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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Office of the Secretary Of Defense **Date:** March 2023

Appropriation/Budget Activity 0400: Research, Development, Test & Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)	R-1 Program Element (Number/Name) PE 0603648D8Z I Joint Capability Technology Demonstration (JCTD)
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COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	1,221.594	99.341	-	-	-	-	-	0.000	-	-	Continuing	Continuing
648: Joint Capability Technology Demonstration (JCTD)	1,221.594	85.135	-	-	-	-	-	-	-	-	Continuing	Continuing
649: Multi-Domain Demonstrations (MDD)	0.000	14.206	-	-	-	-	-	-	-	-	Continuing	Continuing

Note

New Start (Y/N): No

The Joint Capability Technology Demonstration (JCTD) Program Element (PE) transitioned to PE 0603838D8Z Defense Innovation Acceleration (DIA).

A. Mission Description and Budget Item Justification

The mission of the Joint Capability Technology Demonstration (JCTD) Program Element, 0603648D8Z, is to address Combatant Command (CCMD) and Joint Warfighting operational gaps by executing prototypes, reducing technical risk, and conducting operational demonstrations to assess military utility against urgent/emergent warfighter needs. This Congressionally-mandated program serves as one of the few avenues for CCMDs to address their most pressing priority capability gaps and requirements, which often result from inadequate Service Title-10 investment in joint interoperability that achieve improved mission outcomes.

The JCTD PE puts capabilities into the hands of the Joint Warfighter one to two years sooner than would have been accomplished by the Services alone. This is achieved using a CCMD sponsor for each project; leveraging service research and engineering laboratories, academia, and industry expertise; requiring partner funding; and executing the necessary steps for transition with service acquisition partners throughout the project lifecycle. This methodology results in a nearly 80% transition success rate, and solidifies the program's role as a technology catalyst, rapid capability provider, and transition-bridge between the USD(R&E) and the Under Secretary of Defense for Acquisition and Sustainment (USD(A&S)) offices.

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B. Program Change Summary (\$ in Millions)	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024 Base</u>	<u>FY 2024 OCO</u>	<u>FY 2024 Total</u>
Previous President's Budget	102.345	114.100	121.077	-	121.077
Current President's Budget	99.341	0.000	0.000	-	0.000
Total Adjustments	-3.004	-114.100	-121.077	-	-121.077
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-2.988	-			
• DIA Re-alignment to 0603838D8Z	-	-114.100	-121.077	-	-121.077
• Program Adjustment	-0.016	-	-	-	-

Change Summary Explanation

FY 2023 and out-year funding in the Joint Capability Technology Demonstration (JCTD) Program Element (PE) transitioned to PE 0603838D8Z Defense Innovation Acceleration (DIA).

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense										Date: March 2023		
Appropriation/Budget Activity 0400 / 3					R-1 Program Element (Number/Name) PE 0603648D8Z / <i>Joint Capability Technology Demonstration (JCTD)</i>				Project (Number/Name) 648 / <i>Joint Capability Technology Demonstration (JCTD)</i>			
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
648: <i>Joint Capability Technology Demonstration (JCTD)</i>	1,221.594	85.135	-	-	-	-	-	-	-	-	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

JCTD project selection is driven by the ability to accelerate transition of new prototyped capabilities to the Joint Warfighter that have strong CCMD and Joint Staff interest; cost-share commitments from the Military Services and Defense Agencies; advanced technical readiness; and a well-defined and affordable transition path for long-term sustainment. Project proposals are selected following a deliberate process that leverages a wide-ranging stakeholder community that includes the CCMDs, Joint Staff, Service science and technology (S&T) communities, academia, industry, the Intelligence Community, and organizations within the Office of the Secretary of Defense. This selection process and the execution process previously described has resulted in a nearly 80% transition rate, which is defined as a project moving into a new or existing program of record or residual prototypes utilized by the CCMDs and Joint Warfighter for immediate operational use. The final objective for the JCTD program is to maintain the United States' technological superiority across the range of military operations while reducing the cost of operations, facilitating joint interoperability, and allowing for the rapid insertion of new capabilities.

