Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Office of the Secretary Of Defense	Date: February 2020
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603133D8Z / *Foreign Comparative Testing*

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	86.215	23.867	24.970	25.183	-	25.183	25.784	26.243	26.919	27.466	Continuing	Continuing
313: *Foreign Comparative Testing*	86.215	23.867	24.970	25.183	-	25.183	25.784	26.243	26.919	27.466	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Foreign Comparative Testing (FCT) Program increases Joint Force readiness and lethality by providing near-term solutions to existing and future Department of Defense (DoD) capability gaps by leveraging the Research & Development (R&D) investments of allied nations and coalition partners. The FCT Program Element (PE) evaluates prototypes derived from allied and partner nation technologies to provide the U.S. Armed Services, U.S. Special Operations Command (USSOCOM), and Defense agencies capabilities to counter emerging threats. FCT's broad reach across our allies and friendly foreign countries enables development of innovative, cost effective, and interoperable solutions to meet needs communicated by the Joint Chiefs of Staff and the Combatant Commanders. Military Services and USSOCOM jointly conduct FCT projects. FCT strengthens alliances by facilitating international collaboration and evaluating technologies that increase interoperability while serving as a catalyst for teaming and other business relationships between international and domestic industries. Partner nations recognize the long-term value of the "two-way street" for Defense procurements for which FCT provides an avenue. Numerous successful projects have resulted in the licensed production of a qualified foreign item in the United States, including the creation of jobs and contributions to local economies. To date, companies from 34 states have benefited from FCT projects. FCT supports DoD best practices by incentivizing the use of prototyping and experimentation in advancing technological solutions to warfighter problems and acts as a hedge against threat developments. FCT enhances affordability by reducing development costs and risk, accelerating acquisition timelines, and increasing competition. Through increasing Joint lethality and readiness, strengthening alliances, and delivering affordable performance on accelerated timelines, FCT supports all three lines of effort outlined in the National Defense Strategy. Authorized by Title 10, U.S. Code, Section 2350a (g), the FCT program is managed by the Office of the Under Secretary of Defense for Research and Engineering (OUSD R&E), Comparative Technology Office (CTO).

Measurable Outcomes:
-FCT projects will demonstrate capability objectives within 12-36 months.
-Over its 40-year history, FCT has a transition rate of 58 percent (357 out of 612) for completed projects. Of the 357 projects that tested successful, 280 or 78 percent resulted in follow on procurements of over $11.000 billion.

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Office of the Secretary Of Defense					Date: February 2020
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*			R-1 Program Element (Number/Name) PE 0603133D8Z / *Foreign Comparative Testing*		
B. Program Change Summary ($ in Millions)	**FY 2019**	**FY 2020**	**FY 2021 Base**	**FY 2021 OCO**	**FY 2021 Total**
Previous President's Budget	24.277	24.970	25.416	-	25.416
Current President's Budget	23.867	24.970	25.183	-	25.183
Total Adjustments	-0.410	0.000	-0.233	-	-0.233
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	0.000	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.406	-			
• Other Program Adjustments and DoD Priorities	-0.004	-	-0.208	-	-0.208
• Economic Assumption	-	-	-0.025	-	-0.025

Exhibit R-2A, RDT&E Project Justification: PB 2021 Office of the Secretary Of Defense			Date: February 2020
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603133D8Z / *Foreign Comparative Testing*	Project (Number/Name) 313 / *Foreign Comparative Testing*	

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
313: *Foreign Comparative Testing*	86.215	23.867	24.970	25.183	-	25.183	25.784	26.243	26.919	27.466	Continuing	Continuing

