Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Office of the Secretary Of Defense	Date: March 2024
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation Science and Technology*

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
Total Program Element	1,564.481	968.723	345.384	268.722	-	268.722	224.123	248.053	256.284	261.409	-	-
090: *Nuclear Test*	0.000	0.000	11.000	10.806	-	10.806	11.116	11.106	11.099	11.321	-	-
091: *High Speed Systems Test*	583.209	299.938	112.682	106.830	-	106.830	79.552	81.123	82.747	84.402	-	-
092: *Spectrum Efficient Technology*	107.996	49.962	10.053	10.097	-	10.097	9.487	9.676	9.871	10.069	-	-
093: *Electronic Warfare Test*	233.792	415.938	105.055	39.783	-	39.783	19.578	40.121	40.924	41.742	-	-
094: *Advanced Instrumentation Systems Technology*	144.721	11.938	19.957	21.396	-	21.396	20.818	21.155	22.480	22.930	-	-
095: *Directed Energy Test*	114.737	29.938	10.475	10.010	-	10.010	10.257	10.490	10.721	10.935	-	-
096: *C4I & Software Intensive Systems Test*	193.356	12.933	13.246	13.436	-	13.436	13.711	13.982	14.261	14.546	-	-
097: *Autonomy and Artificial Intelligence Test*	95.599	97.938	47.379	40.985	-	40.985	43.714	44.192	47.676	48.630	-	-
098: *Cyberspace Test*	91.071	18.138	14.707	14.619	-	14.619	14.900	15.198	15.475	15.784	-	-
099: *Space Test*	0.000	32.000	0.830	0.760	-	0.760	0.990	1.010	1.030	1.050	-	-

Note

New Start (Y/N): No

A. Mission Description and Budget Item Justification

This program supports the Department's initiatives to defend the homeland, deter strategic attacks and aggression, prevail in conflict, build enduring advantage, and build a resilient joint force and defense eco system. The Test and Evaluation/Science and Technology (T&E/S&T) program seeks out and develops test technologies to keep pace with evolving weapons technologies. Aligned with the National Defense Strategy, this program is critical to ensure that the Department of Defense (DoD) has the ability to adequately test the advanced systems that will be fielded in the future, building a more lethal force. To meet this objective, the T&E/S&T Program performs the following activities:

- Exploits new technologies and processes to meet important T&E requirements.
- Expedites the transition of new technologies from the laboratory environment to the T&E community.
- Leverages industry advances in equipment, modeling and simulation, and networking to support T&E.

Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Office of the Secretary Of Defense	Date: March 2024
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603941D8Z *I Test and Evaluation Science and Technology*

Additionally, the T&E/S&T Program examines emerging T&E requirements resulting from Joint Service initiatives to identify T&E technology needs and develop a long-range roadmap for technology insertion. The program leverages and employs applicable applied research efforts from the highly developed technology base in the DoD laboratories and test centers, other Government agencies, and industry to accelerate development of new test capabilities. The program outreaches and engages academia to address test technology challenges in DoD testing, advancing Science, Technology, Engineering and Mathematics (STEM) initiatives at Historically Black Colleges and Universities (HBCU) and other minority serving institutions. This program provides travel funds for T&E/S&T program oversight, special studies, analyses, and strategic planning related to test capabilities and infrastructure. The T&E/S&T Program aligns with the science and technology (S&T) Communities of Interest (COI) to prepare the T&E community to test warfighting capabilities that emerge from priority S&T investments. The T&E/S&T Program utilizes Advanced Technology Development funding because which supports the development and demonstration of high payoff technologies for current and future DoD test capabilities.

B. Program Change Summary ($ in Millions)	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
Previous President's Budget	972.372	345.384	302.052	-	302.052
Current President's Budget	968.723	345.384	268.722	-	268.722
Total Adjustments	-3.649	0.000	-33.330	-	-33.330
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-3.549	-			
• Cancelled Accounts	-0.100	-	-	-	-
• Program Adjustments	-	-	-33.330	-	-33.330

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2023	FY 2024
Project: 091: *High Speed Systems Test*		
Congressional Add: *Test & Evaluation Science & Technology (TRMC)*	188.650	-
Congressional Add Subtotals for Project: 091	188.650	-
Project: 092: *Spectrum Efficient Technology*		
Congressional Add: *Test & Evaluation Science & Technology (TRMC)*	40.000	-
Congressional Add Subtotals for Project: 092	40.000	-
Project: 093: *Electronic Warfare Test*		
Congressional Add: *Test & Evaluation Science & Technology (TRMC)*	298.500	-

Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Office of the Secretary Of Defense	Date: March 2024
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603941D8Z *I Test and Evaluation Science and Technology*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2023	FY 2024
Congressional Add Subtotals for Project: 093	298.500	-
Project: 095: *Directed Energy Test*		
Congressional Add: *Test & Evaluation Science & Technology (TRMC)*	18.750	-
Congressional Add Subtotals for Project: 095	18.750	-
Project: 097: *Autonomy and Artificial Intelligence Test*		
Congressional Add: *Test & Evaluation Science & Technology (TRMC)*	76.250	-
Congressional Add Subtotals for Project: 097	76.250	-
Project: 098: *Cyberspace Test*		
Congressional Add: *Test & Evaluation Science & Technology (TRMC)*	4.000	-
Congressional Add Subtotals for Project: 098	4.000	-
Project: 099: *Space Test*		
Congressional Add: *Test & Evaluation Science & Technology (TRMC)*	31.400	-
Congressional Add Subtotals for Project: 099	31.400	-
Congressional Add Totals for all Projects	657.550	-

Change Summary Explanation

FY 2023 changes are due to SBIR/STTR and Cancelled Accounts adjustments.
FY 2025 - A reduction of $33.330 was applied to meet DoD overall funding reductions, which was spread to mitigate impact. $3.020 was the topline reduction, $30.850 was the S&T reduction and an inflation adjustment of +$.549.

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense			Date: March 2024
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603941D8Z / *Test and Evaluation Science and Technology*	Project (Number/Name) 090 / *Nuclear Test*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
090: *Nuclear Test*	0.000	0.000	11.000	10.806	-	10.806	11.116	11.106	11.099	11.321	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Nuclear Test (NT) project mission addresses national test capability gaps by providing accurate, robust, and efficient T&E solutions to successfully develop, validate, and inform the employment of a modernized nuclear enterprise. The Department of Defense (DoD) is prioritizing investments to modernize the nuclear enterprise while sustaining and increasing the resiliency of legacy systems. Current developments focus on deploying capabilities and systems to validate new designs and new materials in a complex threat-representative environment. Current testing infrastructure and methodologies to assess nuclear enterprise systems and microelectronics resilience against emerging threats is limited. Many test capabilities used in the past for acquisition are no longer available, either stopped by policy decisions or dismantled for cost savings. The NT project addresses test technology needs for adequate assessment of nuclear enterprise resiliency and aligns with the DoD S&T priority investments. The NT project is supporting the development of a strategic roadmap and investment strategy to establish nuclear test environments for microelectronics, ground test environments for system level testing, and flight test range enhancements for end-to-end testing needs. The NT project develops technologies to enable robust, accurate, and timely T&E of a modernized nuclear enterprise, and to ensure system suitability and survivability.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Nuclear Test (NT)	-	11.000	10.806
Description: The NT project is conducting a test infrastructure gap analysis on the needs of testing the nuclear enterprise. The analysis will result in a time-phased investment strategy based on those requirements. Work includes engaging the nuclear environments test community on needs and gaps to ensure traceability between strategic objectives and test technology development required for relevant microelectronic nuclear test environments such as single event effects, combined effects, electromagnetic pulse and others.			
FY 2024 Plans: The Nuclear Test project is new in FY 2024 and will initiate efforts to address test technology needs identified in the Nuclear T&E investment roadmap and time-phased investment strategy. Several initiatives that were started in the Directed Energy Test Technology project in the area of EMP testing and neutron effects testing were moved to Nuclear Environments Test (NET). NET continued these efforts and started new efforts looking at combined nuclear effects.			
FY 2025 Plans: NET will continue efforts in EMP testing to include large area source development and instrumentation. NET will continue efforts related to neutron testing. NET will initiate efforts in Single Event Effects. NET will initiate efforts related to combined nuclear effects.			
FY 2024 to FY 2025 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation Science and Technology*	**Project (Number/Name)** 090 / *Nuclear Test*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
FY 2025 increase to support NET efforts.			
Accomplishments/Planned Programs Subtotals	-	11.000	10.806