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

	FY 2022	FY 2023	FY 2024
Title: Collaborative Naval Information Warfare Systems Command Cyber Operations (N-Cyber)	2.153	-	-
Description: N-Cyber is a FY 2022 new-start JCTD. The N-Cyber JCTD is an offensive capability that will enable warfighters to create non-kinetic effects (NKE) on traditionally hard-to-affect adversary systems from air, land, or sea through the integration of space, cyber, and electronic warfare. In FY 2022, N-Cyber stood up the Integrated Management Team, signed an Implementation Directive, and executed Technical Demonstrations.			
Title: Signal of Opportunity Receiver (SORcer) Enable Ionospheric Modeling (SEIM)	0.853	-	-
Description: SEIM is a FY 2022 new-start JCTD. By fielding SORcers systems in forward locations, SEIM will deliver necessary high frequency (HF) propagation data to enable operational awareness of the electromagnetic operating environment (EMOE). Artificial Intelligence (AI) and Deep Neural Network (DNN) techniques will be utilized to enable autonomous use of SORcer systems to support better targeting and decision-making for the Joint Warfighter. In FY 2022, SEIM deployed SORcer systems in operationally-relevant locations, connected SORcer systems to specified networks to exfiltrate near-real-time observations to a centralized location for quality control and assimilation.			
Title: Maritime Centric Skywave Over-the-Horizon Radar (MASOR)	1.000	-	-
Description: Previously-funded JCTD. MASOR will create a maritime-dedicated wide-area surveillance over-the-horizon radar (OTHR) system that significantly improves maritime detect-and-track capabilities while also maintaining current air operation			

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2022	FY 2023	FY 2024
capabilities. MASOR's wide-area ground/maritime detection and monitoring capability will degrade the adversary's ability to remain undetected. Transition of this JCTD will be through ROTHr program office as they continue to operate the improved system. JIATF-S JOC will receive the tracks. This JCTD will complete in FY 2022 and transition to the U.S. Navy's Relocatable OTHR (ROTHR) program office and feed tracks into Joint Interagency Task Force - South (JIATF-S)'s Joint Operations.				
Title: Resilient Expeditionary Agile Littoral Logistics (REALL) Description: Previously-funded JCTD. REALL supports the Contested Logistics mission priority area and the National Defense Strategy's modernization priority on forward force maneuver and posture resilience. REALL will demonstrate capabilities to enable a distributed network of fuel distribution and logistics nodes in support of emerging operational concepts. These systems will operate within the arc of enemy fires with significantly less risk than traditional naval platforms due to their distributed nature. In FY 2022, REALL will finalize the concept of operations and complete a Military Utility Assessment. The JCTD will complete in FY 2023 and transition the platform, vertical takeoff and lift (VTOL) kit, and fuel subsystem technical documentation to Naval Facilities Engineering Command (NAVFAC) Expeditionary Programs Office's Sealift program; Naval Beach Group inventories via NAVFAC Expeditionary Programs Office; and Office of the Chief of Naval Operations, Expeditionary Warfare (OPNAV N95) and Strategic Mobility and Combat Logistics (OPNAV N42).		3.000	-	-
Title: Automating Indications and Warnings (I&W) for Operational Awareness (REDLINE) Description: Previously-funded JCTD. REDLINE supports the National Defense Strategy's focus on military applications of machine learning to gain a competitive military advantage. REDLINE will leverage machine learning to provide CCMDs the ability to conduct automated order of battle in denied areas. In FY 2022, REDLINE continued to scale performance, conducted Operational Demonstrations, and completed its Military Utility Assessment. The JCTD will transition to the Defense Intelligence Agency (DIA)'s Foundational Intelligence Modernization effort as a program of record.		1.835	-	-
Title: Resilient Logistics Description: Previously-funded JCTD. Resilient Logistics supports the Contested Logistics mission priority area and the National Defense Strategy's focus on forward force maneuver and posture resilience. Resilient Logistics will provide kitted solutions to increase the survivability of expeditionary and permanent logistical support networks in Anti-Access/Area-Denial (A2/AD) environments. Upon completion of the JCTD, residual operational prototype kits will be available for immediate fielding. In FY 2022, the JCTD developed the concept of operations and tactics, techniques, and procedures for the kitted solution and conducted a comprehensive Military Utility Assessment (MUA) with operational units at an appropriate exercise venue. Resilient Logistics will complete in FY 2023.		2.000	-	-
Title: Analytic Threat Observation, Materialistic Identification, Classification, and Attribution (ATOMICA)		2.125	-	-

