Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Air Force											Date: March 2023	
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603456F / *Human Effectiveness Advanced Technology Development*							
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	-	31.135	15.440	15.593	0.000	15.593	19.528	19.810	20.211	20.861	Continuing	Continuing
635323: *Directed Energy Bioeffects Parameters*	-	6.484	4.262	7.290	0.000	7.290	6.303	4.965	4.905	5.060	Continuing	Continuing
635324: *Human Dynamics and Terrain Demonstration*	-	11.541	2.313	0.346	0.000	0.346	2.973	4.223	3.927	5.036	Continuing	Continuing
635325: *Mission Effective Performance*	-	3.407	4.023	4.134	0.000	4.134	3.914	6.165	7.455	7.667	0.000	36.765
635327: *Warfighter Interfaces*	-	9.703	4.842	3.823	0.000	3.823	6.338	4.457	3.924	3.098	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program develops and demonstrates technologies to enhance Airman performance and effectiveness in the aerospace force. State-of-the-science advances are made in warfighter training, warfighter system interfaces, directed energy bioeffects, deployment and sustainment of warfighters in extreme environments, and understanding and shaping adversarial behavior. The Directed Energy Bioeffects Parameters project develops, demonstrates, and transitions technologies to predict, evaluate, and mitigate the effects of directed energy on personnel and mission performance, and exploits the offensive capabilities of directed energy systems. The Human Dynamics and Terrain Demonstration develops, demonstrates, and transitions technologies to sustain airman performance in adverse operational and/or training environments, monitor and mitigate in-flight unexplained physiological events, and prevent human performance related mishaps through real-time monitoring and mitigation—particularly through highly automated or autonomous systems. The Mission Effective Performance project develops, demonstrates, and transitions advanced training, simulation, mission rehearsal, and other performance-aiding methods and technologies to enhance warfighter readiness. The Warfighter Interfaces project develops, demonstrates, and transitions technologies to revolutionize the way airmen synergistically use Air Force systems, including autonomous machines and adaptive teams of airmen and machines. Efforts in this program have been coordinated through the Department of Defense (DoD) Science and Technology (S&T) Executive Committee process to harmonize efforts and eliminate duplication.

This program element may include necessary expenses to support the operation and maintenance of facilities to manage, execute, and deliver science and technology capabilities. This program element may include necessary civilian pay expenses required to manage, execute, and deliver science & technology capabilities. The use of program funds in this program element would be in addition to the civilian pay expenses budgeted in program elements 0601102F, 0602102F, 0602201F, 0602202F, 0602203F, 0602204F, 0602602F, 0602605F, 0602788F, and 0602298F.

This program is in Budget Activity 3, Advanced Technology Development because this budget activity includes development of subsystems and components and efforts to integrate subsystems and components into system prototypes for field experiments and/or tests in a simulated environment.

Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Air Force	Date: March 2023
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603456F / *Human Effectiveness Advanced Technology Development*

B. Program Change Summary ($ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	23.459	20.652	26.461	0.000	26.461
Current President's Budget	31.135	15.440	15.593	0.000	15.593
Total Adjustments	7.676	-5.212	-10.868	0.000	-10.868
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-5.212			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	9.425	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-1.749	0.000			
• Other Adjustments	0.000	0.000	-10.868	0.000	-10.868

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2022	FY 2023
Project: 635324: *Human Dynamics and Terrain Demonstration*		
Congressional Add: *F-35 Helmet Mounted Display System Tech Refresh and Weight Reduction*	9.590	0.000
Congressional Add Subtotals for Project: 635324	9.590	0.000
Congressional Add Totals for all Projects	9.590	0.000

Change Summary Explanation

In FY 2023, Congressional Directed Reductions where due to realignment into Program 0603032F, Future AF Integrated Technology Demos, Project 0603030, Air Force Vanguards, in order to more appropriately categorize the funding according to purpose.

