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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 0207701F / <i>Full Combat Mission Training</i>							
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	-	11.238	9.405	7.064	0.000	7.064	-	-	-	-	-	-
655012: <i>Full Combat Mission Training</i>	-	11.238	9.405	7.064	0.000	7.064	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Full Combat Mission Training (FCMT) supports Air Force Distributed Mission Operations (DMO) and Live-Virtual-Constructive (LVC) integration. FCMT funding provides research in areas benefiting the DMO/LVC environment as a whole; provides research and development to facilitate integration of fielded and newly acquired, Air Force owned training devices into DMO/LVC networks; enhances the quality of training for the systems added to the network; enables aircrews to network with LVC components to form the integrated DMO battlespace; links geographically distributed high-fidelity combat and combat support training devices including Command and Control and Intelligence, Surveillance, and Reconnaissance systems and develops, demonstrates and inserts Multi-Level Security (MLS) capability. This capability enables warfighters to exercise and train at the operational and strategic levels of war as well as conduct networked unit-level training at home station.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0M was expended for civilian pay expenses in this program element, and in FY21 \$0M is forecasted for civilian pay expenses in this program element.

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 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	9.797	9.422	6.999	0.000	6.999
Current President's Budget	11.238	9.405	7.064	0.000	7.064
Total Adjustments	1.441	-0.017	0.065	0.000	0.065
• Congressional General Reductions	0.000	-0.017			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	1.800	0.000			
• SBIR/STTR Transfer	-0.359	0.000			
• Other Adjustments	0.000	0.000	0.065	0.000	0.065

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<u>Change Summary Explanation</u> No Significant Changes		

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 5					R-1 Program Element (Number/Name) PE 0207701F / Full Combat Mission Training				Project (Number/Name) 655012 / Full Combat Mission Training			
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
655012: Full Combat Mission Training	-	11.238	9.405	7.064	0.000	7.064	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Full Combat Mission Training (FCMT) supports Air Force Distributed Mission Operations (DMO) and Live-Virtual-Constructive (LVC) integration. FCMT funding provides research in areas benefiting the DMO/LVC environment as a whole; provides research and development to facilitate integration of fielded and newly acquired, Air Force owned training devices into DMO/LVC networks; enhances the quality of training for the systems added to the network; enables aircrews to network with LVC components to form the integrated DMO battlespace; links geographically distributed high-fidelity combat and combat support training devices including Command and Control and Intelligence, Surveillance, and Reconnaissance systems and develops, demonstrates and inserts Multi-Level Security (MLS) capability. This capability enables warfighters to exercise and train at the operational and strategic levels of war as well as conduct networked unit-level training at home station.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0M was expended for civilian pay expenses in this program element, and in FY21 \$0M is forecasted for civilian pay expenses in this program element.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Cross Domain Solutions (CDS)	2.074	1.634	1.458
Description: Development, demonstration, and insertion of Multi-Level Security (MLS) capability.			
FY 2021 Plans: Complete initial rule set accreditation process for coalition. Validate rule sets in DMO testbed environments to include Virtual Test and Training Center (VTTC) and Joint Simulation Environment (JSE). Continue development of specific Five Eyes (FVEY) rule sets for DMO. Demonstrate rule set compatibility within Government off-the-shelf (GOTS) and Commercial off-the-shelf (COTS) CDS devices. Begin development of common rule set specifications for Distributed Mission Operations Network (DMON) accreditation standards process. Begin evaluating encrypted range data integration with CDS rule sets.			
FY 2022 Plans: Continue rule set validation and documentation processes. Continue encrypted range data integration for CDS evaluations. Begin evaluating rule set implications associated with Augmented Reality Virtual Reality (AR VR) based and part task trainer technology insertion. Begin development of multinational rule sets supporting F-35 and JSE baselines. Complete FVEY rule set validation study. Complete common rule set specifications for cross CDS (GOTS/COTS) applications.			
FY 2021 to FY 2022 Increase/Decrease Statement:			

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
Funding decreased due to slight reduction of efforts				
<p>Title: DMO Capabilities Development</p> <p>Description: Development, demonstrations, studies and insertions of DMO/LVC related technologies and proficiency based continuation training strategies.</p> <p>FY 2021 Plans: Begin development of tools to support learning scenario management and delivery in DMO events. Begin creation of intelligent scenario generation and syllabus adaptation for local unit and larger event (e.g., Langley Distributed Training Center (DTC)/VTTC/UWFC DTC) training. Continue readiness metrics development and integration for JSE based simulations such as the effects based simulator.</p> <p>FY 2022 Plans: Demonstrate common learning/scenario management capabilities in local unit and larger scale events. Begin creation/modifications of standards to support learning managed readiness across DMO events. Create standards-based specifications for integrating innovative technologies (e.g., AR VR and related gaming-for-training technology). Complete tools development and scenario specifications for learning management in DMO events. Complete DTC/VTTC data format specification for mission and performance tracking.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased due to slight reduction of efforts</p>		4.954	4.377	2.980
<p>Title: Validation of warfighter seasoning and development of objective performance enhancements</p> <p>Description: Studies to assess and validate warfighter seasoning in continuation training and accreditation of portions of this process; studies to develop objective enhancement and measurement tools for the DMO/LVC environment.</p> <p>FY 2021 Plans: Continue to develop metrics and tools to measure training proficiency gained during LVC events. Continue metrics development and readiness tracking in larger LVC events including VTTC and DTC events. Begin development of LVC environment assessment metrics and tools for ops training. Begin field integration of performance readiness and assessment tools in target Mission Training Centers (MTC) including AWACS, F-15E and F-16. Begin specifications for readiness database for routine Combat Air Forces (CAF) tracking. Begin readiness data into current CAF Ready Aircrew Program and Defense Readiness Reporting Systems of Record.</p> <p>FY 2022 Plans:</p>		2.464	2.044	1.525