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2022	FY 2023
<p>Description: Previously-funded JCTD. ATOMICA supports the National Defense Strategy’s focus on providing non-intrusive, real-time identification of threats to support the Joint Force’s secure maneuverability through both land and sea. ATOMICA provides a portable, self-contained sensor system that will provide an unprecedented ability to materialistically determine the contents of an unknown object. The sensor will interrogate objects with a short standoff distance without touching, opening, or disturbing the targeted object. The ATOMICA sensor will be integrated onto various unmanned platforms, to include unmanned ground vehicles (UGV) and unmanned, remotely-operated vehicles (ROV) for both terrestrial and underwater environments. In FY 2022, ATOMICA developed a concept of operations (CONOPS) and tactics, techniques, and procedures (TTP) for fieldable/operational prototypes. In FY 2023, the JCTD will conduct an Operational Demonstration/Military Utility Assessment and transition to a U.S. Navy Expeditionary Combat Branch (OPNAV N957) program of record for Maritime Expeditionary Standoff Response (MESR). The JCTD will complete in FY 2023.</p>			
<p>Title: Secure Tactical Advanced Mobile Power (STAMP)</p> <p>Description: Previously-funded JCTD. STAMP supports the National Defense Strategy’s mission priority of Contested Logistics. STAMP will integrate power generation, distribution, battery storage, metering, control systems, and on-board vehicle power from mobile tactical platforms into an AC/DC micro-grid to enhance resiliency, mobility, and flexibility of tactical units to execute distributed cross domain maneuvers in multi-domain operations. In FY 2022, STAMP conducted an Operational Demonstration for a micro-grid, with mobile tactical charging and energy storage integration; transition integration; and safety confirmation for the Family of Medium Tactical Vehicles (FMTV) micro-grid system. STAMP will transition components and other hardware to programs of record for Power Distribution Illumination System, Electrical Power Distribution and Illumination Equipment (PDISE), and FMTV. Operational prototypes will be delivered to Program Management (PM) office Terminal High Altitude Area Defense (THAAD) and PM Mission Command. The JCTD will complete in FY 2023.</p>		2.635	-
<p>Title: Autonomous Maritime Patrol Craft (AMPA)</p> <p>Description: Previously-funded JCTD. AMPA is developing an unmanned militarized version of the world’s largest solar aircraft, the Solar Impulse. The resulting Skydweller aircraft will be designed to stay airborne for more than 90 days with excess electrical power available to simultaneously operate a suite of sensors, communications, navigation, and electronic warfare (EW) sub-systems. This technological leap will allow a single Skydweller aircraft to more effectively perform the mission of numerous manned and unmanned Intelligence, Surveillance, and Reconnaissance (ISR)-configurable assets, eliminate risk to human pilots, and provide a level of persistence not available anywhere else in the military inventory. In FY 2022, AMPA plans to complete a seven-day, sustained flight of the Skydweller aircraft as an Operational Demonstration of advanced fly-by-wire technology, autonomous flight control system, and vehicle management systems.</p>		1.900	-
<p>Title: Automated Construction of Expeditionary Structure (ACES)</p>		1.365	-

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2022	FY 2023
<p>Description: Previously-funded JCTD. ACES provides Combatant Commands (CCMD) the capability to quickly provide mobility and force protection for deployed Joint Warfighters. Military combat engineer units lack the capability to enable rapid construction, route repair, and gap crossing to establish and sustain lines of communications. ACES will provide an automated 3D printer to construct gap crossings, obstacles, and force protection positions using locally available concrete and other materials at a pace that adversaries cannot match. In FY 2022, ACES conducted a limited Military Utility Assessment (MUA) and delivered prototypes in theater to support Joint Warfighter battlefield needs. Prototypes will transition to programs of record at U.S. Army Facilities Component Systems; U.S. Navy Engineering Expeditionary Warfare Center (EXWC); and U.S. Marine Corps Systems Command (MARCORSYSCOM). The JCTD will complete in FY 2023.</p>			
<p>Title: Prometheus Emerald</p> <p>Description: Previously-funded JCTD. Prometheus Emerald (PE) supports the National Defense Strategy by delivering a proof of concept Artificial Intelligence (AI) collection management and tasking capability to allow Military Intelligence personnel to automate AI workflows. In FY 2022, Prometheus Emerald developed models against specific threats and executed a Technical Demonstration of AI hardware and models. In FY 2023, Prometheus Emerald will conduct an Operational Demonstration and Military Utility Assessment. The JCTD will complete in late FY 2023 and transition to the Army Tactical Intelligence Targeting Access Node (TITAN) program of record.</p>		2.576	-
<p>Title: Pacific Ecosystem for Cyber (PEcoC)</p> <p>Description: Previously-funded JCTD. PEcoC supports the cybersecurity requirements identified in the FY 2021 National Defense Authorization Act and OUSD(R&E)'s cyber modernization priority. PEcoC provides an information advantage through application of integrated artificial intelligence (AI) and machine learning (ML) techniques that improves cyber-threat identification and response while integrating disparate national cybersecurity programs into the Pacific ecosystem. In FY 2022, PEcoC incorporated additional threat and malicious behavior into ML algorithms and software models while continuing development and deployment of deep packet inspection models that look for data exfiltration into DoD operational platforms. In FY 2023, PEcoC will conduct an Operational Demonstration/Military Utility Assessment in Naval Computer and Telecommunications Area Master Station (NCTAMS), Far East, and will deploy a classified prototype high-performance ML system to Naval Computer and Telecommunications Area Master Station (NCTAMS), Pacific. The JCTD will complete in early FY 2023.</p>		2.913	-
<p>Title: Passive Optical Spectrum Control and Exploitation (POSCE)</p> <p>Description: Previously-fund JCTD. POSCE uses innovative sensing methods intended to augment persistent Intelligence, Surveillance, and Reconnaissance (ISR) in maritime environments and along terrestrial chokepoints. Additionally, novel sensing provides penetrating ISR in response to operational challenges in anti-access/area-denial (A2/AD) environments.</p>		2.820	-