A. Mission Description and Budget Item Justification

The FCT Program Element funding supports projects that test and evaluate innovative technologies already developed by partner nations and in doing so, directly aligns to the National Defense Strategy lines of effort: increasing Joint lethality in contested environments, strengthening partnerships, and fostering reform through delivery of capability at the speed of relevance. Individual projects typically average less than $1.200 million each and complete within 12-36 months. Projects are proposed by the Military Services and USSOCOM and are selected using a merit-based process that identifies the most promising, innovative, and cost-effective solutions to validated warfighter requirements, with an emphasis on transitioning technologies into current or future programs of record. Projects are selected based on potential to yield cost, schedule, or performance improvements over the status quo.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: High Power Radio Frequency (HPRF) for Counter Unmanned Aerial Systems (CUAS) (Navy/USMC) ***Description:*** This project integrates and tests HPRF directed energy source components with various off-the-shelf sensor technologies to provide a complete CUAS prototype system that provides the capability to detect, track, identify, engage, and defeat low and slow UAS. This project looks to enhance DoD capabilities in the Directed Energy focus area. Test articles received and acceptance testing occurred in FY 2019. System performance testing continues throughout FY 2020 with FY 2019 funds. Program Manager (PM) will make a transition decision and close-out report will be completed in 4Q FY 2020. If successful, this technology will be available as a quick reaction capability and will be available for transition to Ground Based Air Defense program offices to support CUAS operations.	0.887	-	-
Title: Hybrid Vertical Take-off and Landing (VTOL)/Fixed Wing UAS (Navy) ***Description:*** This project comparatively tests off-the-shelf hybrid UAS capable of vertical takeoff and landing as well as fixed wing flight for increased endurance and range over existing UAS in the Navy inventory. Hybrid UAS do not require a runway or launch and recovery equipment and thus may be better suited for shipboard operations. Test articles received, bench testing completed, and comparative testing initiated in FY 2019. Comparative testing continues throughout FY 2020 with FY 2019 funds. PM will make a transition decision and close-out report will be completed in 4Q FY 2020.	0.610	-	-
Title: Special Operations Force (SOF) Precision Strike System (United States Special Operations Command (USSOCOM)) ***Description:*** This project evaluates a loitering munition for close air support in denied environments. This will provide SOF with an organic precision strike capability in areas where close air support may not be available. If successful, this technology will be available for immediate fielding to Special Operations Forces Component Commanders as well as transition to USSOCOM for	0.500	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2021 Office of the Secretary Of Defense		Date: February 2020
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603133D8Z / *Foreign Comparative Testing*	**Project (Number/Name)** 313 / *Foreign Comparative Testing*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
acquisition. Acceptance testing completed in 2Q FY 2019. Live-fire testing will occur in 2Q FY 2020 with FY 2019 funds. PM will make a transition decision and close-out report will be completed in 3Q FY 2020.			
Title: More Reliable, Longer Endurance, More Power Unmanned Aerial Systems (UAS) (Army) ***Description:*** This project comparatively tests the performance of the Danielson Trident 100TD2 engine versus the existing MQ-5B Hunter engine. The Trident 100TD2 is a candidate engine for use in next generation UAS and new production of existing UAS for foreign military sales because of its improved reliability, increased power, and reduced life cycle costs. If successful, the Army will pursue flight demonstration prior to insertion into the Army's UAS program of record for fielding on MQ-5B Hunter. This project completed legacy baseline testing in FY 2019. Performance testing continues throughout FY 2020 with FY 2019 funds. PM will make a transition decision and close-out report will be completed in 2Q FY 2020.	0.405	-	-
Title: Pilot Physiology Based Autonomous Life Support System (Air Force) ***Description:*** This project will integrate and test a Pilot Physiological Monitoring and Warning System (PPMAWS) with a new digital breathing regulator that incorporates machine learning to autonomously control the flow of oxygen to military aircraft. This project will also evaluate an off-the-shelf Pilot Breath Monitoring System (PBAM) currently in use with the Finnish Air Force, which requires no aircraft modification. These technologies could assist in preventing in-flight hypoxia, hypocapnia, and hyperoxia events currently experienced by pilots, improving flight safety, and aircraft availability. This project supports DoD's Artificial Intelligence/Machine Learning (AI/ML) focus area. If successful, the PBAM will be available for immediate fielding and the PPMAWS will transition to follow-on flight testing which is beyond the scope of this project. Test articles received, integrated into a flight helmet, and bench testing completed in 2Q FY 2019. Performance testing occurs throughout FY 2020 with FY 2019 funds. PM will make a transition decision and close-out report will be completed in 4Q FY 2020.	0.550	-	-
Title: Three Dimensional (3D) Mapping at the Edge (USSOCOM) ***Description:*** Leverages state of the art AI techniques to extract 3D surface models from multiple source data and load products onto forward deployed handheld devices in real-time. This project delivers advanced capability for the management, production, and dissemination of geospatial mission data, including 3D elevation data, in an open standards-based format that supports operations in dismounted and/or disconnected environments using mobile devices. This project supports the AI/ML focus area. Data integration and testing of delivery to mobile devices occurred in 2Q-4Q FY 2019. Streaming 3D tactical user workshop occurred in 4Q FY 2019. This project continues in FY 2020 with FY 2019 funds. The PM will demonstrate the technology during a joint exercise in FY 2020 to highlight a new national capability for interoperable 3D Geospatial Intelligence Products. PM will make a transition decision and close-out report will be completed in 1Q FY 2020. If successful, this technology will transition to the National Geospatial Intelligence Agency program of record for fielding across the Department of Defense.	0.229	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2021 Office of the Secretary Of Defense		Date: February 2020
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603133D8Z / *Foreign Comparative Testing*	**Project (Number/Name)** 313 / *Foreign Comparative Testing*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: Rifle Accessory Control Unit (Navy) ***Description:*** This project tests a rifle-mounted device capable of controlling various weapon accessories or radios. This device enables Marines to maintain situational awareness without taking their hand off the weapon. Laboratory and squad usability testing was conducted in FY 2019. Platoon usability testing and advanced capability maturation will occur in FY 2020 with FY 2019 funds. PM will make a transition decision and close-out report will be completed in 4 Q FY 2020. If successful, this technology will be transitioned to U.S. Marine Corps Program Manager for Marine Expeditionary Rifle Squad for follow on procurement and fielding.	1.326	-	-
Title: Future X-Band Radar (Navy) ***Description:*** Tests an off-the-shelf open-architecture Active Electronically Scanned Array (AESA) X-band aircraft radar for potential application to the Navy's Air and Missile Defense Radar (AMDR) program for ships. Currently, AMDR lacks a modern AESA X-band component to provide horizon surveillance against current and future threats. PM completed test planning and contracting for acquisition in FY 2019. ***FY 2020 Plans:*** PM receive final test articles and laboratory testing will commence in 2Q FY 2020. This project will continue in FY 2021 with FY 2020 funding. If successful, the US Navy plans to award an X-band Radar program to develop and produce an advanced sensor for employment in DDG Flight III and other surface combatants. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding decreases in FY 2021 as test completes and project is closed out.	0.500	1.000	-
Title: Long-Range Tactical Intelligence Surveillance and Reconnaissance (ISR) Targeting, and Strike System (Navy/USMC) ***Description:*** This project evaluates the capabilities of a fully autonomous, recoverable, remotely operated, electro-optical, precision-guided loitering munition, which can conduct ISR as well as locate and engage enemy targets. This provides Marine Corps commanders with a responsive strike capability to increase operational flexibility and shorten engagement timelines. If successful, initial transition would consist of a limited procurement with user evaluation by operational units prior to fielding with Ground Combat Elements. Test planning and test article contract award occurred in FY 2019. This project continues in FY 2020 with FY 2020 funds. ***FY 2020 Plans:*** Project will complete Live Fire testing and assessment in 3Q FY 2020. PM will make a transition decision and close-out report will be completed in 4Q FY 2020. ***FY 2020 to FY 2021 Increase/Decrease Statement:***	0.649	0.800	-

Exhibit R-2A, RDT&E Project Justification: PB 2021 Office of the Secretary Of Defense		Date: February 2020
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603133D8Z / *Foreign Comparative Testing*	**Project (Number/Name)** 313 / *Foreign Comparative Testing*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Funds decrease from FY 2020 to FY 2021 as major test events complete and project is closed out.			
Title: Low Profile Satellite Communications (SATCOM) on the Move Antenna (Navy/USMC) ***Description:*** This project tests a low-profile dual-band (Ku/Ka) antenna with high tracking accuracy for vehicles to enable SATCOM on the move in rough terrain. This reduces the potential of adversaries targeting high value command and control vehicles while increasing operational utility. If successful, the technology will transition to Marine Corps Networks on the Move program of record. PM received test articles and acceptance testing initiated in FY 2019. Testing continues in FY 2020 with FY 2020 funds. ***FY 2020 Plans:*** System performance testing initiated in FY 2019 and will continue in FY 2020. PM will make a transition decision and close-out report will be completed in 4Q FY 2020. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funds decrease from FY 2020 to FY 2021 as final testing is completed and project is closed out.	0.498	0.236	-
Title: Event-Based Sensing for Space & Directed Energy Applications (Air Force) ***Description:*** This project comparatively tests neuromorphic imaging technology and algorithms. This technology enhances daytime ground, space-based situational awareness and directed energy test and evaluation. The resulting prototype if successful will enhance ground-based space situational awareness and the technology will be inserted into further space-based situational awareness technology development. Test articles procured and received in 3Q FY 2019. Integration and initial testing commenced in 4Q FY 2019. This project continues in FY 2020 with FY 2020 funds. ***FY 2020 Plans:*** Application-specific testing will occur throughout FY 2020. PM will make a transition decision and close-out report will be completed in 4Q FY 2020. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding decreases in FY 2021 due to project completion.	0.500	0.456	-
Title: Improved Amphibious Track (Navy) ***Description:*** Comparatively tests composite rubber track systems for Marine Corps and Army vehicles. This technology reduces weight, improves fuel economy and operational reach, reduces maintenance costs, and increases mobility. If successful, the best product will transition to Program Manager - Advanced Amphibious Assault and may transition to other tracked vehicles.	0.800	1.600	-

