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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

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 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	4.993	22.894	23.499	0.000	23.499	-	-	-	-	-	-
653133: <i>Armament Subsystems</i>	-	4.993	22.894	23.499	0.000	23.499	-	-	-	-	-	-
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 weapon 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.

The FY 2022 funding request was reduced by \$1.315 million to account for the availability of prior year execution balances.

This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver Future Advanced Weapon Systems capabilities for emergent or unanticipated weapon system capability. 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 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	5.000	25.161	46.330	0.000	46.330
Current President's Budget	4.993	22.894	23.499	0.000	23.499
Total Adjustments	-0.007	-2.267	-22.831	0.000	-22.831
• Congressional General Reductions	0.000	-0.042			
• Congressional Directed Reductions	0.000	-2.225			
• 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	-0.007	0.000			
• Other Adjustments	0.000	0.000	-22.831	0.000	-22.831

Change Summary Explanation

FY21 Appropriation Conference Mark -\$2.225M RDT&E for "Improving funds management: Forward financing". FY22 reduction due to program rephase.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Capability Strategy Development	3.648	12.485	12.583	0.000	12.583
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, workspace/seating, and information technology capabilities to support mission needs.					
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. 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.					
FY 2022 Base Plans: Conduct requirements analysis for Air Superiority, Global Precision Attack, and Base Defense efforts. Evaluate industry implementation of kinetic weapon open system architecture for a candidate initiative. Collaborate with OSD (R&E), Army, and Navy to develop a common directed energy weapon open system architecture. Begin					

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C. Accomplishments/Planned Programs (\$ in Millions)					
Trade Space Analysis Framework to characterize operational context and desired material system attributes for weapon related capability gaps. Provide weapon effectiveness analyses and capability development strategies to senior leaders for future weapons investment planning and wargames.					
FY 2022 OCO Plans: None					
FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased due to multiple industry contracts to support implementation and evaluation of open system architecture in a candidate weapon initiative and other parallel weapon development efforts.					
Title: Rapid Prototyping					
Description: Conduct rapid acquisition/prototyping efforts and Modeling, Simulation, and Analysis (MS&A) validated through integration of empirical data derived from prototypes and demonstrations.					
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.					
FY 2022 Base Plans: Prototyping of Global Precision Attack and Base Defense weapon concepts to demonstrate feasibility of key attributes. Begin coordination of test planning with key MAJCOM and COCOM stakeholders.					
FY 2022 OCO Plans: None					
FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased due to multiple prototyping defensive weapons demos and follow-on industry studies.					
Title: Digital Foundation					
Description: Provides model-based systems engineering, modeling & simulation (M&S), data analysis tool suites, and associated software engineering expertise to support weapons capability strategy development and rapid prototyping. Provides Validation & Verification (V&V) of contractor M&S models and tools. Develops Guidance, Navigation, and Control (GNC) and weapon survivability analysis capabilities. Creates and maintains					
	0.799	5.064	5.442	0.000	5.442
	0.422	2.679	2.764	0.000	2.764

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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
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<p>a searchable electronic weapons database. Develops and evaluates future weapon open system architectures and digital engineering tools.</p> <p>FY 2021 Plans: 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 strategy development.</p> <p>FY 2022 Base Plans: Maintain weapons analysis repository database. Continue updates to trade space analysis framework to enable online collaboration with other government agencies. Maintain developed digital foundation to support weapon capability strategy development. Conduct weapon lethality and survivability analyses.</p> <p>FY 2022 OCO Plans: None</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased due to building additional M&S capabilities, models, and tools.</p>					
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<p>Title: Industry Connectivity</p> <p>Description: Enables Air Force outreach to small and large businesses to solicit innovative material solutions for future weapon initiatives. This includes planning and execution activities for the development of campaign analysis, rapid innovation events, communicating technology needs at industry conferences (i.e. Weapons Conference, Air Force Association Symposium), and evaluating industry submissions for innovative technologies. Demonstrate potential utility of innovative technologies from Small Business Innovation Research (SBIR) contracts, campaign analyses, experiments, and prototypes.</p> <p>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 strategy development weapons roadmap activities.</p> <p>FY 2022 Base Plans:</p>	0.124	2.666	2.710	0.000	2.710
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Conduct annual AF Armament Futures Workshop, Innovation and Industry Day events for small and large businesses, and Threat Day. Develop future agendas based on participant feedback and informed by capability strategy development weapons roadmap activities. FY 2022 OCO Plans: None FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased due to additional Innovation Day and Industry Days events.					
Accomplishments/Planned Programs Subtotals	4.993	22.894	23.499	0.000	23.499