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Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0207701F / Full Combat Mission Training	Project (Number/Name) 655012 / Full Combat Mission Training		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>Continue development and field test of LVC environment assessment tools. Continue field integration of performance readiness and assessment tools in specific MTCs. Evaluate readiness tracking database integration for routine use in ops. Complete initial evaluations of readiness data integration with current readiness reporting Systems of Record. Begin encrypted range data integration for warfighter seasoning and readiness tracking. Begin development of readiness tracking in broader range of training environments to include AR VR and part task trainers. Begin evaluating common metrics and measures to enable joint (USN) readiness assessment and tracking. Complete readiness and tracking data specifications. Complete field evaluation and refinement of LVC environment assessment tool and metrics.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased due to slight reduction of efforts</p>				
<p>Title: Other Network Studies</p> <p>Description: Research and development to provide for the integration of fielded and newly introduced, Air Force, Joint and Coalition high-fidelity flight and mission trainers.</p> <p>FY 2021 Plans: Continue development and evaluation of data specifications that enable more rapid, higher fidelity constructive modeling in DMO. Continue integration of compressed Distributed Information System (DIS) as a new DMO standard for use across the LVC range enterprise. Begin weather and threat correlation studies to improve peer-level environment assessments of integrated LVC in DMO and on instrumented ranges. Begin database development to capture AR VR technology applications and lessons learned in CAF training. Begin training effectiveness evaluations of the integration of AR VR technologies with more full fidelity sim and live training in squadron level training. Begin evaluations of alternative GOTS/COTS tools for managing learning in DMO and LVC events. Begin gap and solution analysis for peer fight fidelity assessment results from current LVC unit and range environments.</p> <p>FY 2022 Plans: Continue development and evaluation of data specifications that enable more rapid, higher fidelity constructive modeling in DMO. Demonstrate integration of higher fidelity constructive models in GOTS and COTS CGF environments. Continue data development and specifications that permit novel models and behaviors to be easily integrated in existing CGF environments. Continue development and evaluation of lower cost simulation environments to augment training, rehearsal and exercise at local units and at larger event locations (e.g., VTTC/DTCs/Joint Pacific Alaska Range Complex (JPARC). Continue solution analyses for peer fight gaps identified in field training and exercise environment evaluations. Complete AR VR database development for AR VR applications. Complete learning management tools evaluations and make recommendations for alternatives for fuller integration. Complete initial data specifications for rapid CGF model development and integration.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement:</p>		1.746	1.350	1.101

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Funding decreased due to slight reduction of efforts			
Accomplishments/Planned Programs Subtotals	11.238	9.405	7.064

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

Each platform joining the DMO/LVC environment selects its own acquisition strategy based on established requirements, economic analysis, and the magnitude of the training system changes required to provide DMO capability. The initial systems in the DMO/LVC environment; F-15C/E, Airborne Warning and Control System, and F-16 Block 40/50, all required new training systems. Additionally, the operations and integration capability was created. The Training Simulation Service (TSS) acquisition strategy was used to meet a portion of these requirements. In the TSS approach, the contractor owns and provides the simulator equipment, maintains simulator concurrency with weapon systems, and has incentives to keep the equipment up to date with simulator and network technologies. Currently fielded and projected Air Force-owned flight and mission training systems without DMO/LVC capability will be modified using FCMT funds to ensure compatibility with the DMO/LVC environment. To accomplish this, the Air Force Research Laboratory will conduct research/studies to develop/implement CDS, develop DMO capabilities, validate warfighter seasoning, develop objective performance enhancements, and conduct other network studies.