Exhibit R-2A, RDT&E Project Justification: PB 2021 Office of the Secretary Of Defense		Date: February 2020
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603133D8Z / *Foreign Comparative Testing*	**Project (Number/Name)** 313 / *Foreign Comparative Testing*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Test planning and test article contract award occurred in 1-2Q FY 2019. Initial test articles received in 4Q FY 2019. This project continues in FY 2020 with FY 2020 funds. ***FY 2020 Plans:*** Laboratory testing will occur 1Q FY 2020. Noise and obstacle testing will occur in 2Q FY 2020. Durability testing will occur in 3Q FY 2020. The project is expected to complete and PM will make a transition decision and close-out report will be completed in 4Q FY 2020. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding decreases in FY 2021 due to project completion.			
Title: Synthetic Aperture Sonar for Mine Countermeasures Unmanned Underwater Vehicles (UUVs) (Navy) ***Description:*** This project tests a Synthetic Aperture Sonar payload with on-board automatic target recognition algorithms for Mine Countermeasure UUVs to increase detection range and resolution. This technology reduces the time required for mine countermeasure missions and post mission analysis. If successful, the technology will transition to Program Manager Naval Explosive Ordnance Disposal for inclusion on the Mk 18 UUV. Test planning and test article contract award occurred in 1Q-2Q FY 2019. Demonstration of real-time processing on small UUV in 3Q FY 2019. Test articles received in 4Q FY 2019. This project continues in FY 2020 with FY 2020 funds. ***FY 2020 Plans:*** Engineering trials will take place throughout FY 2020. PM will make a transition decision and close-out report will be completed in 4Q FY 2020. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funds decrease from FY 2020 to FY 2021 as final testing is completed.	0.771	0.309	-
Title: Multi-Mission Weaponized Soldier - Unmanned Aerial System (Army) ***Description:*** This project evaluates an Unmanned Aerial System (UAS) in a 40-millimeter grenade form factor with a modular payload. The system is operated by an individual soldier, has a range of up to 12 kilometers, and can fly for up to 12 minutes. This technology provides non-lethal situational awareness and lethal indirect fire support against enemies in defilade or behind walls. This project initiated test planning and contract preparation in 4Q FY 2019 and continues in FY 2020 with FY 2020 funds. ***FY 2020 Plans:***	0.030	0.605	0.885

Exhibit R-2A, RDT&E Project Justification: PB 2021 Office of the Secretary Of Defense		Date: February 2020
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603133D8Z / *Foreign Comparative Testing*	**Project (Number/Name)** 313 / *Foreign Comparative Testing*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Acquisition of test articles will occur in 1Q FY 2020. Phase I weapon system integration testing will occur in 2Q-3Q FY 2020. Phase II baseline performance assessment will occur in 4Q FY 2020. This project will continue in FY 2021 with FY 2021 funds. ***FY 2021 Plans:*** Integration of Government-off-the-shelf payloads will occur in 1Q FY 2021. Phase III performance testing with Government payloads will occur in 2Q FY 2021. Phase IV advanced capabilities assessment and experimentation will occur in 3Q FY 2021. A transition decision and close-out will be completed in 4Q FY 2021. If successful, this technology will transition to the Joint Munitions & Lethality Life Cycle Management Command for follow on operational evaluations. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funds increase from FY 2020 to FY 2021 to support major test events.			
Title: Anti-Submarine Warfare Sensor Capabilities onboard Unmanned Surface Vehicles (Navy) ***Description:*** This project tests a compact towed variable depth sonar system for Navy Unmanned Surface Vehicles. System provides an autonomous anti-submarine warfare (ASW) detection capability aboard unmanned surface vessels to fill area coverage gaps when manned ASW vessels are unavailable. Test planning and contract preparation occurred in 4Q FY 2019. ***FY 2020 Plans:*** Loaned test article will be received in 1Q FY 2020. Test article installation and integration will commence in 2Q FY 2020. Integration testing will occur in 3Q FY 2020. The system will be demonstrated at RIMPAC 2020 during 4Q FY 2020. ***FY 2021 Plans:*** A transition decision and close-out will be completed in 2Q FY 2021. If successful, this technology will be available for transition to the Navy's Unmanned Maritime Systems Program Office for follow on acquisition and fielding. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funds decrease in FY 2021 as testing is completed and project closed out.	0.050	0.750	0.300
Title: Hostile Fire & Pre-Shot Detection for Vehicle Protection Systems (Army) ***Description:*** This project comparatively tests technologies to autonomously detect and locate incoming hostile fire as well as potential threats before a shot is fired. These technologies will increase situational awareness and reduce response times leading to increased lethality and survivability for ground forces, especially in urban environments. If successful, this technology will transition to the Army's Program Manager for Vehicle Protection Systems for initial fielding in 2022. Systems received and initial testing, bench testing and safety certification of components occurred in 2Q-4Q FY 2019. This project continues in FY 2020 with FY 2020 funds. ***FY 2020 Plans:***	1.200	0.900	0.465

Exhibit R-2A, RDT&E Project Justification: PB 2021 Office of the Secretary Of Defense		Date: February 2020
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603133D8Z / *Foreign Comparative Testing*	**Project (Number/Name)** 313 / *Foreign Comparative Testing*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Pre-shot detection systems will be demonstrated in 1Q FY 2020. Additional characterization testing will occur in 3Q FY 2020. Field testing and demonstrations are planned for 3Q-4Q FY 2020. This project continues in FY 2021 with FY 2021 funds. ***FY 2021 Plans:*** A vehicle Rodeo to test the Vehicle Protection Systems is planned for 1Q-3Q FY 2021 with follow on vehicle integration testing in 4Q FY 2021. Final test and closeout reports will be completed in 4Q FY 2021. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funds decrease in FY 2021 with conclusion of major test events and project completion.			
Title: Dual Protocol Network Interface Card (Air Force) ***Description:*** This project evaluates a network interface card that supports both low-speed legacy Military Standard 1553B and high-speed North Atlantic Treaty Organization (NATO) Standardization Agreement (STANAG) 7221 protocols. This provides an affordable upgrade path to high-speed 100 Mbps data throughput for aircraft networks enabling weapons systems to perform at desired warfighting capability levels. If successful, this technology will transition to the Air Force Program Executive Office Fighter/ Bombers for follow on procurement and fielding on military aircraft. This project was initiated out-of-cycle in 4Q FY 2019. Initial test planning and contract preparation occurred in 4Q FY 2019. This project continues in FY 2020 with FY 2020 funds. ***FY 2020 Plans:*** Obtain interim authority to test, complete information assurance assessment, and conduct safety reviews from 1-2Q FY 2020. Initial performance testing will be conducted on a representative avionics data bus in a laboratory environment in 3Q FY 2020. Upon successful completion, a pre-flight test safety assessment will be performed prior to integration and test on a B-52 bomber and KC-135 tanker in 4Q FY 2020. This project continues in FY 2021 with FY 2021 funds. ***FY 2021 Plans:*** Flight demonstrations will be conducted in 1-3Q FY 2021. A final ground demonstration of the ability for STANAG 7221 to sufficiently isolate two channels of data will occur in 4Q FY 2021. Final test and closeout reports will be completed by end of 4Q FY 2021. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding decreases from FY 2021 to FY 2022 as final testing is completed and project is closed.	0.050	0.674	0.297
Title: Active Expendable Decoys (Air Force) ***Description:*** This project evaluates expendable Digital Radio Frequency Memory countermeasures for use on 4th Generation Fighter aircraft. This technology provides increased protection against modern air-to-air and surface-to-air radio frequency guided	1.000	2.000	1.000

