Team (CFT) to define operational context for Affordable Mass Weapons and outline connectivity between acquisition paths and the transition of critical enabling technologies. Collaborate with Navy on future weapon initiatives. Support Next Gen Munitions CFT development of Air-to-Air Weapons Roadmap. Conduct engagement level trade space analyses and initial acquisition strategies for Defensive Weapons. Enable recurring engagements with AFRL to strategize future acquisition of directed energy weapons.</p> <p>FY 2021 Plans: Complete requirements definition via concept studies, engagement level analyses, and develop initial acquisition strategies for Affordable Mass Weapons. Complete engagement-level and begin mission-level trade space analyses for Defensive Weapons.</p>	0.262	2.000	8.750

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Incorporate Weapon Open System Architecture development and digital engineering into Affordable Mass, Defensive Weapons, and future air-to-air weapon concept studies and acquisition planning. Continue directed energy and non-kinetic technology transition activities. Begin pre-acquisition and systems engineering activities of future air-breathing hypersonic weapons.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased due to starting concept studies in FY21</p>				
<p>Title: Rapid Prototyping</p> <p>Description: Conduct rapid acquisition/prototyping efforts and Modeling, Simulation, and Analysis (MS&A) validated through integration of empirical data derived from prototypes and demonstrations.</p> <p>FY 2020 Plans: Establish Memorandums of Agreement between government agencies and outline test plan for Phase I (telemetry) and II (live warhead) demo of a defensive weapon. Establish Cooperative Research & Development Agreement with industry for flight test of a baseline Affordable Mass Weapon concept. Fund government agencies to provide test planning and aircraft integration support of prototype vehicle developed under industry Independent Research & Development (IRAD).</p> <p>FY 2021 Plans: Acquire and modify test assets for demo of a defensive weapon. Conduct Phase I flight test and analysis of a defensive weapon. Complete Phase II test design and planning. Design and flight test a derivative prototype of an Affordable Mass Weapon concept for a second mission using digital engineering.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased due to acquisition of test assets and conducting flight test in FY21.</p>		-	2.000	15.000
<p>Title: Digital Foundation</p> <p>Description: Provides model-based systems engineering, modeling & simulation, data analysis tool suites, and associated software engineering expertise to support weapons capability development and rapid prototyping.</p> <p>FY 2020 Plans: Develop weapons analysis repository database. Maintain trade space analysis framework. Develop model-based systems engineering concept development framework. Develop weapon survivability modeling capability and maritime lethality analysis capability.</p> <p>FY 2021 Plans:</p>		0.000	0.500	0.911

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
Maintain weapons analysis repository database. Update trade space analysis framework to enable online collaboration with other government agencies. Employ newly developed digital foundation to support weapon capability development. FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased to support additional framework capacity and modeling capabilities.				
Title: Industry Connectivity Description: Enables Air Force outreach to small and large businesses to solicit innovative material solutions for future weapon initiatives. FY 2020 Plans: Conduct annual Weapons Industry Day / Armament Futures workshop. Provide support to the Agile Acquisition Consortium's annual classified Threat Day. Establish Weapons Pitch Days for small and large businesses. Establish Innovation Event following the AF Armament Futures workshop to invigorate rapid next generation weapon solutions. FY 2021 Plans: Conduct annual AF Armament Futures Workshop, Innovation Event, Threat Day, and Pitch Days for small and large businesses. Develop future agendas based on participant feedback and informed by capability development weapons roadmap activities. FY 2020 to FY 2021 Increase/Decrease Statement: N/A		-	0.500	0.500
Accomplishments/Planned Programs Subtotals		0.262	5.000	25.161
D. Other Program Funding Summary (\$ in Millions) N/A				
Remarks				
E. Acquisition Strategy Accomplish studies, analyses, concept development and engineering; efforts will be conducted using contracting strategies deemed most appropriate, generally using competitive contracts and/or other obligating documentation considered most appropriate by obligating and performing agencies involved.				