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2022	FY 2023	FY 2024
<p>Title: Reliable Transmission over HF (NORTH)</p> <p>Description: Previously-funded JCTD. NORTH focuses on Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) and Fully-networked Command, Control and Communications (FNC3) modernization. NORTH will integrate with the Navy’s wideband high frequency (HF) mesh networking system and the Air Force’s digital HF radios and repeaters to optimize joint information transport datalinks based on sense and respond (S&R) of the spectral environment. All three systems together provide an enterprise solution which will increase operational effectiveness of resilient C3 in anti-access/area-denial (A2/AD) environments. In FY 2022, NORTH conducted a Technical Demonstration in simulated conditions which demonstrated an ad hoc HF mesh networking system that will enhance FNC3, including Resilient Command and Control (RC2) and Nuclear Command, Control, and Communications (NC3).</p>		3.332	-	-
<p>Title: Quicksink</p> <p>Description: Previously-funded JCTD. Quicksink is developing technologies to reduce the number of air assets required for anti-surface warfare (ASuW) operations by increasing ASuW weapon lethality and standoff while decreasing costs. The program is also using the Joint Direct Attack Munition as an inexpensive integration and testing platform for Quicksink technologies. In FY 2022, the program successfully demonstrated a seeker-less Quicksink munition against both stationary commercial and Naval vessels.</p>		1.927	-	-
<p>Title: Raging Parakeet (RP)</p> <p>Description: Previously-funded JCTD. Combatant Commands (CCMD) lack the ability to rapidly analyze vast amounts of Intelligence, Surveillance, and Reconnaissance (ISR) data to quickly locate hard-to-find targets with a high degree of accuracy. RP will utilize advanced Artificial Intelligence (AI)/Machine Learning (ML) algorithms and sensor fusion to decrease manpower requirements and simultaneously increase the accuracy of high-priority target identification. In FY 2022, the U.S. Air Force handed over technical lead to the Naval Research Laboratory (NRL).</p>		6.497	-	-
<p>Title: Stratospheric Capability Architecture Development (SCAD)</p> <p>Description: Previously-funded JCTD. SCAD supports the National Defense Strategy by delivering materiel solutions to the United States Army (USA) and United States Special Operations Command (USSOCOM) for acquisition and sustainment. SCAD will develop, demonstrate, and assess an unmanned aerial systems platform with stratospheric payloads that provide Ground Moving Target Indicator (GMTI) Synthetic Aperture Radar (SAR), Signals Intelligence (SIGINT), and communications relay capabilities. In FY 2022, SCAD developed a concept of operations and conducted Technical and Operational Demonstrations.</p>		1.400	-	-
<p>Title: Pathfinder</p>		2.000	-	-

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2022	FY 2023	FY 2024
<p>Description: Pathfinder was a previously-funded JCTD. Pathfinder supports the National Defense Strategy by delivering U.S. Northern Command (USNORTHCOM) and North American Aerospace Defense Command (NORAD) a prototype Homeland Defense Data Ecosystem (HDDE) that fuses hundreds of terabytes of data and provides a synthesized analytical solution. In FY 2022, Pathfinder participated in several Global Information Dominance Exercises and conducted successful Operational Demonstrations. The JCTD completed in FY 2022 and is now integrated with USNORTHCOM capabilities.</p>				
<p>Title: Cybersecurity for Robotic and Autonomous Systems Hardening (CRASH)</p> <p>Description: Previously-funded JCTD. The Department of Defense (DoD)'s deployed Robotic Autonomous Systems (RAS) face pervasive threats to adversary hacking at multiple touch points that, if left unsecured, could potentially allow adversaries to manipulate DoD Forces without Joint Warfighter knowledge and create climates of permanent uncertainty and distrust within the Joint Warfighter community toward RAS assets. CRASH will tailor RAS software solutions to provide deep and layered cyber defenses against multi-vector cyberattacks from existing and emerging threats to allow completion of autonomous missions in contested battlefields. In FY 2022, CRASH executed a cyber-tabletop exercise and a Technical Demonstration of the current software development.</p>		2.475	-	-
<p>Title: Joint Targeting Support (JTS)</p> <p>Description: Previously-funded JCTD. JTS will reduce the sensor-to-shooter timeline and increase the rate of target identification and engagements by leveraging resources across services, agencies, and coalition partners. JTS will connect sensors, shooters and data across the Services to effectively support targeting cells at all echelons to provide capabilities in support of Joint All-Domain Command and Control (JADC2). JTS will automate Joint target development for deep fires missions by developing and integrating machine learning analytics with Joint- and Service-specific information systems and Intelligence, Surveillance, and Reconnaissance (ISR) networks. JTS will simultaneously build and refine numerous user- and machine-nominated target decks by employing distributed processing and fusion analytics and augmenting the Joint Automated Deep Operations Coordination System (JADOCS) to improve the target development process across echelons and services. In FY 2022, JTS further developed analytics, user interfaces, and exploitation and correlation of Joint forces data.</p>		5.921	-	-
<p>Title: Aerial Port of the Future (APoF)</p> <p>Description: Previously-funded JCTD. Aerial ports and air transportation expeditionary operations are constrained by poorly performing and unlinked Information Technology (IT) systems, outdated command, control, and communications (C3) networks, and physical handling of critical classes of supply. To solve these problems, APoF will develop, integrate, and test emerging capabilities at aerial ports by providing a logistics common operating picture for planning, processing, and managing Joint Force cargo; an integrated automated system to manage personnel, cargo, and munitions; and man/unmanned materiel handling equipment to rapidly load sustainment to global air mobility assets. In FY 2022, APoF leveraged high-impact improvements to IT</p>		2.257	-	-