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense			Date: March 2024
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603941D8Z / *Test and Evaluation Science and Technology*	Project (Number/Name) 091 / *High Speed Systems Test*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
091: *High Speed Systems Test*	583.209	299.938	112.682	106.830	-	106.830	79.552	81.123	82.747	84.402	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

High-speed/hypersonic weapons are being developed to ensure the continued military superiority and strike capability of the United States including freedom of movement and freedom of action in areas protected by anti-access/area denial defenses. Current weapon system demonstrations and technology development programs include high-speed and hypersonic air-breathing missiles, maneuvering reentry and boost-glide weapons, hypersonic gun-launched projectiles, and air-breathing space access vehicles. These systems require development of conventional and high-speed turbine, ramjet, scramjet, and combined cycle engines; high temperature materials; thermal protection systems (TPS); and thermal management systems. The High Speed Systems Test (HSST) project addresses test technology needs including propulsion, aerodynamic and aerothermal testing, so the test community has the technology to support the required test scenarios for concepts under development in the S&T community. The technology developments within the HSST project align with the Department of Defense (DoD) S&T priority investments. As such, the HSST project is developing, validating and transitioning advanced T&E technologies for ground test, open-air range flight test, and advanced computational tools, along with instrumentation and diagnostics systems for use in both ground tests and flight tests of high speed systems.

The HSST project develops technologies to enable robust, accurate, and timely T&E of these future weapon systems. DoD acquisition regulations require weapon systems to undergo a thorough T&E process to detect deficiencies early and to ensure system suitability and survivability. However, the extreme environments in which these weapons operate preclude accurate determination of their performance and operability with today's T&E assets. Current national test capabilities have deficiencies in data accuracy, flight condition replication and simulation, test methods, productivity, modeling and simulation (M&S) fidelity, and range safety.