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force												Date: February 2020				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)					Project (Number/Name)							
3600 / 5				PE 0604200F / Future Advanced Weapon Analysis & Programs					653133 / Armament Subsystems							
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Directed Energy Studies	MIPR	AFRL : Various	-	-		1.250	Jul 2020	3.530	Jul 2021	-		3.530	0.000	4.780	-	
Prototype Vehicle Development & Integration	C/Various	AFLCMC/EB : Eglin AFB, FL	-	-		1.480	May 2020	10.250	Mar 2021	-		10.250	0.000	11.730	-	
Affordable Mass Studies	C/TBD	TBD : TBD	-	-		0.250	Jul 2020	4.040	Jul 2021	-		4.040	0.000	4.290	-	
Subtotal			-	-		2.980		17.820		-		17.820	0.000	20.800	N/A	
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Systems Engineering & Studies Support	C/Various	AFLCMC/EB : Eglin AFB, FL	-	0.079	Feb 2020	0.536	Jun 2020	2.144	Jun 2021	-		2.144	0.000	2.759	-	
Modeling & Simulation Licenses & Support	C/Various	AFLCMC/EB : Eglin AFB, FL	-	-		0.500	May 2020	0.911	May 2021	-		0.911	0.000	1.411	-	
Subtotal			-	0.079		1.036		3.055		-		3.055	0.000	4.170	N/A	
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Government Test and Evaluation	MIPR	Various : Various	-	-		0.216	Nov 2020	2.750	Apr 2021	-		2.750	0.000	2.966	-	
Subtotal			-	-		0.216		2.750		-		2.750	0.000	2.966	N/A	
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Program Management Administration	Various	Various : Eglin AFB, FL	-	0.183	Sep 2019	0.768	Dec 2019	1.536	Dec 2020	-		1.536	0.000	2.487	-	

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Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604200F / <i>Future Advanced Weapon Analysis & Programs</i>	Project (Number/Name) 653133 / <i>Armament Subsystems</i>
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Subtotal			-	0.183		0.768		1.536		-		1.536	0.000	2.487	N/A

Remarks
Includes A&AS contract, IT requirements, travel, and office supplies.

	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	-	0.262	5.000	25.161	-	25.161	0.000	30.423	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604200F / <i>Future Advanced Weapon Analysis & Programs</i>	Project (Number/Name) 653133 / <i>Armament Subsystems</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Capability Development																												
Defensive Weapons Engagement Lvl Analysis																												
Defensive Weapons Mission Lvl Analysis																												
Directed Energy/Non-Kinetic Studies																												
Air-to-Air Roadmap Analysis of Alternatives																												
Affordable Mass Capabilities Based Assessment																												
Affordable Mass Engagement Lvl Analysis																												
Affordable Mass Concept Studies																												
Air-Breathing Hypersonics Pre-Acquisition Analysis																												
Rapid Prototyping																												
Defensive Weapon Prototyping & Demonstration																												
Affordable Mass Prototyping & Demonstration																												
Affordable Mass Open System Architecture Development Phase I																												
Affordable Mass Open System Architecture Development Phase II																												
Digital Foundation																												
Weapons Analysis Database & Framework																												
Models Based Systems Engr Framework																												
Weapons Survivability Modeling																												
Maritime Effects Lethality Modeling																												
Industry Connectivity																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Futures Workshops, Pitch Days, Innovation Days	[REDACTED]																											
Threat Day Events	[REDACTED]																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Capability Development				
Defensive Weapons Engagement Lvl Analysis	3	2019	3	2020
Defensive Weapons Mission Lvl Analysis	4	2020	3	2021
Directed Energy/Non-Kinetic Studies	4	2020	4	2022
Air-to-Air Roadmap Analysis of Alternatives	3	2021	3	2022
Affordable Mass Capabilities Based Assessment	2	2020	3	2020
Affordable Mass Engagement Lvl Analysis	4	2021	3	2022
Affordable Mass Concept Studies	3	2021	4	2022
Air-Breathing Hypersonics Pre-Acquisition Analysis	2	2021	4	2022
Rapid Prototyping				
Defensive Weapon Prototyping & Demonstration	3	2020	3	2022
Affordable Mass Prototyping & Demonstration	4	2020	4	2022
Affordable Mass Open System Architecture Development Phase I	2	2021	4	2021
Affordable Mass Open System Architecture Development Phase II	1	2022	4	2022
Digital Foundation				
Weapons Analysis Database & Framework	1	2020	4	2022
Models Based Systems Engr Framework	3	2020	1	2021
Weapons Survivability Modeling	1	2021	4	2022
Maritime Effects Lethality Modeling	1	2021	2	2022
Industry Connectivity				
Futures Workshops, Pitch Days, Innovation Days	3	2020	3	2022
Threat Day Events	2	2020	2	2022