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2022	FY 2023	FY 2024
infrastructure for tactical awareness of the aerial port, completed the spiral for IT infrastructure development, and started two new spirals: one for automated systems with portable computing and another for the integration of autonomy and machine learning with advanced data analytics.				
<p>Title: Turul</p> <p>Description: Turul was a FY 2022 new-start JCTD. Turul will provide scalable, machine learning-enabled algorithms to find and fix fleeting targets to accelerate kill chain activities against time-sensitive targets. Information from these capabilities will provide situational awareness to Combatant Command (CCMD) operators and be used to tip and cue other sensor systems. Maritime moving target indicator (MMTI), ground moving target indicator (GMTI), and air moving target indicator (AMTI) information is needed by the CCMDs in quantities and timelines that are not currently being met by existing means. In FY 2022, Turul formed its Integrated Management team, signed an Implementation Directive, and conducted Technical Demonstrations.</p>		1.200	-	-
<p>Title: Surface-Launched Advanced Munition Datalink (SLAMD)</p> <p>Description: SLAMD was a FY 2022 new-start JCTD. The SLAMD JCTD is developing and integrating a tactical Projectile Data Link (PDL) into a gun-launched, maneuvering projectile to enable long-range precision fires in a GPS-denied environment. The data link will enable communications between the projectile and a ground-based tracking radar to enable mid-course corrections to the projectile's path. The data link is also an enabler for ground-to-round and round-to-round communications for tactical applications, such as swarming. In FY 2022, SLAMD completed System and Subsystem technical requirements generation, initial PDL design and development, PDL Interface Control Document (ICD) development, Radar Mode design, and assessment metrics development.</p>		1.500	-	-
<p>Title: High-Frequency Silent Transmission over Optimum Delivery of Expeditionary Situational Awareness Resilient Mesh (HF STORM)</p> <p>Description: Previously-funded JCTD. This JCTD refines the Department of Defense (DoD)'s Fully-networked Command, Control, and Communications (FNC3) and high frequency (HF) roadmaps to mature and layer several key technologies. HF STORM will develop and employ antenna arrays (communication hubs), covert mobile architectures, and software defined radio (SDR) capabilities. These developments combine to increase transmission directivity while minimizing detection susceptibility in tactical, relocatable, and expeditionary ground and aerial nodes that link with a large ground-based array to provide global and secure reach in a contested or denied environment. The integration of wideband SDRs with advanced waveforms enables robust and resilient beyond-line-of-sight (BLOS) communication links while decreasing an adversary's jamming ability. In FY 2022, HF STORM conduct a Technical Demonstration.</p>		3.947	-	-
<p>Title: Joint Undersea Surveillance and Targeting (JUST)</p>		2.713	-	-