Exhibit R-2A, RDT&E Project Justification: PB 2024 Air Force			Date: March 2023
Appropriation/Budget Activity 3600 / 3	R-1 Program Element (Number/Name) PE 0603456F / *Human Effectiveness Advanced Technology Development*	Project (Number/Name) 635323 / *Directed Energy Bioeffects Parameters*	

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
635323: *Directed Energy Bioeffects Parameters*	-	6.484	4.262	7.290	0.000	7.290	6.303	4.965	4.905	5.060	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project develops, demonstrates, and transitions technologies to predict, evaluate, and mitigate the effects of novel weapon systems on personnel and mission performance, and exploits the offensive capabilities of directed energy systems. This project develops the human components of the guidelines for testing, deployment, and protection from high-power microwave and high-energy laser systems and uses this information to inform design and enhance the effectiveness of these weapon systems in air, space, and cyber operations. This project develops tools and plug-ins that enhance mission and engagement models, provide predictive risk analysis for deployment of Directed Energy systems, and analyzes systems for use. This project develops tools and analysis techniques for counter directed energy weapon technologies. The effort also develops modeling and simulation tools to unite bioeffects and human performance models from across the Department of the Air Force in support of Digital Transformation initiatives.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: WARTECH	0.958	0.000	0.000
Description: This effort will initiate new and continue existing Transformational Technology Development efforts. The Transformational Technology Development program will select new projects, in alignment with mission focused areas which include, but are not limited to: Intelligent Planning and Wargaming, Battlespace Awareness, Integrated Base Defense, and Hypersonic Multi-Mission Aircraft. Investments focus on technology development efforts including, but are not limited to technologies to enhance survivability, operability and performance of personnel, sensors, and structures in a threat environment through the development of new tools and plug-ins that enhance mission and engagement models, and provide predictive risk analysis for deployment of directed energy systems. This investment is overseen by senior representatives from Air and Space Forces who participate in the submission, initial review, and down-selection of Transformational Technology Development proposed efforts. Final selections will be reviewed by the Air Force Deputy Assistant Secretary for Science, Technology, and Engineering before a final recommendation for Congressional approval is made. ***FY 2023 Plans:*** In FY 2023 this effort will be realigned under Program 0603032F Future AF Integrated Technology Demos, Project 630320: Air Force Vanguards, effort Vanguard Prospect - Fight Tonight. ***FY 2024 Plans:*** Not Applicable			
Title: Directed Energy Bioeffects	5.526	4.262	7.290

Exhibit R-2A, RDT&E Project Justification: PB 2024 Air Force		Date: March 2023
Appropriation/Budget Activity 3600 / 3	**R-1 Program Element (Number/Name)** PE 0603456F / *Human Effectiveness Advanced Technology Development*	**Project (Number/Name)** 635323 / *Directed Energy Bioeffects Parameters*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Description: This project combined two efforts into a single effort to better align the directed energy modeling simulation and analysis supporting both radio-frequency and laser bioeffects advanced demonstration. Developed and demonstrated modeling capabilities to assess collateral hazards from high power directed energy systems, including the use of probabilistic risk assessment techniques and analysis of system-level effects on the Airman. Develop and demonstrate counter directed energy weapons technologies for aircrew and ground personnel to provide protection against directed energy threats. United bioeffects and human performance models from across the Department of the Air Force in support of Digital Transformation initiatives. ***FY 2023 Plans:*** Continue providing hazard analysis for directed energy systems under development for the Department of Defense. Continue maturation of high peak power radio frequency and laser assessment models and tools to address real world concerns. Continue analyzing operational and mission performance impacts of ocular personnel protection equipment. Continue integration of radio frequency and optical radiation hazards and vision analysis into engagement-level modeling, simulation, and analysis tools for future transitions in mission-level tool suites to support formal studies and analyses. Continue development of integrated vision modeling libraries to inform display design and advanced protection technologies. ***FY 2024 Plans:*** Continue to provide hazard analysis for directed energy and novel weapon systems under development. Continue maturation of high peak power radio frequency and laser human effects assessment models and tools to address real world concerns. Provide human based design requirements optimizing operational and mission performance for counter directed energy weapon technologies. Continue integration of radio frequency and optical radiation hazards and behavioral analysis into engagement-level modeling, simulation, and analysis tools for future transitions in mission-level tool suites to support formal studies and analyses. Continue development of integrated vision modeling libraries to optimize agile laser eye protection technologies. Integrate modeling and simulation capabilities into existing architectures for weaponeering and mission level analyses to enable holistic human performance modeling. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** FY 2024 increased compared to FY 2023 by $3.028 million. Funding increase due to added emphasis on Directed Energy Bioeffects efforts such as radio frequency and laser human effects assessment models and tools to address real world concerns.			
Accomplishments/Planned Programs Subtotals	6.484	4.262	7.290