Exhibit R-2A, RDT&E Project Justification: PB 2021 Office of the Secretary Of Defense		Date: February 2020
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603133D8Z / *Foreign Comparative Testing*	**Project (Number/Name)** 313 / *Foreign Comparative Testing*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
missiles. If successful, the technology will transition to F-15, F-16, and F-18 electronic warfare programs for procurement. Test planning and contract preparation occurred in 2Q-4Q FY 2019. This project continues in FY 2020 with FY 2020 funds. ***FY 2020 Plans:*** Laboratory testing of expendables to occur in 1Q FY 2020. Dispenser integration and testing to occur in 2Q FY 2020. Platform-specific testing to include integrated avionics will be conducted in 3Q-4Q FY 2020. This project continues in FY 2021 with FY 2021 funds. ***FY 2021 Plans:*** Flight testing will occur 1Q FY 2021, culminating with a bilateral demonstration in 3Q FY 2021. PM will make a transition decision and close-out report will be completed in 4Q FY 2021. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding decreases in FY 2021 due to completion of major tests and project closeout.			
Title: Lightweight Short Range Guided Missiles (USSOCOM) ***Description:*** FY 2020 New Start – This project comparatively tests man portable, shoulder fired missile systems that utilize seeker technology for engaging moving or static targets at extended ranges compared to existing unguided weapons systems within the USSOCOM inventory. If successful, this technology will transition to USSOCOM's Program Executive Office Special Operations Forces Warrior for follow-on procurement. ***FY 2020 Plans:*** Test planning and contract preparation occur in 1Q-3Q FY 2020. System acquired and initial laboratory performance testing initiates in 4Q FY 2020. This project continues in FY 2021 with FY 2021 funds. ***FY 2021 Plans:*** Laboratory performance testing continues through 2Q FY 2021. Live fire testing commences in 3Q FY 2021. This project continues in FY 2022 with FY 2021 funds with completion of live fire testing, warhead characterization and final test and closeout reporting. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding increases in FY 2021 to support major test events.	0.000	0.550	1.109
Title: Mine Clearance Line Charge Replacement ***Description:*** FY 2020 New Start – This project will comparatively test the performance and reliability of modern mine clearing technologies against the legacy MK-154 Mine Clearing Line Charge (MICLIC). The MICLIC, which is 1950's era technology has a	0.000	1.090	0.965

Exhibit R-2A, RDT&E Project Justification: PB 2021 Office of the Secretary Of Defense		Date: February 2020
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603133D8Z / *Foreign Comparative Testing*	**Project (Number/Name)** 313 / *Foreign Comparative Testing*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
history of reliability, safety, and availability issues. If successful, this technology will transition to the U.S. Marine Corps' Portfolio Manager for Logistics Combat Element Systems to replace/supplement existing MK-154 MICLICs. ***FY 2020 Plans:*** Initiate test planning and contract award preparation in 1Q-2Q FY 2020. Conduct test readiness review 3-4 Q FY 2020. This project continues in FY 2021 with FY 2021 funds. ***FY 2021 Plans:*** Conduct three phases of live fire testing in 1Q-4Q FY 2021. This project continues in FY 2022 with FY 2021 funds. Live fire testing concludes and final test and closeout reports are completed in 1Q FY 2022. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding decreases in FY 2020 with conclusion of major test events.			
Title: Turreted Mortar System (Army) ***Description:*** FY 2020 New Start - This project will test a turreted mortar system to fill high risk capability gaps within the Brigade Combat Team and across the Multi-Domain Battlefield concept. The system will increase lethality and survivability through extended range, low angle, 360 degree delivery capability, and fire on the move capabilities with overhead protection. If successful, this technology will transition to the Army's Armored Multi-Purpose Vehicle Program Office in FY 2022. ***FY 2020 Plans:*** Test planning and contract preparation occur in 1-3Q FY 2020. Test article delivery and initial performance testing will occur in 4Q FY 2020. This project continues in FY 2021 with FY 2021 funds. ***FY 2021 Plans:*** Live fire testing will occur 1-3Q FY 2021. This project continues in FY 2022 with FY 2021 Funds. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding increases in FY 2021 to support major live fire test events.	0.000	0.250	0.877
Title: Improved Lean Services Architecture (Air Force) ***Description:*** FY 2020 New Start - This project will test software based on published open standards to enhance communications between weapon platforms, ground teams, and command and control centers across different radio networks. This will increase interoperability and save time and money through rapid and flexible configuration of networked devices. This project addresses the Fully Networked Command, Control, and Communications focus area. If successful, this technology will transition to the Air Force Special Operations Command's Airborne Mission Networking Program of Record.	0.000	0.500	-