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2022	FY 2023
Description: JUST was a FY 2022 new-start. JUST will deliver a new capability to monitor changes to the undersea battlespace and seabed infrastructure by demonstrating intelligent autonomous unmanned undersea vehicle (UUV)-enabled target recognition and change detection capability enabling secure Joint Force offensive and defensive operations. Combatant Commands (CCMD) require JUST capabilities for force protection and operational plan execution. In FY 2022, JUST developed and tested automatic target recognition (ATR) and automatic change detection (ACD) capabilities and assessed surrogate UUVs for testing in an operationally-relevant environment.			
Title: Low-Cost Chip-Scale Atomic Clock (LC CSAC)		0.970	-
Description: LC CSAC was a FY 2022 new-start. LC CSAC will develop smaller scale devices that can be produced at a higher quantity and a lower price point. LC CSAC is a pre-Engineering and Manufacturing Development (EMD) effort that will provide low-Size, Weight, Power, and Cost (SWaP-C) atomic clocks for GPS receivers and radios to operate smoothly through GPS-contested and GPS-denied environments. The JCTD will demonstrate LC CSAC integrated with representative U.S. Army systems operating under future threat environments. In FY 2022, LC CSAC verified that design simulations met cost and performance metrics.			
Title: Autonomous Multi-Domain Launcher (AML)		2.500	-
Description: AML was a FY 2022 new-start. AML will develop and demonstrate an unmanned, cab-less, highly mobile, C-130 transportable prototype Long Range Precision Fires (LRPF) launcher. The prototype launcher will be capable of leader-follower autonomy, drive-by-wire, and remote launcher turret and fire control operation. The prototype launcher will also be capable of handling/launching longer munitions (up to 20 feet in length) while remaining compatible with the current Multiple Launch Rocket System (MLRS) Family of Munitions (MFOM) (13 feet in length). Australia is collaborating on this JCTD project. In FY 2022, AML completed its Implementation Directive and Management Plan.			
Title: Combatant Commander (CCMD) Support, Capability Transition and Strategic Project Operational Management		18.720	-
Description: Continuously-funded effort. This effort is comprised of three programs that support the entire JCTD Program: (1) CCMD direct liaison support, (2) JCTD pre-transition, and (3) Program Integration Office (PIO) for execution of select, classified projects. (1) CCMD direct liaison support: The CCMDs are essential in specifying capability needs, project identification, demonstration venues, military utility assessment, and transition of JCTDs. The JCTD Program provides direct support to CCMDs, enabling them to provide an on-site JCTD operational manager. (2) JCTD pre-transition: In some cases, Service or Agency partner transition funding is unavailable for one to two years following the JCTD demonstration phase. In such cases, where there is a clear transition and the need to sustain the capability for a short time prior to availability of Service or Agency transition funds, JCTD pre-transition funds may be used to meet that need.			

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Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603648D8Z / <i>Joint Capability Technology Demonstration (JCTD)</i>	Project (Number/Name) 648 / <i>Joint Capability Technology Demonstration (JCTD)</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2022	FY 2023	FY 2024
(3) PIO: Executes a select number of highly-classified projects in areas such as time sensitive targeting (TST), electronic miniaturization, electronic countermeasures, advanced mobile ad hoc network communications, space situational awareness intelligence surveillance and reconnaissance, sensor platforms and communications, and persistence surveillance.				
Title: Birdseye Yonder (BEYOND) Description: BEYOND is a FY 2023 new-start JCTD. BEYOND matures and integrates advanced, photonic-based radiofrequency (RF) sensors (referred to as "Wall Fly") that generate high-quality geolocation and signal intelligence of threats far beyond current capabilities. BEYOND matures and integrates sensors into existing EUCOM sensor networks and demonstrates signals intelligence (SIGINT) and high-quality passive geolocation far beyond current capabilities. The sensor technology is a 360-degree wideband passive geolocation, track, and target classification capability designed around a novel physically-assisted wideband correlator technology.		0.050	-	-
Title: Collaborative Artificial Intelligence (AI) for Predicting Enemy Course of Action (ECOA) (CAPE) Description: CAPE is a FY 2023 new-start JCTD. CAPE is an Artificial Intelligence (AI)-enabled decision support software for predicting enemy course of action (ECOA). CAPE introduces a unique Decision Centric Architecture (DCA) not currently found in fielded systems and advances symbolic plan recognition, semantic networks, and mixed-initiative reasoning that facilitate human-machine teaming while automating ignorance identification and request for information generation.		0.050	-	-
Title: Correlating Order-of-Battle (OB) Movement Patterns for Learned Event Exploitation (COMPLEX) Description: COMPLEX is a FY 2023 new-start JCTD. COMPLEX is Artificial Intelligence (AI) and Machine Learning (ML) software that improves our ability to predict our adversaries' movements and operational activities. COMPLEX will have two main impacts on the Joint Warfighter capability: increasing warning capability against foreign military actions and increasing knowledge of activity patterns within, across, and between foreign units.		0.050	-	-
Title: Crystal Vista (CV) Description: CV is a FY 2023 new-start JCTD. CV addresses a Joint operational need for a federated data platform. Our forces require secure, reliable access to data and applications anywhere on the planet in near-real-time to achieve freedom of action across the battlespace. CV will utilize existing infrastructure as well as novel satellite, cloud, and mesh networks to provide the Joint force with a platform that will augment and extend current investments while also driving the evolution, resilience, interoperability, and security of future DoD strategic investments such as the Joint Warfighting Cloud Capability. To this end, CV will advance quantum-resistant capabilities into CV while eliminating the cyber kill chains of adversaries targeting our fabric, eliminating insider threat, and delivering legally-compliant explainable Artificial Intelligence (AI) to achieve sustained advantage		0.001	-	-