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2024 Air Force		Date: March 2023
Appropriation/Budget Activity 3600 / 3	**R-1 Program Element (Number/Name)** PE 0603456F / *Human Effectiveness Advanced Technology Development*	**Project (Number/Name)** 635323 / *Directed Energy Bioeffects Parameters*

D. Acquisition Strategy

Not applicable

Exhibit R-2A, RDT&E Project Justification: PB 2024 Air Force			Date: March 2023
Appropriation/Budget Activity 3600 / 3	R-1 Program Element (Number/Name) PE 0603456F / *Human Effectiveness Advanced Technology Development*	Project (Number/Name) 635324 / *Human Dynamics and Terrain Demonstration*	

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
635324: *Human Dynamics and Terrain Demonstration*	-	11.541	2.313	0.346	0.000	0.346	2.973	4.223	3.927	5.036	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project objective is to develop, demonstrate, and transition products that provide Airman-integrated capabilities to sustain, enhance, and augment airmen physical and cognitive performance under challenging and adverse operational and training mission environments. Integrate technical advances in molecular and synthetic biology, multi-omics, cognitive performance optimization, brain-machine interface, and application of non-invasive physiological and cognitive performance monitoring devices. Develop solutions to sense, assess, and mitigate impacts to airmen performance degradation including, but not limited to, unexplained physiological events, fatigue, injury, stressors (i.e. environmental, occupational, personal), and cognitive overload. Develop technologies to enhance and accelerate individual physical and cognitive ability to rapidly learn and acquire new mission skills and maintain proficiency of acquired skills. Develop technologies providing commanders real time status monitoring and assessment of individual's mission ready status and intervention protocols to accelerate restoral to combat readiness.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: WARTECH	1.232	0.000	0.000
Description: This effort will initiate new and continue existing Transformational Technology Development efforts. The Transformational Technology Development program will select new projects, in alignment with mission focused areas which include, but are not limited to: Intelligent Planning and Wargaming, Battlespace Awareness, Integrated Base Defense, and Hypersonic Multi-Mission Aircraft. Investments focus on technology development efforts including, but are not limited to technologies to enhance survivability, operability and performance of personnel, sensors, and structures in a threat environment through unexplained physiological events, fatigue, injury, stressors (environmental, occupational, personal), and cognitive overload. This investment is overseen by senior representatives from Air and Space Forces who participate in the submission, initial review, and down-selection of Transformational Technology Development proposed efforts. Final selections will be reviewed by the Air Force Deputy Assistant Secretary for Science, Technology, and Engineering before a final recommendation for Congressional approval is made. ***FY 2023 Plans:*** In FY 2023 this effort will be realigned under Program 0603032F Future AF Integrated Technology Demos, Project 630320: Air Force Vanguards, effort Vanguard Prospect - Fight Tonight. ***FY 2024 Plans:*** Not Applicable			
Title: Sensing and Assessment	0.719	1.291	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2024 Air Force		Date: March 2023
Appropriation/Budget Activity 3600 / 3	**R-1 Program Element (Number/Name)** PE 0603456F / *Human Effectiveness Advanced Technology Development*	**Project (Number/Name)** 635324 / *Human Dynamics and Terrain Demonstration*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Description: Develop advanced systems integrating biological, physiological, neural, environmental, and behavioral sensing capabilities with validated analytics and assessments to sustain and enhance Airman performance. Resulting products fall within three operational mission environments: (1) maintenance, (2) special operations/dismount forces, and (3) aircrew (cockpit). Emphasis is on maturing and transitioning platform integrated technologies that provide operator mission-specific performance sustainment and enhancement. ***FY 2023 Plans:*** Complete development of the Integrated Cockpit Sensing prototype, conduct operational flight demonstration of the Integrated Cockpit Sensing prototype, and transition Integrated Cockpit Sensing system and corresponding data package to transition partner. Complete system development of the baseline Hypothermia Prevention System and conduct operational demonstration of the Hypothermia Prevention System prototype. Foster and maintain a rapid prototype capability to support activities relating to early learning prototyping, product development, and quick turn customer needs. ***FY 2024 Plans:*** There are no planned FY 2024 activities for the Sensing and Assessment Project. The project will complete all planned activities by end of FY 2023 and close out. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** FY 2024 decreased compared to FY 2023 by $1.291 million. Funding decrease due to a reduced emphasis in sensing and assessment efforts, and the close out and completion of all planned activities by end of FY 2023.			
Title: Human Performance Augmentation and Development ***Description:*** Develop and demonstrate advanced prototype products that provide Air and Space-integrated capabilities to provide decision advantage and enable Airman and Guardian performance under cognitive and physiological stressors associated with prolonged, high tempo, and demanding mission scenarios as well as stressors associated with operations in adverse environments (i.e. high altitude, Arctic, Space). Provide capabilities to assess in real-time the physical and cognitive state of operators and provide feedback and intervention capabilities to restore and enhance operator performance. ***FY 2023 Plans:*** Initiate advanced product development effort to develop a fatigue management system prototype incorporating integrated sensing capabilities with validated models of cognitive performance under fatigue to guide targeted intervention. Initiate planning for start of advanced product effort to develop a biochemical sensor platform utilizing interstitial fluid sensing technologies to analyze operator biomarkers indicative of operational and mission stressors. ***FY 2024 Plans:***	0.000	1.022	0.346

