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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Air Force **Date:** March 2023

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 0604735F / <i>Combat Training Ranges</i>
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COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	23.218	103.784	152.569	0.000	152.569	235.960	54.645	61.565	63.792	0.000	695.533
652286: <i>Combat Training Range Equipment</i>	-	23.218	103.784	152.569	0.000	152.569	235.960	54.645	61.565	63.792	0.000	695.533
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

COMBAT TRAINING RANGES (CTR): Portfolio provides electronic warfare equipment and support to Air Force combat training ranges for training, testing, and evaluation of aircrews. Development and integration efforts include: aircraft pods, radar emitters, advanced radar emitters, communication jammers, command and control and debrief capability, and instrumentation equipment. All development efforts support USAF aircraft for Joint, Coalition, and Live Virtual Constructive (LVC) training events.

This program leverages Digital acquisition tenets of open, agile, and digital. Common component development, in collaboration with other weapon systems, to reduce redundant costs between systems with similar subsystems requirements. Invests in analytical, information management, data management, digital environments, networks, facilities, and security infrastructure upgrades directly supporting development and sustainment of this program's capabilities, while leveraging DoD and DAF enterprise IT solutions

ADVANCED RADAR THREAT SYSTEM (ARTS): The ARTS program will design, develop, and test threat systems based on replicating advanced foreign fielded Surface-to-Air Missile (SAM) radar and Electronic Warfare (EW) threat systems. The ARTS variants will be used at Department of Defense (DoD) test and training ranges for 4th generation, 5th generation, and 5th generation plus aircrew training and tactics development. ARTS variants are also developed for LVC integration and full simulation training. Efforts include but are not limited to: research, studies, technology development, engineering, and manufacturing advanced radar emitters.

MODERNIZATION RANGE THREATS SYSTEMS (RTS): The RTS program supports upgrading and modifying legacy range threat systems to provide combat training relevancy and enhanced systems capabilities. Legacy systems include Multiple Threat Emitter System (MUTES), Miniature Multiple Threat Emitter System (Mini-MUTES), Modular Threat Emitter (MTE) system, Tactical Radar Threat Generator (TRTG) system, Band Simulator, Unmanned Modular Threat Emitter (UMTE) system, and Joint Threat Emitter (JTE) system.

LIVE MISSION OPERATIONS CAPABILITY (LMOC): LMOC is an effort to modernize range control centers with common hardware and software that can support live-synthetic training missions. LMOC will provide a node-based enterprise that integrates all range system capabilities, including pre/post mission coordination, in a multi-level secure environment to enable blended live-synthetic training for 4th/5th generation aircraft and aircrew.

P6 COMBAT TRAINING SYSTEM (P6CTS): P6CTS replaced the existing P5 Combat Training System (P5CTS). P6CTS will resolve existing critical training capability gaps and will enable comprehensive, realistic training environments for 4th Gen - 5th Gen aircraft systems. Key upgrades include a trusted operating system, Multiple

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Level Security (MLS) architecture, Type 1 encryption of over-air data, and increased processing capability. P6CTS investment will support a robust Air-to-Air and Air-to-Ground combat training environment and provide a growth path to LVC exercises.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605827F, 0605828F, 0605829F, 0605831F, 0605832F, 0605833F, 0605898F, 0606398F.

This FY24 funding request was reduced by \$2.024 million to account for the availability of prior year execution balances.

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.

B. Program Change Summary (\$ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	23.980	91.284	182.696	0.000	182.696
Current President's Budget	23.218	103.784	152.569	0.000	152.569
Total Adjustments	-0.762	12.500	-30.127	0.000	-30.127
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	12.500			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.762	0.000			
• Other Adjustments	0.000	0.000	-30.127	0.000	-30.127

Change Summary Explanation

FY22 reduced by 0.762M for SBIR

FY23 Congressional Add for 12.500M to support Joint Pacific Alaska Range Complex

FY24 funding reduced by 20.000M to properly align ARTS v3 for bed down; FY24 additionally reduced by 8.085M for ARTS V2 cancellation and 2.040M for availability of prior year execution balances.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2022	FY 2023	FY 2024
Title: Advanced Radar Threat System-Variant 1 (ARTS-V1)	0.314	0.100	0.000