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2022	FY 2023	FY 2024
for a range of missions including but not limited to: cyber mission force, intelligence operations, information operations, mission-critical priority assurance, and battlespace management.				
Title: Carbon Swift Security (CS2) Description: CS2 is a FY 2023 new-start JCTD. The Carbon Swift (CS) unmanned aerial vehicle (UAV) does not currently have an assured self-destruction capability and must be recovered after use. Recovery efforts put U.S. personnel at risk in contested environments and, if these efforts fail, the adversary may recover the UAV and reverse engineer its capabilities, eroding U.S. asymmetrical advantage. CS2 will deliver a self-destruction capability for the CS UAV without incurring weight or volume penalties. Vacuum thermal-forming of energetic materials (VTFEM), combined with novel nitrocellulose-based plastics, will enable high-throughput manufacturing of energetic components in bulk to meet future demands.		0.050	-	-
Title: HAYFINS (full name is classified) Description: HAYFINS is a FY 2023 new-start JCTD. HAYFINS is a ground-based system supporting Space and Autonomy modernization priorities by fusing protection technologies, Artificial Intelligence/Machine Learning (AI/ML), and legacy systems enabling freedom of maneuver in support of Multi-Domain Operations.		0.050	-	-
Title: Joint Radiant Touchstone (J-RTS) Description: J-RTS is a FY 2023 new-start JCTD. Joint Warfighters require a vulnerability assessment tool designed to enable warfighters with freedom of maneuver and freedom of action. The J-RTS tactical software tool will provide warfighters with freedom of maneuver, function as a key offensive warfare enabler, and provide awareness for disaggregated/disadvantaged users. J-RTS will scale into a Joint Force capability supporting warfighters across all theaters by sharing data as well as planning details once the tool is deployed to theater assets. Further technical details are classified.		0.050	-	-
Title: Low-Altitude Future Vertical Take-off and Landing (VTOL) Long-Range Attack Missile (LRAM) Description: LRAM is a FY 2023 new-start JCTD. The LRAM JCTD will build upon L3Harris' Red Wolf air-launched unmanned air vehicle (UAV). Specifically, the JCTD will develop a launcher and control interface for vertical takeoff and landing (VTOL) aircraft, kinetic payload, command and control (C2) architecture, and a seeker for autonomous over-the-horizon engagements. Most of the aforementioned will be extensible to other aircraft, to include unmanned aircraft. This weapon system concept will significantly extend the lethal range of VTOL-launched weapons. Moreover, outfitting the VTOL fleet of tactical aircraft (H-1, H-60 series, AH-64, and Joint Future Vertical Lift) with this weaponized UAV will dramatically increase the number of aircraft available for over-the-horizon strike.		0.050	-	-
Title: Rapid Large Area Clearance (RLAC)		0.050	-	-

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2022	FY 2023	FY 2024
<p>Description: RLAC is a FY 2023 new-start JCTD. RLAC will rapidly conduct large area clearance of ports and airfields from multiple explosive threats to enable access, maneuver and protection for multi-domain operations to ensure that critical air and sea ports of debarkation and ground lines of communication are tenable to support Joint Fires and Logistics in contested environments. Specifically, RLAC will develop and integrate autonomous small Unmanned Aerial Systems (sUAS) and Unmanned Ground Vehicles (UGV) equipped with automatic target recognition to rapidly survey, detect, identify, and map both surface and buried unexploded explosive ordnance (UXO), and then use lasers to neutralize submunitions at stand-off distances.</p>			
<p>Title: Sea Archer</p> <p>Description: Sea Archer is a FY 2023 new-start JCTD. Sea Archer will hold key fixed military systems at risk at the onset of conflict. Further details of the project are classified.</p>	0.050	-	-
<p>Title: Shadow Cat</p> <p>Description: Shadow Cat is a FY 2023 new-start JCTD. This project is part of the Fully-Networked Command, Control, and Communications (FNC3) problem-set. Further details and descriptions of this project are classified.</p>	0.050	-	-
<p>Title: Sky Mark - Next-Generation Ground Positioning System (GPS)-like Celestial Navigation (Sky Mark)</p> <p>Description: Sky Mark is a FY 2023 new-start JCTD. Sky Mark provides crucial navigation updates to enable GPS-like accuracy in contested environments and enables weapons effects on target in contested environments. By enabling GPS-like accuracy and freedom of navigation in spectrum-contested environments, Sky Mark gives the warfighter tactical and strategic advantage in hypersonic weapon application and ability to defeat the adversaries' defensive capabilities. Sky Mark is Alternative Position, Navigation, and Timing (APNT) instrument or automated celestial navigation providing GPS-like accuracy in a GPS-contested environment.</p>	0.050	-	-
<p>Title: Wide-Area Autonomous Maritime Target Detection and Classification (WAMTDC)</p> <p>Description: WAMTDC is a FY 2023 new-start JCTD. The WAMTDC JCTD will develop a low-space, -weight and -power (SWAP) maritime sensing and automated processing capability for demonstration aboard an unmanned aircraft. While initially integrated within a Group Two Stalker Unmanned Aerial System (UAS), this capability will be broadly applicable for multiple follow-on UAS and fixed-wing platforms. The sensor package will feature ViDAR (Visual Detection and Ranging) for maritime search and Artificial Intelligence/Machine Learning (AI/ML)-enabled object detection capability, coupled with AI/ML-enabled Electro-Optical/Infrared (EO/IR) object classification capability. The addition of ViDAR will enable the UAS to search an area 300 times larger than a traditional EO/IR sensor alone. The onboard ML-based target detection and classification will be underpinned by a capability for Agile Model Refinement that provides the flexibility to identify new vessel signatures while deployed. This on-board contact</p>	0.050	-	-