The HSST mission is to address these national test capability gaps by providing test technology solutions that will enable high-speed and hypersonic weapon systems to be successfully developed through accurate, robust, and efficient T&E.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: High Speed Systems Test (HSST)	111.288	112.682	106.830
Description: The HSST project continued to advance ground and flight test technologies, techniques, instrumentation, and modeling and simulation capabilities required for the development of hypersonic weapon systems. In FY 2023, HSST continued to address critical technology shortfalls for hypersonic test and evaluation in aerothermal and propulsion ground testing capabilities and advanced instrumentation to support hypersonic flight tests. Several other technology development efforts also progressed throughout the year. To address the technology shortfall involving aerothermal and propulsion testing, HSST is developing a new test facility that utilizes clean-air heat addition (non-vitiated air) and a variable Mach number nozzle (VMN) capability to provide the representative			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation Science and Technology*	**Project (Number/Name)** 091 / *High Speed Systems Test*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
high-temperature conditions for characterizing weapon systems, including air-breathing propulsion capabilities. The clean-air heat addition is especially important to the characterization of air-breathing propulsion systems, as previous HSST efforts demonstrated that vitiated air provides different gas properties than clean air found in the atmosphere and thus is not representative of what the vehicle would experience in flight. This significantly affects the engine's operation in the test environment and results in erroneous predictions of performance in flight. Additionally, characterization of advanced seeker/sensor systems for hypersonic systems also benefits from clean-air heat addition as it provides a more representative environment for the system to operate in. The variable Mach number capability provides a more representative trajectory simulation for the system under test, permitting more accurate predictions before conducting flight tests. Assembly of the new test facility, called the Hypersonic Aerothermal and Propulsion Clean-Air Testbed (HAPCAT), was completed in FY 2022, enabling initial facility checkouts in FY 2023. All of the efforts associated with HAPCAT also serve as pathfinders for the development of a larger-scale, more capable facility at the AEDC. To address quality of flight simulation deficiencies and capacity constraints involved with aerothermal material characterization ground testing, HSST continued new aerothermal test technology development efforts to prototype alternative high enthalpy test technologies. This includes the advancement of inductively-coupled plasma ground test facilities and hypersonic wave heated ground test facilities that can serve as a complement to arc-jet heater capabilities. The SkyRange capability is an unmanned aerial vehicle-based range to support hypersonic flight tests and other missions for the Department of Defense. SkyRange provides a more agile, flexible, and cost-effective method for providing support to long-range hypersonic flight tests with increased data collection capabilities beyond the current state-of-the-art. It also addresses a critical throughput shortfall for supporting the number of hypersonic flight tests required, as a sufficient number of instrumentation assets does not exist. RQ-4 Global Hawks (RangeHawks) and MQ-9 Reapers (RangeReapers) comprise the platforms used for SkyRange, taking advantage of their long-endurance, flexibility, and high-payload capability. SkyRange augments existing air, sea, and land test support assets referred to as the "string of pearls," reducing the high costs associated with traditional flight test support and increasing mission flexibility. Novel sensor suites are being developed in the areas of telemetry capture and relay, multispectral imaging, atmospheric sensing, terminal scoring, and other areas to aid in the development of hypersonic systems. Several of these sensors are being developed through HSST for integration into the SkyRange capability. Achievements were made for both SkyRange aircraft platforms in FY 2023. SkyRange telemetry systems supported multiple missile flight test events on both the Pacific and Atlantic ranges, demonstrating the ability to rapidly deploy, from a central location, to any flight test range that is required. RangeReapers were modified with telemetry systems integrated onto the aircraft. A new adaptive phased-array telemetry system was delivered and has been integrated onto a RangeHawk for initial testing late in FY 2023. The program continued to establish a central hub for mission support in Grand Sky, North Dakota, while continuing to			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation Science and Technology*	**Project (Number/Name)** 091 / *High Speed Systems Test*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
develop several forward operating locations for flight test support. Block 20 and Block 30 modifications to RQ-4 aircraft converting them into Rangehawk configuration was also initiated. RangeLynx module development was completed in FY 2022 and installation was completed on RangeReapers in FY 2023, providing real-time, secure satellite-based telemetry and data relay to ground stations and other SkyRange assets. Progress continued on the development of a high-fidelity multispectral imaging tracking system for integration onto an RQ-4 Global Hawk as part of the SkyRange capability. Fabrication was completed and a critical fit-check of the one of a kind prototype system on a RangeHawk was successfully executed. Integration and ground testing was ongoing during FY 2023. A high-altitude laser based atmospheric measurement system in FY 2023. The software to operate this system on a RangeHawk was completed. The first RangeHawk system is being fabricated after passing critical design review in FY 2022. This system provides never-before-obtained critical atmospheric measurements (such as temperature, pressure, and wind speed) along the path of hypersonic missiles during flight test. The data is required to evaluate missile performance during flight. Flying testbeds have the potential to support a wide range of RDT&E activities from basic research to acquisition programs by providing opportunities to mature hypersonic technologies in flight test on shorter schedules with and smaller costs than previously available. An effort, the Multi-Service Advanced Capability for Hypersonics-Test Bed (MACH-TB) is active and have progressed through requirement gathering and design reviews in FY 2023. The MACH-TB effort completed its first and second flight tests in FY 2023, demonstrating sub scale and full scale launch platform testbed capability. Additional upgrades and technology development continued at the CUBRC hypersonic shock and expansion wind tunnels to support hypersonic ground testing. The new hypersonic wave heated facility (HWF) construction continued with manufacturing of the full-scale facility components based on successful operation of the prototype facility. This facility will provide important capabilities for aero-optic and aerothermal ground testing required for hypersonic weapon system development. ***FY 2024 Plans:*** New test techniques for the HAPCAT facility will be developed and demonstrated, taking advantage of the clean-air, long-duration run-time capability. The variable Mach nozzle design will be completed, installed.. Additionally, the HAPCAT facility will be used for the first time to generate data for hypersonic test and evaluation. The initial test will be a demonstrations of aero-optical systems that are critical to various DoD hypersonic efforts. SkyRange will further mature its capabilities while simultaneously supporting DoD flight tests. The development will include a third generation version of the original telemetry antennas, providing additional capability for a wider range of hypersonic telemetry			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation Science and Technology*	**Project (Number/Name)** 091 / *High Speed Systems Test*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
collection. The atmospheric measurement capability will be fully integrated and demonstrated in flight on a RangeHawk platform and two additional production units will be manfactured. Development of a flight termination capability and a terminal scoring system will continue on the RangeHawks and RangeReapers. SkyRange will continue conversion of additional RQ-4 platforms into the RangeHawk configurations. A multispectral imaging capability for the RangeReaper will be completed and integrated onto the platform. MACH-TB is planning multiple flight tests for FY 2024 including demonstration of flying test beds from sub-scale platforms, full scale platforms, and novel flight experiment platforms, leveraging commercial launch capability. Initial operation of the CUBRC hypersonic wave-heated facility and design studies to expand the capability will occur. Divert thrust systems provide maneuverability for hypersonic missile defense kill vehicles. Without divert thrust systems, the lethality of missile defense systems would be negatively impacted. A wind tunnel measurement capability will be demonstrated in the CUBRC facility that can support multiple MDA missile systems. ***FY 2025 Plans:*** SkyRange will further mature its capabilities while simultaneously supporting DoD flight tests. The development will include a fourth generation of the original telemetry antennas, providing additional capability and versatility for hypersonic telemetry collection. Development of a flight termination capability and a terminal scoring system will continue on the RangeReapers. SkyRange will continue conversion of additional RQ-4 platforms into the RangeHawk configuration with the delivery of the first aircraft of the production system. MACH-TB is planning additional flight tests for FY 2025 expanding to support air-breathing capabilty. New test techniques for the HAPCAT facility will be developed and demonstrated, taking advantage of the clean-air, long-duration run-time capability. The protype variable Mach nozzle will be tested in order to evaluate its performance. Additionally, the HAPCAT facility will be used for to demonstrate of the performance of radars and radomes systems that are critical to various DoD hypersonic efforts. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** FY 2025 decrease is a result of completed improvements in hypersonic ground test and flight test capability.			
Accomplishments/Planned Programs Subtotals	111.288	112.682	106.830