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2022	FY 2023	FY 2024
<p>Description: ARTS-V1 program to design, develop, build, and test radar threat systems based on advanced strategic, long-range, re-locatable foreign fielded SAM radar threat systems is now in production. ARTS-V1 leverages an existing DoD test resource development program to reduce non-recurring development cost, minimize schedule risk, and promote range interoperability between test and training. The focus of the program is to develop realistic radar threat systems meant to test 5th Generation aircraft capabilities.</p> <p>FY 2023 Plans: RDT&E closeout efforts</p> <p>FY 2024 Plans: N/A. Program shift to procurement.</p> <p>FY 2023 to FY 2024 Increase/Decrease Statement: RDT&E reduced in FY24 due to reaching Milestone C.</p>				
<p>Title: Advanced Radar Threat System-Variant 2 (ARTS-V2)</p> <p>Description: ARTS-V2 program will design, develop, build, and test radar emitter systems based on an advanced tactical, mobile, short/medium range foreign fielded SAM radar threat system. Development efforts include ARTS-V2 integration into LVC architecture, ongoing analyses, studies, developing high-fidelity surrogate targets, and risk reduction.</p> <p>FY 2023 Plans: No FY23 activity. Contract has been terminated for convenience.</p> <p>FY 2024 Plans: No FY24 activity. Contract has been terminated for convenience.</p> <p>FY 2023 to FY 2024 Increase/Decrease Statement: No activity planned for FY24. Contract has been terminated for convenience.</p>		0.100	0.000	0.000
<p>Title: Advanced Radar Threat System-Variant 3 (ARTS-V3)</p> <p>Description: ARTS-V3 program will design, develop, build, and test advanced Surface-to-Air Missile (SAM) radar threat systems. ARTS-V3 will replicate strategic/tactical threats at the fidelity necessary for 5th generation and 5th generation plus aircraft supporting multi-domain platform engagements. The ARTS-V3 requirement is to develop a modular radar threat system that has a growth path to replicate multiple advanced SAM threats and support Live Virtual Constructive (LVC) training. Efforts include but are not limited to: development of a Production Representative Articles (PRA), development of command and control software, digital engineering, and efforts focused on integrating ARTS-V3 into test and training ranges plus LVC architectures.</p>		22.704	86.193	123.858

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2022	FY 2023	FY 2024
<p>FY 2023 Plans: Award the contract to develop the ARTS-V3 PRA for developmental and operational testing. Efforts include but are not limited to the following: PRA development, engineering, manufacturing, training range integration, interfaces, software development, and developmental tests, and operational tests.</p> <p>FY 2024 Plans: Continue the work awarded in FY 2023 to develop the ARTS-V3 Production Representative Articles (PRA) for developmental and operational testing. Efforts include but are not limited to the following: PRA development, engineering, manufacturing, training range integration, interfaces, software development, and developmental tests, and operational tests.</p> <p>FY 2023 to FY 2024 Increase/Decrease Statement: The FY 2024 funding increased to enable the rest of the radar system to be built, integrating the long lead hardware and software from FY 2023, to have a full PRA designed and built for full system testing by FY 2025.</p>				
<p>Title: Live Mission Operations Capability (LMOC)</p> <p>Description: LMOC is an effort to modernize training range control centers with common hardware and software that can support live-synthetic training missions. LMOC provides a node-based software enterprise that integrates all range system capabilities, including pre/post mission coordination, in a multi-level secure environment to enable blended live-synthetic training for 4th/5th generation aircraft and aircrew.</p> <p>FY 2023 Plans: Funding supports continued development of "WarRoom" for all fielded locations, automated mission planning and Multi-Level Security development.</p> <p>FY 2024 Plans: FY24 plans include, but not limited to: continued development and testing of additional capabilities for WarRoom such as Mission Planning, Performance-based Training and Pre/Post Mission applications. Conduct further the development of multi-level security to provide the capability to guise, filter or block data as required.</p> <p>FY 2023 to FY 2024 Increase/Decrease Statement: Funding increased to allow the program to continue to develop and deliver minimum viable capability releases to the field. Increased funding will also support, but not limited to test and integration activities for WarRoom to include Spectrum upgrade testing.</p>		0.100	4.864	6.970
<p>Title: P6 Combat Training System (P6CTS)</p>		0.000	12.627	21.741

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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2022	FY 2023	FY 2024
<p>Description: P6CTS is aircraft instrumentation pod that will replace the existing P5CTS pods used for training exercises between 4th and 5th generation platforms. P6CTS will resolve existing critical training capability gaps and will enable comprehensive, realistic training environments for 4th Gen - 5th Gen aircraft systems. Key upgrades include the following: trusted operating system, Multiple Level Security (MLS) architecture, Type 1 encryption of over-air data, and increased processing capability.</p> <p>FY 2023 Plans: Funds will support but is not limited to product development, test, and aircraft integration on the F-15 and F-16. Funds will also support integrating P6CTS ground subsystem with select training ranges.</p> <p>FY 2024 Plans: Funds will support but is not limited to product development, test, and continued aircraft integration on the F-15 and F-16 and other AF platforms including F-35, T-38 and B-52. Funds will also support rehosting of P6CTS ground subsystem on Live Mission Operation Capability Center (LMOC) WarRoom infrastructure. Funds will also be applied toward cost-shared Class I Engineering Change Proposals (ECPs) to address Diminishing Manufacturing Sources and Material Shortages (DMSMS).</p> <p>FY 2023 to FY 2024 Increase/Decrease Statement: Funding increase to integrate onto additional AF platforms including F-35, T-38 and B-52 as well as the USAF cost-share of DMSMS driven Class I ECPs to include redesign of the KOV74a and the TCTS Inc II Time-Space-Position-Information (TSPI) unit.</p>			
Accomplishments/Planned Programs Subtotals	23.218	103.784	152.569

D. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
• OPAF 03 Line Item 834190: <i>Combat Training Ranges</i>	320.088	139.213	103.977	-	103.977	95.433	214.758	223.760	228.504	0.000	1,325.733
• OPAF 05 Line Item 861900: <i>Spares and Repair Parts</i>	1.559	8.094	744.000	-	744.000	760.000	776.000	806.000	0.823	0.000	3,096.476
• APAF 07 Line Item 000075: <i>Other Production Charges</i>	14.784	21.973	57.086	-	57.086	81.884	69.479	23.014	51.495	0.000	319.715

Remarks

E. Acquisition Strategy
The acquisition strategy varies by effort. Overall strategy is competition focused, with the use of but not limited to other transaction authority, cost plus and fixed price contracts.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Air Force **Date:** March 2023

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604735F / <i>Combat Training Ranges</i>	Project (Number/Name) 652286 / <i>Combat Training Range Equipment</i>
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Product Development (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 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			
Advanced Radar Threat System-Variant 1 (ARTS-V1) Development	Various	Georgia Tech Research : Pax River, MD	-	0.251	Nov 2021	0.100	Nov 2022	-		-		-	0.000	0.351	-
Advanced Radar Threat System-Variant 2 (ARTS-V2) Development	C/FPIF	Lockheed Martin : Grand Prairie, TX	-	0.080	Dec 2021	-		-		-		-	0.000	0.080	-
Advanced Radar Threat System-Variant 3 (ARTS-V3) Development	C/FFP	SAAB, LM, NG, DYNETICS : Various	-	18.025	Jan 2022	64.484	Apr 2023	117.275	Apr 2024	-		117.275	0.000	199.784	-
Not specified.	Various	Various : TBD	-	-		-		-		-		-	0.000	0.000	-
P6 Combat Training System	Various	Various : Various	-	-		2.000	Apr 2023	15.541	Dec 2023	-		15.541	0.000	17.541	-
Modernization Systems	Various	Various : Hill AFB, UT	-	0.080	Nov 2021	-		-		-		-	0.000	0.080	-
Live Mission Operation Capability (LMOC)	Various	Georgia Tech Research : Various	-	-		4.700	Jan 2023	4.567	Mar 2024	-		4.567	0.000	9.267	-
Subtotal			-	18.436		71.284		137.383		-		137.383	0.000	227.103	N/A

Support (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 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			
Advanced Radar Threat Systems-Variant 3 (Direct Msn Spt)	Various	Various : Various	-	0.250	Dec 2021	2.000	Dec 2022	1.500	Oct 2023	-		1.500	0.000	3.750	-
Advanced Radar Threat Systems-Variant 3 (Direct Cite Authority Civ Pay)	Various	Various : Various	-	0.900	May 2022	1.000	Feb 2023	1.650	Oct 2023	-		1.650	0.000	3.550	-
Live Mission Operation Capability (Direct Cite Authority Civ Pay)	Various	Various : Various	-	-		-		0.823	Oct 2023	-		0.823	Continuing	Continuing	-
Live Mission Operation Capability	Various	Not specified. : TBD	-	-		-		0.450	Oct 2023	-		0.450	Continuing	Continuing	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Air Force **Date:** March 2023

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604735F / <i>Combat Training Ranges</i>	Project (Number/Name) 652286 / <i>Combat Training Range Equipment</i>
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Support (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 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			
(Intergovernmental Support Agreement)															
P6CTS (Direct Cite Authority Civ Pay)	Various	Various; Various : TBD	-	-		-		2.000	Feb 2024	-		2.000	0.000	2.000	-
Subtotal			-	1.150		3.000		6.423		-		6.423	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 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			
Advanced Radar Threat Systems-Variant 3 (Direct Msn Spt)	C/Various	Not specified. : TBD	-	1.473	Oct 2021	3.500	Dec 2022	2.643	Mar 2024	-		2.643	0.000	7.616	-
P6 Combat Training System	C/Various	Not specified. : TBD	-	-		22.250	Apr 2023	1.200	Nov 2023	-		1.200	0.000	23.450	-
Live Mission Operations Capability	PO	Not specified. : TBD	-	-		-		0.165	Dec 2023	-		0.165	Continuing	Continuing	-
Subtotal			-	1.473		25.750		4.008		-		4.008	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 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			
Advanced Radar Threat Systems-Variant 3 (Program Support Cost - Contractor Services)	Various	Various : Hill AFB, UT	-	2.050	May 2022	3.000	Dec 2022	0.790	Feb 2024	-		0.790	0.000	5.840	-
Advanced Radar Threat Systems-Variant 3 (Program Support Cost - Other Govt. Costs)	Various	Various : Hill AFB, UT	-	-		-		-		-		-	Continuing	Continuing	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Air Force **Date:** March 2023