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2022	FY 2023	FY 2024
classification will allow very low bandwidth contact reporting. This low-bandwidth contact reporting, when used in concert with an autonomous UAS, will be critical when operating unmanned systems in a contested electromagnetic and cyber environments.			
Accomplishments/Planned Programs Subtotals	85.135	-	-

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

N/A

Remarks

D. Acquisition Strategy

Upon project closeout, a JCTD has three possibilities:

- 1) Transition as Capability Delivery (Operational Prototype)
 - To a new or existing Program of Record
 - As a residual leave behind for immediate operational use
 - Or both

- 2) Transition as Capability Enabler (Developmental Prototype)
 - Informs further acquisition programs and/or requirements development

- 3) No Transition
 - Requirements change or no longer valid
 - Did not meet deliverables as planned

The integrated management team on a JCTD includes an operational manager from a CCMD, a technical manager from service research and engineering labs, and a transition manager from a program executive office. This ensures that transition is planned for throughout the lifecycle of the project, and is a major reason for the nearly 80 percent JCTD transition rate.

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense **Date:** March 2023

Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603648D8Z / <i>Joint Capability Technology Demonstration (JCTD)</i>	Project (Number/Name) 649 / <i>Multi-Domain Demonstrations (MDD)</i>
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COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
<i>649: Multi-Domain Demonstrations (MDD)</i>	0.000	14.206	-	-	-	-	-	-	-	-	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project addresses the need for distributed, rapidly-deployed capabilities that can provide persistent sensing to find, fix, and finish time-sensitive threats by integrating prototypes and experiments into a series of Joint, multi-domain operational experiments. Demonstrations focus on evaluating how the Joint Force can leverage modernization technologies, commercial space-based capability, and operationalization of the stratosphere to refine hypersonic and long-range fire kill chains and Long Range Precision Strike to counter time-sensitive targets. Integrating these prototype capabilities with major exercises enhances the operational military utility assessments in real-world, multi-domain venues and satisfies additional service requirements leading to transition of these capabilities. The project integrates coalition participation within the Pacific to enable coalition warfighting techniques across forces.

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

	FY 2022	FY 2023	FY 2024
Title: Multi-Domain Demonstrations (MDD)	14.206	-	-
Description: This project addresses the need for distributed, rapidly-deployed capabilities that can provide persistent sensing to Find, Fix, and Finish time-sensitive threats by integrating prototypes and experiments into a series of Joint, multi-domain operational demonstrations. Demonstrations focus on evaluating how the Joint Force can leverage operational prototypes, commercial space-based capability, and operationalization of the stratosphere to refine hypersonic and long-range fire kill chains to counter time-sensitive targets. Integrating these prototype capabilities with major exercises enhances the military utility assessments in real-world, multi-domain venues and satisfies additional service requirements leading to transition of these capabilities.			
Accomplishments/Planned Programs Subtotals	14.206	-	-

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

N/A

Remarks

D. Acquisition Strategy

Upon project closeout, a JCTD has three possibilities:
 1) Transition as Capability Delivery (Operational Prototype)
 -To a new or existing Program of Record

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<p>-As a residual leave behind for immediate operational use -Or both</p> <p>2) Transition as Capability Enabler (Developmental Prototype) -Informs further acquisition programs and/or requirements development</p> <p>3) No Transition -Requirements change or no longer valid -Did not meet deliverables as planned</p> <p>The integrated management team on a JCTD includes an operational manager from a CCMD, a technical manager from service research and engineering labs, and a transition manager from a program executive office. This ensures that transition is planned for throughout the lifecycle of the project, and is a major reason for the nearly 80 percent JCTD transition rate.</p>		