	FY 2023	FY 2024
Congressional Add: Test & Evaluation Science & Technology (TRMC)	188.650	-

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation Science and Technology*	**Project (Number/Name)** 091 / *High Speed Systems Test*

	FY 2023	FY 2024
FY 2023 Accomplishments: Program increase to support the improvement of hypersonic ground test and flight test capability.		
Congressional Adds Subtotals	188.650	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense			Date: March 2024
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603941D8Z / *Test and Evaluation Science and Technology*	Project (Number/Name) 092 / *Spectrum Efficient Technology*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
092: *Spectrum Efficient Technology*	107.996	49.962	10.053	10.097	-	10.097	9.487	9.676	9.871	10.069	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Weapon systems have become increasingly complex in recent years, resulting in the need for significantly more data to be passed among these systems as well as between the systems and our test infrastructure. A vast amount of data must be collected, transmitted, and analyzed, which requires a large amount of radio frequency (RF) spectrum resources. However, the amount of RF spectrum designated to support test and evaluation (T&E) is decreasing, most notably due to reallocation of spectrum for commercial use. The combination of decreasing RF spectrum and increasing data requirements results in an urgent need to develop test technologies that maximize the use of spectrum resources for the Department of Defense (DoD) T&E operations.

The L- and S- Band frequencies are the traditional spectrum allotted for military T&E use. The explosive need for spectrum in the commercial sector has resulted in reallocation of portions of these bands to industry. To compensate, the DoD is now authorized to use the C-Band spectrum which offers numerous benefits, including the potential for a large increase in available bandwidth, but the C-Band spectrum comes with technical challenges and regulatory constraints. Most notably, our current test infrastructure for telemetry is not designed to accommodate C-Band and the band is heavily shared for alternate uses. Technologies are required to implement innovative techniques that efficiently facilitate our use of C-Band without a major overhaul to our national test infrastructure. For instance, commercial telemetry transmitters operate in C-Band but do not have the form factor (size, weight and power) nor ruggedized packaging to survive airborne test applications.

Traditional telemetry applications employ streaming telemetry where data is moved one-way from the instrumented system under test to our test range infrastructure. Modern network based telemetry and cellular based telemetry capabilities enable more robust, efficient bidirectional transfer of data. The DoD strategy is to create technologies for implementing a telemetry capability in C-Band, using the legacy L- and S-Bands for both streaming and networked telemetry, and researching the feasibility of using higher frequency bands to augment telemetry operations.