Exhibit R-2A, RDT&E Project Justification: PB 2021 Office of the Secretary Of Defense		Date: February 2020
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603133D8Z / *Foreign Comparative Testing*	**Project (Number/Name)** 313 / *Foreign Comparative Testing*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
FY 2020 Plans: Initiate test planning and contract award in 1-2Q FY 2020. Laboratory testing will initiated in 3Q FY 2020. Field demonstration will occur in 4Q FY 2020. This project concludes in FY 2021 using FY 2020 funds. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** The project funding concludes in FY 2020.			
Title: Low Cost Innovative Projects (Projects Less Than One Million Dollars Each):	13.065	11.613	8.407
Description: The OSD Comparative Technology Office in execution of the FCT Program selects multiple low cost projects in the areas of Force Application, Force Protection, Force Support, Logistics, Anti-Access/Area Denial, Robotics and Autonomous Systems, Interoperability and Countering Unmanned Systems. These projects were selected to deliver prototypes for evaluation, assessment, and Service adoption within 12 to 36 months. Projects: -Civil Affairs Solution-Army Analytics (USSOCOM): This project tests intelligence software that fuses imagery from UAS and satellites with other sensor data and applies uses AI/ML to rapidly provide actionable analytics. This technology supports Department of Defense Civil Affairs operations by analyzing population migration caused by conflict or natural disasters to enabling dynamic planning for Large Scale Operations. If successful, this technology will be available for transition to the Army's Distributed Common Ground System Program of Record. This project was approved out-of-cycle and initiated test planning in 4Q FY 2019. This project continues in FY 2020 with FY 2020 funds. -Insensitive Munitions Fuze for the M67 Fragmentation Hand Grenade (Army): Comparatively tests off-the-shelf hand grenade fuzes to provide increased safety to the soldier while maintaining lethality for the widely used M67 fragmentation hand grenade. The M67 has been in use since the 1960's and does not meet current Insensitive Munitions safety standards. If successful, this technology will transition to Army, Program Executive Office Ammunition for follow on acquisition. Test articles delivered and initial safety testing occurred in 4Q FY 2019. This project continues in FY 2020 with FY 2020 funds. -Panoramic Infrared Sensor Test (Navy): Comparatively tests foreign naval panoramic Infrared sensors with autonomous detection capabilities to enhance shipboard detection and tracking of both surface and air targets to include low, slow, and SUAS. If successful, this technology will transition to the Navy's Program Executive Office for Integrated Warfare Systems for insertion into the future Guided Missile Frigate (FFG(X)) and Supercarrier CVN I-Stalker programs. Test articles received and acceptance testing began in FY 2019. This project continues in FY 2020 with FY 2020 funds. -Accurate Tracking & Unmanned Underwater Vehicle Navigation (Navy): This project tests sensors that enable accurate real-time tracking of unmanned underwater systems without the need for a high-cost Inertial Navigation Systems. If successful, this technology will be available for transition to Navy Unmanned Underwater Vehicle (UUV) and Remotely Operated Vehicles programs of record. Test articles procured in 1Q FY 2019. Lab testing occurred in 2Q FY 2019. Platform integration occurred 3Q			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Office of the Secretary Of Defense		Date: February 2020
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603133D8Z / *Foreign Comparative Testing*	**Project (Number/Name)** 313 / *Foreign Comparative Testing*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
FY 2019. Operational demonstration occurred in 4Q FY 2019. This project will continue in FY 2020 with FY 2019 funds. PM will make a transition decision and close-out report will be completed by 2Q FY 2020. -Aerostable Penetrator (Army): Evaluates a foreign off-the-shelf 2.75-inch rocket motor integrated with a prototype U.S. developed flachette warhead to optimize lethality against light armor targets dispersed over an area. This project will demonstrate an affordable replacement solution for Cluster Munitions. If successful, this capability is anticipated to transition to the Army's Joint Attack Munition Systems Program Office. Additional test articles were received and characterization testing completed in 3Q FY 2019. This project continues in FY 2020 with FY 2019 funds. -Autonomous Aircraft Material Maintenance (Navy): This project tests a trailer-mounted, autonomous cold spray metallization technology for in-situ repair of corrosion damaged areas on aircraft. If successful, the technology will be available for follow-on procurement and fielding by the Navy's Fleet Readiness Centers. The project completed several demonstration events in FY 2019 for the military aviation community. This project continues in FY 2020 with FY 2019 funds. -Diagnostics/Prognostics Test for Traumatic Brain Injury (TBI) (USSOCOM): This project conducts clinical studies to provide an assessment of the effectiveness of using a panel of specific micro ribonucleic acid (miRNA) biomarkers to detect a traumatic brain injury. The ability to objectively diagnose a TBI within 15 minutes allows medical providers to properly asses, evacuate, or return to duty military personnel in lieu of prolonged observation or evacuation that decreases readiness. If successful, the technology would be incorporated as a diagnostic aid at military treatment facilities. Through the follow-on development of a portable diagnostic system (PDS), the Diagnostic/Prognostic Test for TBI will be incorporated into the USSOCOM Tactical Combat Casualty Care Program of Record. The initial study was completed in 2Q FY 2019. Data collection continued in 3Q-4Q FY 2019 with a larger population to meet Food and Drug Administration requirements proving product viability. This project continues in FY 2020 with FY 2019 funds. -Multi-Agent Identification Kit and Equipment (MIKE) Butt-pack (Army): Tests an off-the-shelf colorimetric chemical detection system currently in use with NATO assembled into a small, lightweight packaging configuration for U.S. military use. Enhances interoperability between U.S. and NATO forces and reduces resupply requirements and life cycle costs. If successful, the technology will be available for immediate purchase by Special Operations units and will be pursued for acquisition by the Army through the Guardian Joint Program Management Office. The test articles were demonstrated during the Army Experimental Warfighter Exercise in 2Q FY 2019 and underwent soldier testing in 4Q FY 2019 with live agents at White Sands. This project continues in FY 2020 with FY 2019 funds. -Night Vision Device Capable Deck Status Display (Navy): This project evaluates a Deck Status Display currently in use with over ten countries that provides landing status to pilots through night vision compatible symbology instead of colors enabling safer night landing operations. If successful, this project will transition to the Navy’s Aircraft Launch and Recovery Equipment Program of Record. Test articles underwent acceptance testing in 4Q FY 2019. This project continues in FY 2020 with FY 2019 funds. -Quantum Communication, Cryptography, and Networking for Secure Satellite Communications (Air Force): This project evaluates a Quantum Key Distribution System (QKDS) for application to high priority encryption requirements. QKDS enables secure encrypted communication without the need to pre-generate, store, and secure large numbers of encryption keys. Quantum			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Office of the Secretary Of Defense		Date: February 2020
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603133D8Z / *Foreign Comparative Testing*	**Project (Number/Name)** 313 / *Foreign Comparative Testing*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