Exhibit R-2A, RDT&E Project Justification: PB 2024 Air Force		Date: March 2023
Appropriation/Budget Activity 3600 / 3	**R-1 Program Element (Number/Name)** PE 0603456F / *Human Effectiveness Advanced Technology Development*	**Project (Number/Name)** 635324 / *Human Dynamics and Terrain Demonstration*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Continue system development of a fatigue management system, Fatigue Optimized Cognition Under Stress (FOCUS). Integrate the FOCUS mobile device app with sensors monitoring both physical/cognitive biometrics and molecular biomarkers indicative of fatigue. Develop and fine tune models/algorithms utilizing the sensor data and self-assessment inputs to provide real-time feedback and intervention protocols to sustain and optimize cognitive performance per mission needs. Initiate testing, evaluation, and validation of a recommended caffeine dosing algorithm. Initiate initial field testing of the Gen 1 FOCUS app, integrated sensors, and data analytics. Complete interstitial fluid sensing analysis of operational and mission stressors. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** FY 2024 decreased compared to FY 2023 by $0.676 million. Funding decrease due to reduced emphasis in fatigue and cognitive monitoring, and the improvement to models and algorithms utilizing sensor data to optimize cognitive performance for mission needs.			
Accomplishments/Planned Programs Subtotals	1.951	2.313	0.346

	FY 2022	FY 2023
Congressional Add: F-35 Helmet Mounted Display System Tech Refresh and Weight Reduction ***FY 2022 Accomplishments:*** Conduct Congressionally directed efforts ***FY 2023 Plans:*** Not Applicable	9.590	0.000
Congressional Adds Subtotals	9.590	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Not applicable

Exhibit R-2A, RDT&E Project Justification: PB 2024 Air Force			Date: March 2023
Appropriation/Budget Activity 3600 / 3	R-1 Program Element (Number/Name) PE 0603456F / *Human Effectiveness Advanced Technology Development*	Project (Number/Name) 635325 / *Mission Effective Performance*	

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
635325: *Mission Effective Performance*	-	3.407	4.023	4.134	0.000	4.134	3.914	6.165	7.455	7.667	0.000	36.765
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project develops, demonstrates, and transitions advanced training, simulation, mission rehearsal, and other performance-aiding methods and technologies to enhance warfighter readiness. This project also develops advanced methods and technologies to enable interactive Live-Virtual-Constructive blended environments for performance-aiding methods and technologies. Focus areas include integrated high-fidelity weapon systems training technologies for air, space, and cyber; tailored immersive simulation environments for airmen at the tactical and operational levels; and incorporation of performance assessment and feedback tools. These methods and technologies facilitate the development of mission-essential competencies.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: WARTECH	1.643	0.000	0.000
Description: This effort will initiate new and continue existing Transformational Technology Development efforts. The Transformational Technology Development program will select new projects, in alignment with mission focused areas which include, but are not limited to: Intelligent Planning and Wargaming, Battlespace Awareness, Integrated Base Defense, and Hypersonic Multi-Mission Aircraft. Investments focus on technology development efforts including, but are not limited to technologies to enhance survivability, operability and performance of personnel, sensors, and structures in a threat environment through advanced training, simulation, mission rehearsal, and other performance-aiding methods and technologies to enhance warfighter readiness. This investment is overseen by senior representatives from Air and Space Forces who participate in the submission, initial review, and down-selection of Transformational Technology Development proposed efforts. Final selections will be reviewed by the Air Force Deputy Assistant Secretary for Science, Technology, and Engineering before a final recommendation for Congressional approval is made. ***FY 2023 Plans:*** In FY 2023 and beyond, this work is performed under PE 0603032F, Future AF Integrated Technology Demos, Project 630320, Air Force Vanguards. ***FY 2024 Plans:*** Not Applicable			
Title: Readiness	1.764	4.023	4.134