The Spectrum Efficient Technology (SET) project is developing test technologies that enable more efficient use of legacy telemetry bands and expansion into non-traditional areas of the RF and optical spectra at DoD test ranges. The technology development efforts within the SET project have been prioritized to align with the Department of Defense guidance on science and technology priority investments. As such, the SET project is focusing on growing data requirements of warfighting systems and the limited availability of spectrum for testing. The SET project is structured to develop test technologies to advance range communications, networked and cellular based telemetry capabilities, and enhanced management of spectrum at DoD test ranges

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Spectrum Efficient Technology	9.962	10.053	10.097

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation Science and Technology*	**Project (Number/Name)** 092 / *Spectrum Efficient Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Description: The SET project continued to mature technologies required for network and cellular based telemetry for both manned and unmanned platforms. The SET project is developing an airborne cellular transceiver for aeronautical telemetry for larger throughput of data to ground control systems, bi-directional communication to the platform, and spectrum reuse. The SET project is developing low-cost, digital beamforming airborne phased array telemetry receiving antennas to operate in S-band frequencies to autonomously track multiple streams from fast-moving targets. Development of 5G radios integrated onboard airborne platforms to support test missions was initiated. Development of a spectrum analysis manager is near completion; this planning tool will efficiently de-conflict telemetry spectrum assignments and provide actionable information regarding telemetry link performance. ***FY 2024 Plans:*** The SET project will continue development of technologies required for network and cellular based telemetry. The SET project will begin transition of cellular technologies to support aeronautical telemetry requirements at open-air test ranges. Airborne and ground based phased array telemetry antenna technologies will continue to be matured. Ground based phased array telemetry antenna technologies to support large footprint test events will be transitioned to support multiple long range flight test corridors. ***FY 2025 Plans:*** The SET project will continue development and begin transition of technologies required for network and cellular based telemetry. Airborne and ground based phased array telemetry antenna technologies will continue to be matured. Technology development to support adoption of modern modulation schemes will begin enabling higher quality, high throughput telemetry capability at test ranges. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** FY 2025 increase supports program adjustments for technology development of modern modulation schemes.			
Accomplishments/Planned Programs Subtotals	9.962	10.053	10.097

	FY 2023	FY 2024
Congressional Add: Test & Evaluation Science & Technology (TRMC) ***FY 2023 Accomplishments:*** Program increase in support of airborne 5G test capability and 5G range instrumentation.	40.000	-
Congressional Adds Subtotals	40.000	-

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation Science and Technology*	**Project (Number/Name)** 092 / *Spectrum Efficient Technology*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense			Date: March 2024
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603941D8Z / *Test and Evaluation Science and Technology*	Project (Number/Name) 093 / *Electronic Warfare Test*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
093: *Electronic Warfare Test*	233.792	415.938	105.055	39.783	-	39.783	19.578	40.121	40.924	41.742	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

In order to establish dominance in the modern battlespace, our offensive and defensive electronic warfare systems must be capable against advanced radio frequency (RF) directed threats and electro-optic (EO) guided threats, which include infrared (IR) guidance. Ensured dominance in these areas requires more robust test and evaluation (T&E) with technologies that are rapidly adaptable to changing threats.

Readily available, IR seeking, man-portable air defense systems (MANPADS) are difficult to detect and pose an imminent and lethal threat to military aircraft of all types. Our ability to counter such threats is essential to owning the battlespace in theater. Therefore, the ability to test missile warning systems (MWS), hostile fire indicator (HFI) systems, IR countermeasures (IRCM), and advanced threat sensors is critical to our national defense. Additionally, a new generation of enemy RF missile seekers is both currently fielded and in further development, requiring a correspondingly new generation of test technologies to test the latest countermeasures. The T&E community is required to test IRCM and RF countermeasure systems in a repeatable manner with ground-truth data before and after integration into warfighting systems. Without new test technologies, the Department of Defense (DoD) will be unable to perform adequate T&E of advanced warning and countermeasure systems.

The Electronic Warfare Electronic attack and Electronic protect (EP) community is developing jammers and EP measures that are more sophisticated and take advantage of newer technology that allows adaptive waveforms and artificial intelligence and autonomy to respond to threats more rapidly and robustly. In addition, the testing of these systems in realistic many on many environments that are more threat representative requires new technology investment.

The technology development efforts within the Electronic Warfare Test (EWT) project have been prioritized to align with DoD guidance on science and technology priority investments. As such, the EWT project is focusing on the test needs in both the EO, including IR, and the RF threat domains. Additionally, development of core test technologies in this area can be leveraged to meet other EO and RF test requirements, such as in fire control systems; intelligence, surveillance and reconnaissance (ISR) sensors, and weapon seekers.