cryptography technology promises secure encryption, while making network intrusion without detection impossible. Enhances DoD capabilities in the Quantum science focus area. If successful, the technology will transition to the Air Force Space and Missile Systems Center and Air Force Global Strike Command for satellite payload and ground station applications. Test articles received and laboratory testing completed in FY 2019. This effort continues in FY 2020 with FY 2019 funds. -Reserve Battery for Munitions (Army): This project comparatively tests foreign off-the-shelf reserve battery solutions for use with medium caliber, mortar, and artillery applications to enhance the industrial base. If successful, the Army's Armaments Research Development and Engineering Center will pursue acquisition through either direct purchase from a foreign source or licensed production by a U.S. company. This project completed laboratory testing in 2Q FY 2019 and initiated live fire testing in 4Q FY 2019. This effort continues in FY 2020 with FY 2019 funds. -Rapid Obscuring System (ROSY) (Army): This project comparatively tests advanced vehicle obscuring smoke grenade systems from Germany and France. Modern off-the-shelf systems have potential to replace decades old technology and enable 360 coverage in both the visible and infrared spectrums. If successful, this technology will be available for transition to the Army's Program Manager for Vehicle Protection Systems. Static grenade testing was conducted in 3Q FY 2019. Live fire testing from a Bradley Fighting Vehicle occurred in 4Q FY 2019. This effort continues in FY 2020 with FY 2019 funds. -Tactical Debriefing System (Navy): This project evaluates a mission and military exercise debriefing tool currently in use with the Finnish Air Force to increase the quality of and reduce the time required to generate after action reviews. The system will be modified to support Electronic Warfare debriefing, a capability that does not currently exist. If successful, this technology will transition to the Navy's aircraft mission debriefing system program. Software received and integrated for acceptance testing in 4Q FY 2019. This project continues in FY 2020 with FY 2019 funds. - 2.75 Inch Guided Rocket System for Asymmetric Force Engagement of Fast In-Shore Attack Craft (FIAC) for (Navy): This project evaluates a "fire and forget" rocket system with an advanced imaging infrared seeker to counter FIAC swarms. If successful, the technology will transition to the Office of Naval Research for follow-on prototype evaluations prior to fielding. Characterization testing occurred in FY 2019 and live-fire testing will be completed in FY 2020 with FY 2019 funds. -HALO Integration with Common Remotely Operated Weapon System (CROWS) (Army): The CROWS provides the capability to locate and attack targets without exposing operators to enemy fire. This project tests an image processor technology add-on to the CROWS that fuses day and night images to enhance target detection and reduce motion blur to increase lethality. If successful, this capability is anticipated to transition to the Army's CROWS Program of Record. This project continued in FY 2019 with operational prototype testing. This project continues in FY 2020 with FY 2019 funds and will complete in final test report and transition decision in 3Q FY 2020. -Supercavitating Ammunition (NAVY): This project comparatively tests small caliber ammunitions with supercavitating properties for use in the undersea environment. If successful, the ammunition will be available for immediate transition to Naval Special Forces. Test planning initiated in 2Q FY 2019. This project continues in FY 2020 with FY 2019 funding. Live fire demonstration scheduled for 1Q FY 2020. A final test report and transition decision is scheduled for 2Q FY 2020. Project closes in FY 2020 with FY 2019 funding.			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Office of the Secretary Of Defense		Date: February 2020
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603133D8Z / *Foreign Comparative Testing*	**Project (Number/Name)** 313 / *Foreign Comparative Testing*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
-Blood and IV Warmer (NAVY/USMC): This project tests a lightweight, portable blood warmer that is suitable for expeditionary use. If successful, this technology will transition to U.S. Marine Corps Product Manager Supply & Maintenance Systems through the Authorized Medical Allowance List Modernization Program for follow on acquisition. Test article contract awarded in 3Q FY 2019. Acceptance testing completed in 4Q FY 2019. This project continues in FY 2020 with FY 2019 funding and completes in 3Q FY 2020 with decision to pursue approval by the Food and Drug Administration prior to fielding. -Smartshooter Evaluation (Army): This project evaluates an intelligent fire control system for assault rifles that is capable of identifying, selecting, and locking onto stationary or moving targets. This technology significantly improves shooter accuracy and probability of hit while reducing engagement times. If successful, the Army's Program Manager for Soldier Weapons will transition the technology into its Next Generation Fire Control development program. Test articles acquired, tested, and demonstrated in FY 2019. This project continues in FY 2020 with FY 2020 funds. -Transparent Ceramic Armor (Army): This project evaluates armor technology that is fifty percent lighter and thinner than existing glass-based systems for application on rotary wing and other military platforms. This technology provides a cost effective solution versus competing products. If successful, the technology will be incorporated into the CH-47 Multi-Impact Transparent Armor System program of record. Test articles received in 3Q FY 2019. This project continues in FY 2020 with FY 2019 funds. -AT4 Confined Space Tandem Warhead (Army): This project tests the a new warhead for the existing AT4 84mm shoulder fired weapon system to increase lethality by enabling fire from enclosure and the ability to engage structures and light armored targets. Performance verification testing occurred in FY 2019. This project continues in FY 2020 with FY 2020 funds. -Hydrogen Fuel Cell Technology for Small UAS (Air Force): This project comparatively tests foreign hydrogen fuel cells to increase the performance and range of Small UAS versus using traditional battery technology. If successful, this technology will transition to Air Force Special Operations Command Small UAS programs for follow-on procurement and fielding. Laboratory testing of individual fuel cells occurred in 1Q-2Q FY 2019. Safety certification and integration with platforms occurred in 3Q-4Q FY 2019. This project continues in FY 2020 with FY 2020 funds. -Small Size Weight and Power (SWaP) Mid-Wave Infrared (MWIR) Camera for Small UAS (Air Force): This project evaluates the performance of a low-cost, small SWaP MWIR camera system for Small UAS. Existing MWIR cameras are too large and cost prohibitive Small UAS applications. If successful, this technology will be available for transition to Air Force Research Laboratory on-going Small UAS development programs. Test articles received in 3Q FY 2019. Laboratory testing and gimbal integration occurred in 4Q FY 2019. This project continues in FY 2020 with FY 2019 funds. Final test and closeout reports are expected 3Q FY 2020 using FY 2019 funding. -Low-Cost Autonomous Target Classification (L-CATC) (Navy): This project conducts at-sea testing of underwater passive acoustic sensors and associated processing software. This technology provides an increased probability of detection and classification for both surface and submerged vessels. Test article engineering change initiated in 4Q FY 2019. Final test and closeout reports are expected 1Q FY 2020 using FY 2019 funds.			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Office of the Secretary Of Defense		Date: February 2020
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603133D8Z / *Foreign Comparative Testing*	**Project (Number/Name)** 313 / *Foreign Comparative Testing*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
-Energy Storage for Directed Energy Weapons and Sensors (Navy): This project tests graphene based ultra-capacitors for enhancing the capabilities energy storage systems. If successful, the technology will transition to the Multifunction Energy Storage Future Naval Capability effort. Completed final test and closeout reports in 1Q FY 2019. -Enhancing DoD Circuit Card Repair (Navy): This project evaluates a portable circuit card test system that could significantly enhance Department of Defense diagnostic capabilities. Test article contract awarded in 3Q FY 2019. Test articles received in 4Q FY 2019. This project continues in FY 2020 with FY 2019 funds. Acceptance testing will complete in 1Q FY 2020. Information assurance evaluation will complete in 2Q FY 2020 and demonstrations by maintenance personnel in the field will complete in 3Q FY 2020. Final test report and project closeout to complete in 4Q FY 2020. -Simultaneous Multi-Channel Modem (USSOCOM): Evaluates an off-the-shelf device that autonomously disaggregates and transports data over multiple networks simultaneously. Phase I laboratory testing was completed in FY 2019. This technology did not meet requirements and will not proceed to Phase II field testing. A final test report and project closeout will complete in 1Q FY 2020 with FY 2019 funds. -105 Millimeter Family of Multi-Purpose Munitions (Army): This project tests two variants of a multi-purpose 105 millimeter munitions including High Explosive (HE) and Anti-Personnel/Anti Material for increased lethality, safety, and reliability. If successful, the technology will be available for transition to the Army's Mobile Protected Firepower vehicle program. Test article contract awarded in FY 2019. This project continues in FY 2020 with FY 2020 funds. -Uncooled 