Exhibit R-2A, RDT&E Project Justification: PB 2024 Air Force		Date: March 2023
Appropriation/Budget Activity 3600 / 3	**R-1 Program Element (Number/Name)** PE 0603456F / *Human Effectiveness Advanced Technology Development*	**Project (Number/Name)** 635325 / *Mission Effective Performance*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Description: Develop and demonstrate a secure, persistent, and standardized blended live-virtual-constructive operational test and training enterprise. Utilize modeling capabilities for technology demonstration efforts focused on developing software-based tools for managing training, tracking proficiency and readiness, and for training that would replace the human as adversaries and instructors. ***FY 2023 Plans:*** Complete proficiency tracking and reporting in Program of Record Mission Training Centers for the F-16, F-15E and Airborne Warning and Control System Block 40/45. Using encrypted data specifications begin migration and integration of those data into an operational readiness data lake with user-specified data extraction and reporting formats. Continue integration of readiness measurement tools in all current training and readiness environments, to include augmented and virtual reality, part-task and full fidelity simulators, and operational range infrastructure. Continue conducting evaluations of higher fidelity software agent models integrated with live and virtual systems and their impact on the quality of training and exercise for a peer fight. Initiate work integrating technologies to support multi-capable airmen with just-in-time-training and readiness support in deployed and austere mission contexts and locations. Initiate work connecting developed data lake and proficiency infrastructure with operational event-based tracking and reporting systems. Initiate systematic evaluations of proficiency-based live-virtual-constructive on operational readiness and more optimal mixes of live and virtual training and exercise. ***FY 2024 Plans:*** Continue using encrypted data specifications as part of the migration and integration of those data into an operational readiness data with user-specified data extraction and reporting formats. Continue integration of readiness measurement tools in all current training and readiness environments, to include augmented and virtual reality, part-task, full fidelity simulators, the Joint Simulation Environment, and operational range infrastructure. Continue conducting evaluations of higher fidelity software agent models integrated with live and virtual systems and their impact on the quality of training and exercise for a peer fight. Continue work to integrate, evaluate and demonstrate technologies to support multi-capable airmen with just-in-time-training and readiness support in deployed and austere mission contexts and locations. Initiate work integrating training management and data tracking tools and interfaces into the Synthetic Operational Test and Training Infrastructure. Continue field evaluations connecting big data and proficiency-based training infrastructure with operational event-based tracking and reporting systems. Continue systematic evaluations of proficiency-based live-virtual-constructive on operational readiness and more optimal mixes of live and virtual training and exercise. Initiate demonstrations of secure fighter integration blended training events in both research and operational locations, including The Five Eyes coalition partner venues. Initiate work to integrate Distributed Mission operations-and Joint Simulation Environment-based architectures to support interoperable, peer-level training and rehearsal across 4th, 5th, and beyond generation mission sets. ***FY 2023 to FY 2024 Increase/Decrease Statement:***			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Air Force		Date: March 2023
Appropriation/Budget Activity 3600 / 3	**R-1 Program Element (Number/Name)** PE 0603456F / *Human Effectiveness Advanced Technology Development*	**Project (Number/Name)** 635325 / *Mission Effective Performance*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
FY 2024 increased compared to FY 2023 by $0.111 million. Funding increase due to added emphasis in training management and data tracking tools and interfaces for Synthetic Operational Test and Training infrastructure.			
Accomplishments/Planned Programs Subtotals	3.407	4.023	4.134