The EWT project develops test technologies to stimulate IRCM and RF system sensors through the high-fidelity simulation of scenes viewed by the sensors. Stimulation can be as simple as testing to see if a system under test responds to an image or as complex as simulating complex battle space phenomena to measure the response of a system under test in a more relevant, cluttered scenario. Simulations and stimulations are used at open air ranges and in installed system test facilities (ISTF), and in hardware-in-the-loop (HWIL) test beds.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Electronic Warfare Test	117.438	105.055	39.783

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation Science and Technology*	**Project (Number/Name)** 093 / *Electronic Warfare Test*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Description: EWT initiated joint Electronic Warfare (EW) test technology developments to address Electronic Attack (EA) test technology needs, to expand the battlespace, and to enable improved assessment of EW platforms. This includes efforts to address inadequate laboratory and secure Installed System Test Facility (ISTF) modeling and simulation (M&S) representing evolving and changing RF threat systems, simulator and stimulator test technology. These joint EW test technologies initiated will also address shortfalls with open-air-range complex radar emitters, models, and RF threats inability to represent emerging and changing threat systems. The EWT project initiated efforts to address the inability to test EA techniques in secure environments and replicate modern threat signals through Hardware-In-the-Loop (HITL) and Installed System Test Facility (ISTF) simulations. Also, EWT initiated efforts to expand current range play-boxes to enable test and training with EW platforms that stress modern threat radar acquisition and detection ranges. The EWT project also began to address test technology needs for EW platforms and systems to have representative scale and depth for test and training of real-world missions. The EWT project continued to develop high fidelity scene generation technology for both EO and RF environments. The EWT project continued to develop high fidelity scene generation technology for both EO and RF environments. Work continued on the development of hardware and software that generates large number of independent radar targets in a high fidelity HITL facility. This enabled chamber testing of radars in more dense target environments by generating large numbers of dissimilar false targets. Work continued on high temperature IR scene projectors. The EWT project developed a dynamic infrared (IR) scene projector to enable chamber testing of missile warning systems and directional infrared countermeasure systems. The new scene projector creates scenes with higher temperatures and higher resolution creating a more threat representative environment for sensor test. The effort transitioned and delivered scene projectors to the Air Force Guided Weapons Evaluation Facility (GWEF). Work continued on increasing the efficiency of LED pixels for use in IR scene projectors. Work continued on development of interfaces for use of Active Electronically scanned arrays for open air range threat simulators. ***FY 2024 Plans:*** EWT will continue joint electronic warfare test technology developments to address Electronic Attack (EA) test technology needs, to expand the battlespace, and to enable improved assessment of EW platforms. The EWT project will continue investments in technologies related to Cognitive EW, Cognitive Radar, and EW sensors that feed Artificial Intelligence uses of EW data. EWT will continue technology developments to improve Ground EW systems and cUAS EW testing. Prototype open air range threat emitter with wider frequency coverage and agility will be matured. EWT will continue efforts in Infrared Scene projection for sensor and seeker testing. EWT will continue efforts to address scene generation for both EO and RF sensors and seeker testing. EWT will initiate efforts to improve motors for flight motion simulator performance. EWT will initiate efforts to improve airborne jammer simulation. EWT will initiate efforts to address simulation of many on many EA environment. ***FY 2025 Plans:*** EWT will continue joint electronic warfare test technology developments to address Electronic Attack (EA) test technology needs, to expand the battlespace, and to enable improved assessment of EW platforms. The EWT project will continue investments			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation Science and Technology*	**Project (Number/Name)** 093 / *Electronic Warfare Test*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
in technologies related to Cognitive EW, Cognitive Radar, and EW sensors that feed Artificial Intelligence uses of EW data. EWT will continue technology developments to improve Ground EW systems and cUAS EW testing. EWT will continue efforts in Infrared Scene projection for sensor and seeker testing. EWT will continue efforts to address scene generation for both EO and RF sensors and seeker testing. EWT will continue efforts to improve motors for flight motion simulator performance. EWT will continue efforts to improve airborne jammer simulation. EWT will continue efforts to address simulation of many on many EA environment. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Decrease from FY 2024 to FY 2025 due to the completion of an upgrade to electronic warfare threat emitter technology.			
Accomplishments/Planned Programs Subtotals	117.438	105.055	39.783