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604735F / <i>Combat Training Ranges</i>	Project (Number/Name) 652286 / <i>Combat Training Range Equipment</i>
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Management Services (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 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			
Live Mission Operations Capability (Program Support Cost - Contractor Services)	Various	Various : Hill AFB, UT	-	0.100	Dec 2021	0.300	Nov 2022	0.915	Feb 2024	-		0.915	0.000	1.315	-
Live Mission Operations Capability (Program Support Cost - Other Govt. Costs)	Various	Various : Hill AFB, UT	-	-		-		0.050	May 2024	-		0.050	Continuing	Continuing	-
P6 Combat Training System (Program Support Cost - Contractor Support costs)	Various	Various : Hill AFB, UT	-	-		0.450	Apr 2023	2.000	Feb 2024	-		2.000	0.000	2.450	-
P6 Combat Training System (Program Support Cost - Other Govt. Costs)	Various	Various : Hill AFB, UT	-	-		-		1.000	May 2024	-		1.000	0.000	1.000	-
Modernization Systems (Program Support Cost - Contractor Support)	Various	AFLCMC/XA : Hill AFB, UT	-	0.009	Oct 2021	-		-		-		-	0.000	0.009	-
Modernization Systems (Program Support Cost - Other Govt. Costs)	Various	Not specified. : Hill AFB, UT	-	-		-		-		-		-	Continuing	Continuing	-
Subtotal			-	2.159		3.750		4.755		-		4.755	Continuing	Continuing	N/A
Project Cost Totals			-	23.218		103.784		152.569		-		152.569	Continuing	Continuing	N/A

Remarks
ARTS V2 program terminated for the convenience of the government.

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Exhibit R-4, RDT&E Schedule Profile: PB 2024 Air Force		Date: March 2023
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FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028			
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

	FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028			
Combat Training Range Equipment																												
P6 CTS - Integration on USAF Aircraft																												
-- P6 CTS - F-15/16 Aircraft Test & Integration																												
Advanced Radar Threat System-Variant 1(ARTS-V1) EMD Phase																												
-- ARTS-V1 PRA Contract																												
-- ARTS-V1 DT-E and OT-E																												
-- ARTS-V1 Milestone C																												
Advanced Radar Threat System-Variant 3 (ARTS-V3) System Spec Definition																												
-- ARTS-V3 Intelligence Assessment																												
-- ARTS-V3 Intelligence Model Development																												
Advance Radar Threat System (ARTS-V3) Development																												
-- Digital Modeling and Subscale Prototype Efforts																												
-- ARTS-V3 Request For Proposal (RFP) for Production Representative Article (PRA)																												
-- ARTS-V3 PRA Contract Award																												
-- ARTS-V3 PRA Development																												
-- VADR C2 App Development																												
Modernization Systems																												
-- Mini-MUTES Upgrade																												
Live Mission Operations Capability (LMOC)																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2024 Air Force		Date: March 2023
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Combat Training Range Equipment</i>				
P6 CTS - Integration on USAF Aircraft	2	2023	2	2026
-- P6 CTS - F-15/16 Aircraft Test & Integration	2	2023	2	2026
Advanced Radar Threat System-Variant 1(ARTS-V1) EMD Phase	1	2022	2	2022
-- ARTS-V1 PRA Contract	1	2022	3	2022
-- ARTS-V1 DT-E and OT-E	3	2022	2	2023
-- ARTS-V1 Milestone C	2	2022	4	2022
Advanced Radar Threat System-Variant 3 (ARTS-V3) System Spec Definition	1	2022	3	2022
-- ARTS-V3 Intelligence Assessment	1	2023	4	2023
-- ARTS-V3 Intelligence Model Development	1	2023	3	2023
Advance Radar Threat System (ARTS-V3) Development	1	2022	1	2026
-- Digital Modeling and Subscale Prototype Efforts	1	2022	3	2023
-- ARTS-V3 Request For Proposal (RFP) for Production Representative Article (PRA)	1	2023	3	2023
-- ARTS-V3 PRA Contract Award	3	2023	3	2023
-- ARTS-V3 PRA Development	3	2023	1	2026
-- VADR C2 App Development	1	2024	1	2026
Modernization Systems	1	2022	4	2022
-- Mini-MUTES Upgrade	1	2022	4	2022
Live Mission Operations Capability (LMOC)	1	2022	4	2024