120 Hertz Longwave Infrared Focal Plane Arrays for Night Vision Sensors (Army): This project tests foreign developed focal plane array technology for next generation night vision devices. Recent advancements in optical technology offer increased resolution and refresh rates for night vision applications, which enable enhanced situational awareness. If successful, this technology will be available for transition to Army's Project Manager for Soldier Sensors and Lasers for insertion into programs of record. Test article acquisition and integration occurred in FY 2019. This project continues in FY 2020 with FY 2020 funds. -Modular Airdrop Platform (Army): This project tests an innovative airdrop platform system with underside airbags that eliminates the need for energy dissipating material. The technology will increase lethality and readiness by enabling a rapid roll-on/off capability and will significantly reduce logistics costs. If successful, this technology will be available for transition to the Product Manager, Force Sustainment Systems - Cargo Air Delivery for insertion into the Advanced Low Velocity Airdrop System Program of Record. Ground testing completed in 3Q FY 2019. This project continues in FY 2020 with FY 2020 funds. -Magnetic Signature Duplicator System (Army): This project evaluates the performance of a foreign magnetic signature duplicator and against known landmine threats. If successful, the technology will be available for transition to the Army's Mounted Detection System Program of Record for follow on acquisition. Test planning and contract award occurred in FY 2019. This project continues in FY 2020 with FY 2020 funds. -Personal Dosimeter as an Emergency Response System (Army): This project tests foreign Dosimeter technology along with an automated field analytics system for rapid identification and triage of individuals exposed to radiological or nuclear substances. This technology will be tested alongside the current Joint Personal Dosimeter to determine capabilities in an operational environment. If successful, this technology will transition to the Joint Program Manger Guardian program of record. This project			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Office of the Secretary Of Defense		Date: February 2020
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603133D8Z / *Foreign Comparative Testing*	**Project (Number/Name)** 313 / *Foreign Comparative Testing*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
was initiated out-of-cycle in 4Q FY 2019. Initial test planning and contract preparation occurred in 4Q FY 2019. This project continues in FY 2020 with FY 2020 funds. -Artificial Intelligence (AI) Neuromorphic Chip (Army): This project evaluates a low cost neuromorphic chip to replace the current paper and pencils method for counting 120-millimeter mortar rounds to more accurately determine weapon system life cycle maintenance. This effort demonstrates a tactical application of AI, will increase readiness, and could save millions of dollars in maintenance cost. If successful, this technology will be available for transition to the Army's Stryker Program Office for follow on acquisition. This project was initiated out-of-cycle in 4Q FY 2019. Initial test planning and contract preparation occurred in 4Q FY 2019. This project continues in FY 2020 with FY 2020 funds. -Vector Engine Processor for Use with Legacy Hypersonic Codes (Navy): This project evaluates a high-performance vector processor to significantly reduce time required to evaluate hypersonic designs. If successful, the technology will transition to the High Performance Computing Modernization Program. This project was initiated out-of-cycle in 4Q FY 2019. Initial test planning and contract preparation occurred in 4Q FY 2019. This project continues in FY 2020 with FY 2020 funds. -High Powered Microwave (HPM) Electro-Optic Electromagnetic Field Sensors (Air Force): This project tests various foreign Electro-Optic Electromagnetic Field sensors for use at Department of Defense test ranges to enhance Directed Energy Weapon Research, Development, and Test and Evaluation efforts. Current radio frequency antennas are too large to embed within HPM targets and thus, are unable to accurately measure HPM effects. If successful, the technology will transition to the Air Force Research Laboratory for follow on procurement as a test asset in support of future HPM test and evaluation efforts. This project was initiated out-of-cycle in 4Q FY 2019. Initial test planning and contract preparation occurred in 4Q FY 2019. This project continues in FY 2020 with FY 2020 funds. ***FY 2020 Plans:*** -Accelerating Human Performance Discovery (Army): FY 2020 New Start - This project evaluates an automated live-cell imaging and analysis microscope system to enable high-throughput and reduce the time required to conduct basic and applied biological research in support of accelerating human performance discovery. If successful, this technology will initially transition to the Army's Combat Capabilities Development Command, Soldier Center prior to further adoption across the Department of Defense medical research community. Test planning and contract award will occur in 1Q-2Q FY 2020. Receive test articles and conduct user training in 3Q-4Q FY 2020. This project continues in FY 2021 with FY 2021 funds. -Counter Unmanned Aerial System (CUAS) for Vehicle Protective Systems (Army): FY 2020 New Start – Evaluates a CUAS system for application to ground vehicles that uses passive radio frequency technology to detect and track UAS targets and provides the capabilities to determine operator origin and non-kinetically defeat UAS threats. If successful, the technology will transition to the Army's Program Manager for Vehicle Protection Systems. Test planning and contract award preparation to occur in 1Q FY 2020. Test articles to be delivered in 2Q FY 2020. Initial demonstrations to occur in 3Q-4Q FY 2020. This project continues in FY 2021 with FY 2021 funds.			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Office of the Secretary Of Defense		Date: February 2020
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603133D8Z / *Foreign Comparative Testing*	**Project (Number/Name)** 313 / *Foreign Comparative Testing*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
-Nano-Clay Seals for Long Service Life (Air Force): FY 2020 New Start - This project tests the service life of emerging nano-clay enhanced compression seal materials against the service life of existing nitrile rubber. This technology will extend seal service life significantly reduce life cycle maintenance costs for aircraft engines by reducing the number of required overhauls. If successful, the Air Force Research Laboratory will modify the current seal specification to include nano-clay materials. Follow-on procurement will occur through the Defense Logistics Agency. Test planning and test article acquisition will occur in 1Q FY 2020. Phase I Material Characterization will occur in 2Q-3Q FY 2020. Phase II service life testing will occur in 4Q FY 2020. This project continues in FY 2021 with FY 2021 funds. -Precision Vertical Take-Off and Landing Unmanned Aerial System (VTUAS) Recovery (Navy): FY 2020 New Start- This project evaluates a platform agnostic ultrasonic based sensor system for vehicles and vessels to enable autonomous recovery of VTUAS on stationary or moving platforms. If successful, the technology will be available for transition to Navy and Army UAS Programs for follow-on procurement and fielding. Test planning contract award will occur in 1Q-2Q FY 2020. Delivery of test articles will occur in 3Q FY 2020. Developmental testing will be performed in 4Q FY 2020. This project continues in FY 2021 with FY 2021 funds. -Artificial Intelligence (AI) Neuromorphic Chip (Army): Prototype integration and testing to occur throughout FY 2020. PM will make a transition decision and close-out report will be completed in 4Q FY 2020. -Vector Engine Processor for Use with Legacy Hypersonic Codes (Navy): Test article acquisition will occur in 1Q FY 2020. Performance testing will begin in 2Q FY 2020 and complete in 4Q FY 2020. This project continues in FY 2021 with FY 2020 funds to complete testing, final test report, and project closeout. -Personal Dosimeter as an Emergency Response Dosimetry System (Army): An interim test report will be provided in 4Q FY 2020 and this project continues in FY 2021 with FY 2020 funds. Operational field testing will continue into 3Q FY 2021 and culminate in a demonstration with live radiological material in 4Q FY 2021. The results will be provided to the Joint Product Leader for Radiological and Nuclear Defense who serves as the transition agency for the Dosimeter Technology. This project will complete in FY 2021. -Civil Affairs Solution-Army (CAS-A) Analytics (USSOCOM): Algorithms will be acquired and refined in 1Q-2Q FY 2020. Software integration and operational testing to commence in 3Q FY 2020. Testing will continue into 4Q FY 2020 using primarily open source data to determine best processes and procedures to create usable products to support the analysis process. This project continues in FY 2021 with FY 2021 funds. -Cryo-cooler For Distributed Aperture System (Air Force): This project combines a new cryo-cooler technology with leading edge infrared sensor technology to increase reliability, extend the life of sensor equipment, and reduce costs. This technology will also decrease cool down time enabling aircraft to meet critical launch timelines. This project completed test article integration and reliability testing in 3Q FY 2019 with FY 2018 funds. This project continues in FY 2020 with FY 2020 funds. Test article integration will occur in 2Q FY 2020. Component level reliability testing to occur in 3Q FY 2020. System level reliability testing to occur in 4Q FY 2020. PM will make a transition decision and close-out report will be completed in 4Q FY 2020.			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Office of the Secretary Of Defense		Date: February 2020