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 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604200F / <i>Future Advanced Weapon A nalysis & Programs</i>	Project (Number/Name) 653133 / <i>Armament Subsystems</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
Directed Energy Studies	MIPR	AFRL : Various	-	1.250	Jul 2020	0.400	Jul 2021	-		-		-	-	-	-
Prototype Vehicle Development & Integration	C/Various	AFLCMC/EB : Eglin AFB, FL	-	1.480	May 2020	-		3.322	Jul 2022	-		3.322	-	-	-
Affordable Mass & Concept Studies	C/TBD	TBD : TBD	-	0.250	Jul 2020	0.203	Jul 2021	3.528	Jan 2022	-		3.528	-	-	-
Future Weapons Open System Architecture	TBD	TBD : Various	-	-		1.361	Apr 2021	0.478	Jan 2022	-		0.478	-	-	-
Subtotal				-		2.980		1.964		7.328		7.328	-	-	N/A

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
Systems Engineering & Studies Support	C/Various	AFLCMC/EB : Eglin AFB, FL	-	0.536	Jun 2020	5.901	Jun 2021	4.016	Jun 2022	-		4.016	-	-	-
Modeling & Simulation Licenses & Support	C/Various	AFLCMC/EB : Eglin AFB, FL	-	0.500	May 2020	0.613	May 2021	1.008	May 2022	-		1.008	-	-	-
Subtotal				-		1.036		6.514		5.024		5.024	-	-	N/A

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
Government Test and Evaluation	MIPR	Various : Various	-	0.216	Nov 2020	7.288	Apr 2021	3.120	Feb 2022	-		3.120	-	-	-
Subtotal				-		0.216		7.288		3.120		3.120	-	-	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

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Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
Government Program Management Administration	Various	Various : Eglin AFB, FL	-	0.761	Dec 2019	7.128	Dec 2020	8.027	Dec 2021	-		8.027	-	-	-
Subtotal			-	0.761		7.128		8.027		-		8.027	-	-	N/A

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

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	4.993	22.894	23.499	-	23.499	-	-	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
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FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
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 Strategy Development	
Air Superiority, Global Precision Attack, and Base Defense Requirements Analyses	
Future Weapons Open System Architecture	
Trade Space Analysis Framework	
Rapid Prototyping	
Global Precision Attack Weapon Demos	
Base Defense Weapon Demos	
Digital Foundation	
Lethality, GNC & Survivability Modeling, Simulation and Analysis	
Analysis Database Repository	
Model-Based Systems Engineering Foundation	
Weapon Open System Architecture Built-In	
Industry Connectivity	
Futures Workshops, Concepts Studies	
Threat Day Events, Innovation Days	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Capability Strategy Development				
Air Superiority, Global Precision Attack, and Base Defense Requirements Analyses	2	2021	4	2026
Future Weapons Open System Architecture	3	2021	4	2026
Trade Space Analysis Framework	2	2021	4	2026
Rapid Prototyping				
Global Precision Attack Weapon Demos	2	2021	4	2026
Base Defense Weapon Demos	2	2021	4	2026
Digital Foundation				
Lethality, GNC & Survivability Modeling, Simulation and Analysis	1	2021	4	2026
Analysis Database Repository	2	2021	3	2026
Model-Based Systems Engineering Foundation	1	2021	4	2026
Weapon Open System Architecture Built-In	1	2021	2	2026
Industry Connectivity				
Futures Workshops, Concepts Studies	1	2021	4	2026
Threat Day Events, Innovation Days	2	2021	2	2026