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

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Support (\$ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
				Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Cross Domain Solutions (CDS): Development, Testing and insertion of Multi-Level-Security protocols, Cross Domain rule set development and accreditation	Various	Air Force Research Lab, 711 Human Performance Wing, Human : Dayton, OH	-	2.074	Jan 2020	1.634	Jan 2021	1.458	Jan 2022	-		1.458	-	-	-
Develop DMO Capabilities: demonstration, studies and insertion of distributed mission ops related technologies and proficiency based continuation training	Various	Air Force Research Lab, 711 Human Performance Wing : Dayton, OH	-	4.954	Jan 2020	4.377	Jan 2021	2.980	Jan 2022	-		2.980	-	-	-
Validation of warfighter seasoning and development of objective performance enhancements for DMO/ LVC environment	Various	Air Force Research Lab, 711 Human Performance Wing : Dayton, OH	-	2.464	Jan 2020	2.044	Jan 2021	1.525	Jan 2022	-		1.525	-	-	-
Other Network Studies: Supporting integration of newly fielded high-fidelity training systems and networks	Various	Air Force Research Lab, 711 Human Performance Wing : Dayton, OH	-	1.746	Jan 2020	1.350	Jan 2021	1.101	Jan 2022	-		1.101	-	-	-
Subtotal			-	11.238		9.405		7.064		-		7.064	-	-	N/A

	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	-	11.238	9.405	7.064	-	7.064	-	-	N/A

Remarks

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

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0207701F / Full Combat Mission Training	Project (Number/Name) 655012 / Full Combat Mission Training
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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
Develop metrics and tools to measure training proficiency gained during LVC events / standardize implementation at Distributed Training Centers (DTCs)																												
Integrate 5th generation systems into DMO network																												
Conduct interoperability studies to evaluate the training value of 5th generation interoperable coalition training on the Combat Air Forces (CAF) DMO network																												
Develop joint and coalition data standards and evaluate data management methods to support LVC events																												
Evaluation of the integration of different data management and tracking methods to support large scale, secure and persistent Joint and Coalition LVC events.																												
Demonstrate persistent performance measurement and readiness assessment in fourth to 5th generation LVC events																												
Evaluate network architectures and typologies for distributed secure LVC events																												
Develop gateways and CDS to integrate high-fidelity trainers with Air Force, joint, and coalition networks																												
Evaluate compressed DIS network standards for CDS in DMO																												
Integrate and evaluate multi-domain operations and kill-chain training scenarios for contested environments																												

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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
Evaluate multi-national mission planning and debrief technologies in research training events																												
Implement, evaluate, and field technologies aligned with future training strategies for LVC																												
Develop specifications for live data harvesting using encrypted systems and tools																												
Update Five Eyes (FVEY) rule sets for full 4th, 5th and autonomous tactical employment training																												
Create Secure LVC testbed environment for kill chain and JADC2 ops training via DMO																												

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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
<i>Full Combat Mission Training</i>				
Develop Multi-Level Security testbed and support testing on 5th Gen systems	2	2020	2	2022
Develop 4th to 5th generation rule sets for coalition integration	1	2020	2	2022
Evaluate and assess commercial and government off-the-shelf Cross Domain Solution devices (CDS)	1	2020	2	2021
Perform accreditation for CDS rule sets	2	2020	4	2021
Develop rule sets for routine Live-Virtual-Constructive (LVC) environment integration	2	2020	4	2021
Continue to develop CDS rule sets	1	2020	1	2021
Integrate scenarios and syllabi across DMO environments	1	2020	1	2021
Develop metrics for routine proficiency evaluations and determine standard format for storing/analyzing proficiency data	1	2020	2	2022
Create and evaluate alternative data formats for routinely tracking and storing performance and proficiency data	3	2020	2	2022
Refine learning managed scenario and integrate with LVC events	3	2020	1	2025
Validate training environment credibility assessments for an identified set of Air Combat Command Virtual and Constructive Environments	3	2020	3	2021
Develop and integrate After Action Review tools for Mission Training Centers	1	2020	2	2025
Develop metrics and tools to measure training proficiency gained during LVC events / standardize implementation at Distributed Training Centers (DTCs)	2	2020	4	2023
Integrate 5th generation systems into DMO network	1	2020	2	2021
Conduct interoperability studies to evaluate the training value of 5th generation interoperable coalition training on the Combat Air Forces (CAF) DMO network	1	2020	4	2022
Develop joint and coalition data standards and evaluate data management methods to support LVC events	1	2020	3	2023

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

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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Evaluation of the integration of different data management and tracking methods to support large scale, secure and persistent Joint and Coalition LVC events.	2	2020	4	2021
Demonstrate persistent performance measurement and readiness assessment in fourth to 5th generation LVC events	2	2020	3	2026
Evaluate network architectures and typologies for distributed secure LVC events	1	2020	2	2021
Develop gateways and CDS to integrate high-fidelity trainers with Air Force, joint, and coalition networks	3	2020	1	2024
Evaluate compressed DIS network standards for CDS in DMO	1	2020	3	2025
Integrate and evaluate multi-domain operations and kill-chain training scenarios for contested environments	3	2020	2	2024
Evaluate multi-national mission planning and debrief technologies in research training events	4	2020	4	2024
Implement, evaluate, and field technologies aligned with future training strategies for LVC	2	2020	2	2025
Develop specifications for live data harvesting using encrypted systems and tools	2	2023	4	2026
Update Five Eyes (FVEY) rule sets for full 4th, 5th and autonomous tactical employment training	4	2024	4	2026
Create Secure LVC testbed environment for kill chain and JADC2 ops training via DMO	3	2022	2	2026