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603133D8Z / *Foreign Comparative Testing*	**Project (Number/Name)** 313 / *Foreign Comparative Testing*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
-Insensitive Munitions Fuze for the M67 Fragmentation Hand Grenade (Army): Conduct down select in 1Q FY 2020. Conduct fragmentation testing and lethality analysis in 2Q-3Q FY 2020. Complete final test and close-out reports in 4Q FY 2020. -Panoramic Infrared Sensor Test (Navy): Integration and shipboard testing will be conducted in FY 2020. Final test and closeout report will be completed in 4Q FY 2020. -Smartshooter Evaluation (Army): This project will continue with live fire testing throughout FY 2020. Final test and closeout reports will be submitted in 4Q FY 2020. -AT4 Confined Space Tandem Warhead (Army): Live fire testing will take place in 1Q-2Q FY 2020. The project will complete in 3Q FY 2020 with a final test and closeout reports. -Modular Airdrop Platform (Army): Unloaded air drop testing will occur in 1Q-2Q FY 2020 followed by drops utilizing generic payloads in 3Q FY 2020. Final airdrop demonstration at Fort Bragg will take place in 4Q FY 2020. The project will conclude by the end of FY 2020 with a final test and closeout report. -105 Millimeter Family of Multi-Purpose Munitions (Army): Characterization and operational testing will occur in 1Q-3Q FY 2020. Final test and closeout reports to be delivered 4Q FY 2020. -Uncooled 120 Hertz Longwave Infrared Focal Plane Arrays for Night Vision Sensors (Army): Size, weight, and power verification will occur in 1Q FY 2020. Frame rate verification will also occur in 1Q FY 2020. Sensitivity testing will occur in 2Q FY 2020. Thermal time constant verification will occur in 3Q FY 2020. Extended solar exposure testing will complete in 4Q FY 2020. Final test report and project closeout will occur in 4Q FY 2020. -Magnetic Signature Duplicator Systems (Army): Operational testing to determine effectiveness and suitability of the system by combat engineers, infantry, and cavalry and armor forces will occur in 2Q-4Q FY 2020. The project will complete with a closeout report in 4Q FY 2020. -Hydrogen Fuel Cell Technology for Small UAS (Air Force): Operational testing will occur throughout FY 2020. Project will complete with a final test and closeout reports in 4Q FY 2020. -High Powered Microwave (HPM) Electro-Optic Electromagnetic Field Sensors (Air Force): Test articles will be received in 3Q FY 2020 and low-level lab testing will commence. This project continues in FY 2021 with FY 2021 funds.			
FY 2021 Plans: - Accelerating Human Performance Discovery (Army): FY 2020 New Start- Lab testing and end product cross validation studies will occur in 1-2Q FY 2021. If lab testing is successful, full scale studies will occur in 3Q-4Q FY 2021. This project completes in FY 2022 with FY 2021 funds. -Counter Unmanned Aerial System (CUAS) for Vehicle Protective Systems (Army): FY 2020 New Start- Vehicle integration and field testing and demonstrations to occur in 1Q FY 2021. Final test report and project closeout to complete by 3Q FY 2020. -Nano-Clay Seals for Long Service Life (Air Force): FY 2020 New Start- Phase II material qualification occurs in 1-3Q FY 2021 with long term compression set testing and compressive stress relaxation testing. Phase III component performance testing occurs in 4Q FY 2021. Final test and closeout reports will be delivered by the end of FY 2021.			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Office of the Secretary Of Defense		Date: February 2020
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603133D8Z / *Foreign Comparative Testing*	**Project (Number/Name)** 313 / *Foreign Comparative Testing*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
- Precision Vertical Take-Off and Landing UAS (VTUAS) Recovery Navy): FY 2020 New Start- Operational testing of the units will occur in 1-3Q FY 2021. Interference testing and vulnerability assessment will occur in 4Q FY 2021. Final test and closeout reports will be delivered by the end of FY 2021. -Civil Affairs Solution-Army (CAS-A) Analytics (Army): Operational testing to occur throughout FY 2021. A final test report and transition decision will occur in 4Q FY 2021. -High Powered Microwave (HPM) Electro-Optic Electromagnetic Field Sensors (Air Force): Operational testing under harsh field conditions will occur during an HPM experiment in 3Q FY 2021. Final test and closeout reports will be provided by the end of FY 2021. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** FY 2020 funding commitment is reduced as currently selected projects complete their 12-36 month evaluation and are transitioned.			
Title: Foreign Comparative Testing Prototype Development Focus Areas	0.247	1.637	10.878
Description: Previously funded effort. The FCT program will select new projects to evaluate allied/partner nation technologies that address emerging DoD capability gaps and provide substantial cost, schedule, and/or performance benefit to the warfighter. As projects are selected, they will be reported individually. Prototype development will be aligned to the National Defense Strategy (NDS) and current Office of the Under Secretary of Defense, Research and Engineering focus areas to deliver increased readiness and a more lethal Joint Force while strengthening alliances, attracting new partners, and achieving greater performance and affordability. ***FY 2020 Plans:*** During FY 2020, FCT will prioritize selecting projects supporting the NDS and DoD modernization priorities: - Fully Networked Command Control and Communications - Space - Autonomous Systems - Cybersecurity – Offense and Defense - Hypersonics – Offense and Defense - Directed Energy - Machine Learning and Artificial Intelligence - Microelectronics - Quantum Technology - Bio-technology - 5G			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Office of the Secretary Of Defense		Date: February 2020
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603133D8Z / *Foreign Comparative Testing*	**Project (Number/Name)** 313 / *Foreign Comparative Testing*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
In addition to the above areas of technology development, FCT will select programs that resolve emerging urgent operational needs with field-ready allied technologies and programs that promise substantial life-cycle cost savings/avoidance in fielded systems. ***FY 2021 Plans:*** FCT anticipates supporting ten to twelve projects spread across the focus area priorities in FY 2021. Deliverables will include integrated products that enhance the warfighters capabilities or technology that advances the battlefield advantage of the DoD across the multi-domain battlefield capabilities. This will be done through test and evaluation of prototypes, demonstrations, and concept experimentation in coordination with the Services and United States Special Operations Command and other DoD Agencies. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** This funding will be allocated for the selection of new projects that will commence in FY 2020 and FY 2021. Projects will be selected through a merit-based process and will address current and future OUSD R&E modernization priorities. Funding increases from FY 2020 to FY 2021 as commitments to on-going projects continues and new projects are approved.			
Accomplishments/Planned Programs Subtotals	23.867	24.970	25.183

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Successful FCT projects support capability acquisition in several ways: technology upgrade insertion into a current platform or program providing greater capability or prolonging the life of the weapon system, informed/refined requirements for planned systems, or direct transition/procurement. FCT leverages the Services' and Defense Agencies' most efficient and effective acquisition approaches for rapid prototyping. This includes using Other Transaction Authorities and new or existing contract vehicles within middle-tier acquisition strategy.