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Not applicable

Exhibit R-2A, RDT&E Project Justification: PB 2024 Air Force			Date: March 2023
Appropriation/Budget Activity 3600 / 3	R-1 Program Element (Number/Name) PE 0603456F / *Human Effectiveness Advanced Technology Development*	Project (Number/Name) 635327 / *Warfighter Interfaces*	

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
635327: *Warfighter Interfaces*	-	9.703	4.842	3.823	0.000	3.823	6.338	4.457	3.924	3.098	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project develops, demonstrates, and readies the transition of technologies to revolutionize the way airmen optimize the capabilities of Air Force systems, including autonomous machines and adaptive teams of Airmen and machines. Improvements in the presentation of operational information to the community of users, from the system operator to the commander, must be developed in step with advancements in the acquisition, storage, and retrieval of information. This project provides the advances in understanding of human cognitive abilities, as well as the utilization of human interfaces, multisensory fusion, high-resolution image displays, and three-dimensional audio to customize communications and enhance shared understanding across a diverse user community in air, space, and cyber for maximum situational awareness.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: WARTECH	0.685	0.000	0.000
Description: This effort will initiate new and continue existing Transformational Technology Development efforts. The Transformational Technology Development program will select new projects, in alignment with mission focused areas which include, but are not limited to: Intelligent Planning and Wargaming, Battlespace Awareness, Integrated Base Defense, and Hypersonic Multi-Mission Aircraft. Investments focus on technology development efforts including, but are not limited to technologies to enhance survivability, operability and performance of personnel, sensors, and structures in a threat environment through autonomous machines and adaptive teams of Airmen and machines. This investment is overseen by senior representatives from Air and Space Forces who participate in the submission, initial review, and down-selection of Transformational Technology Development proposed efforts. Final selections will be reviewed by the Air Force Deputy Assistant Secretary for Science, Technology, and Engineering before a final recommendation for Congressional approval is made. ***FY 2023 Plans:*** In FY 2023 this effort will be realigned under Program 0603032F Future AF Integrated Technology Demos, Project 630320: Air Force Vanguards, effort Vanguard Prospect - Fight Tonight. ***FY 2024 Plans:*** Not Applicable			
Title: Airman Machine Interfaces	3.156	1.694	1.338
Description: Develops advanced, situationally-adaptive and scalable interface technology and decision aiding tools for more rapid and accurate battlefield awareness, decision making and maximized collaborative, distributed human-machine team			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Air Force		Date: March 2023
Appropriation/Budget Activity 3600 / 3	**R-1 Program Element (Number/Name)** PE 0603456F / *Human Effectiveness Advanced Technology Development*	**Project (Number/Name)** 635327 / *Warfighter Interfaces*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
performance. This is accomplished through integrated solutions that manage Airman and Guardian cognitive workload in complex, distributed, and degraded environments. ***FY 2023 Plans:*** Continue transitioning advanced command and control (C2) technologies for operators in multiple domains, as well as enabling Air Battle Management System capabilities for distributed C2. Continue building library of user interfaces for manned-unmanned teaming in order to meet demands of strategic, operational and tactical environments. Continue development of collaborative interfaces, leveraging intelligent agents, for cognitive workload reduction. Initiate open and interoperable software to Air Battle Management System-supported platforms. Initiate interface technologies for base defense and protection of the tactical airspace from small unmanned aerial systems. Initiate development wearable communication management platform prototype for mission recording and intelligibility enhancement. Initiate automating mission planning and debrief for assets with unique capabilities and enhance with intelligent agent aided decision making. ***FY 2024 Plans:*** Continue advanced command and control (C2) technologies for operators in multiple domains (to include cyber and space domains), as well as enabling Air Battle Management System capabilities for distributed C2. Continue expanding the library of user interfaces for Autonomous Collaborative Enabling Technologies, and initiate multiple autonomous behaviors developed by Defense Advanced Research Projects Agency and the Air Force Strategic Development Planning and Experimentation in order to meet demands of strategic, operational and tactical environments for manned-unmanned teaming. Continue development of collaborative interfaces, leveraging intelligent agents and autonomy for cognitive workload reduction, and optimization of distributed human-human and human-machine teaming. Continue the transition of open and interoperable software to Air Battle Management System-supported platforms. Continue the transition of interface technologies and battle management C2 systems for base defense and protection of the tactical airspace from small unmanned aerial systems. Complete wearable communication management system prototypes for mission recording and intelligibility enhancement. Continue automation of mission planning and debrief for assets with unique capabilities and include intelligent agent aided decision making. Initiate the development of mission planning for Intelligence, Surveillance, Reconnaissance optimization and battle damage assessment. Initiate the enhancement of map drawing capabilities for mission planning and debrief. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** FY 2024 decreased compared to FY 2023 by $0.356 million. Funding decrease due to reduced emphasis in command and control technologies.			
Title: Analytic Tools	5.862	3.148	2.485
Description: Develop, demonstrate, and transition software and hardware tools that help conventional Department of Defense, Special Operations, and Intelligence customers to rapidly identify, analyze, shape, and operationalize all types of information			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Air Force		Date: March 2023
Appropriation/Budget Activity 3600 / 3	**R-1 Program Element (Number/Name)** PE 0603456F / *Human Effectiveness Advanced Technology Development*	**Project (Number/Name)** 635327 / *Warfighter Interfaces*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
without succumbing to "analysis paralysis." In addition to delivering stand-alone tools, supports other Air Force Research Laboratory Technical Directorates. Build human-centric training solutions to: triage data-at-scale, automate mundane processes, optimize workflow, identify obscured patterns, mitigate cognitive overload, expedite logical decision-making, quantify performance metrics, accelerate human interpretation of information, and autonomously cue humans in live-virtual-constructive environments. These tools mitigate the scale and complexity in Joint All Domain Operations environments. ***FY 2023 Plans:*** Continue in-house Live-Virtual-Constructive simulation architecture to address training deficiencies across the United States Air Force. Automate the following: post-training grading in single simulator environment, real-time feedback in single simulator environment, proactive cueing in single simulator environment, real-time feedback and proactive cueing in multi-simulator, team environment. Continue in-house Live-Virtual-Constructive simulation architecture to include the Space, Cyber, and/or Maritime domains to support the emerging focus on the Great Power Competition, and Joint All Domain Operations environment. Initiate productizing a suite of customized software developed to operationalize existing, in-house Live-Virtual-Constructive architecture. Continue developing existing Artificial Intelligence/Machine Learning analytic tools from "canned" frameworks to explainable architectures and interfaces that leverage the psychology of human trust. ***FY 2024 Plans:*** Continue in-house Live-Virtual-Constructive simulation architecture to address training deficiencies across the Department of the Air Force. Initiate the integration of augmented reality, virtual reality, and mixed reality tools into Live-Virtual-Constructive environments, improving upon the current simulation ecosystems. Complete automation and real-time feedback of single simulator environments, and proactive cueing in multisimulator, team environments. Continue expansion of in-house Live-Virtual-Constructive simulation architecture to include the Space, Cyber, and/or Maritime domains. Continue the production and maturation of software to operationalize existing, in-house Live-Virtual-Constructive architecture, to include autonomy-enabled intelligence, Surveillance, and Reconnaissance applications. Initiate integration of data analysis tools into the emerging Synthetic Operational Test and Training Infrastructure, with emphasis on software that detect patterns in: friend/enemy verbal communications, multi-sensor data extraction/correlation, and automated cuing for complex, high-stress, and/or time-sensitive tasks. Continue Artificial Intelligence/Machine Learning analytic tools from "canned" frameworks to explainable architectures and interfaces that leverage the psychology of human trust. Initiate object-based Graphical User Interfaces that are highly customizable by military users with limited software skills. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** FY 2024 decreased compared to FY 2023 by $0.663 million. Funding decrease due to reduced emphasis automation and real-time feedback of single simulator environments, and proactive cueing in multisimulator, team environments.			
Accomplishments/Planned Programs Subtotals	9.703	4.842	3.823

Exhibit R-2A, RDT&E Project Justification: PB 2024 Air Force		Date: March 2023
Appropriation/Budget Activity 3600 / 3	**R-1 Program Element (Number/Name)** PE 0603456F / *Human Effectiveness Advanced Technology Development*	**Project (Number/Name)** 635327 / *Warfighter Interfaces*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Not applicable