	FY 2023	FY 2024
Congressional Add: Test & Evaluation Science & Technology (TRMC)	298.500	-
FY 2023 Accomplishments: Program increase to support improvement of electronic magnetic spectrum test emitters, sensor fusion, and 5th generation aerial target test technology development.		
Congressional Adds Subtotals	298.500	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense			Date: March 2024
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603941D8Z / *Test and Evaluation Science and Technology*	Project (Number/Name) 094 / *Advanced Instrumentation Systems Technology*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
094: *Advanced Instrumentation Systems Technology*	144.721	11.938	19.957	21.396	-	21.396	20.818	21.155	22.480	22.930	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Advanced Instrumentation Systems Technology (AIST) project addresses the test technology gaps resulting from emerging weapon systems that need to be assessed at the Department of Defense (DoD) installed systems test facility and hardware-in-the-loop testing (ISTF/HITL) and open-air range test facilities (including tropospheric, land-based, open-ocean, and undersea ranges). Instrumentation requirements for systems under test are increasing exponentially for new weapons systems. System-borne, warfighter-wearable, and remote sensing instrumentation packages are required. This instrumentation is for sensing and collecting critical performance data; determining accurate time, space, position information (TSPI) and attitude information; interfacing with command and control data links; monitoring and reporting system-wide communications; recording human operator physical and cognitive performance; and storing and transmitting data.

The technology development efforts within the AIST project have been prioritized to align with the DoD guidance on science and technology (S&T) communities of interest (COIs). The AIST project is focused on developing technologies for advanced TSPI instrumentation (especially with limited or no availability of Global Positioning System (GPS)), advanced sensors, advanced energy and power systems for instrumentation, micro-electronics, mitigating range encroachment issues, and measuring warfighter physical and cognitive performance. The AIST project addresses requirements for miniaturized, non-intrusive instrumentation suites with increased survivability in harsh environments. Such instrumentation is an urgent need because minimal space is available to add instrumentation to new or existing weapon systems subsequent to their development; furthermore, additional weight and power needs for instrumentation can adversely affect weapon system signature and performance. Instrumentation for humans-in-the-loop, especially dismounted warfighters, must not adversely affect performance, induce artificiality in the test environment, or create any operational burdens. New technologies can be exploited to integrate small, non-intrusive instrumentation (micro-technology) into emerging platforms during design and development, and, in some cases, into existing platforms. This class of instrumentation will provide critical system performance data during operational test (OT) and continuous assessment throughout a system's lifecycle. Technology developed under AIST can also benefit training and combat missions by enabling a continual feedback loop between the developer, training staff, operators, and commanders.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Advanced Instrumentation Systems Technology	11.938	19.957	21.396
Description: Major thrusts included efforts in advanced sensors and TSPI instrumentation. The AIST project continued three efforts to design a test technology for weapon testing use cases impacting the broad ocean area to collect TSPI, lethality, and scoring data; one technology uses optics, another leverages an imaging radar, and a third employs underwater acoustic technology. We began a technology development effort that implements a terrestrial-based network of transmitters to maintain situational awareness on tactical system when performing Multi-Domain Operation testing in GPS jammed/denied/degraded environments. The AIST project commenced development of a Global Navigation Satellite System (GNSS) Engine Software			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation Science and Technology*	**Project (Number/Name)** 094 / *Advanced Instrumentation Systems Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Defined Receiver using multichip module technology, and acquisition and tracking algorithm development to provide TSPI ground truth for T&E of missile systems, etc., in high dynamic environments. The AIST project continued an effort to develop a sensor to collect acceleration measurement data during high-speed flight tests, enabling the gathering of accurate position and attitude, 6 Degrees of Freedom (6DOF) data over very long ranges and into the exo-atmosphere to measure the aerodynamics and internal guidance and control systems of new munitions in an ultra-high dynamic environment. The AIST project continued development of an innovative sea battery technology to support energy generation in the deep ocean via oxidizing aluminum, enabling clandestine long-term deployments of deep ocean TSPI and advanced sensor instrumentation. We continued an effort to develop advanced electromagnetic (EM) propagation modeling & real-world measurements for an open-air dynamic radar cross section measurement system to provide insight regarding potential effects of planned offshore wind power infrastructure on Atlantic Test Range operations. The AIST project completed the development of an effort to support testing of military aircraft using externally mounted sound pressure instrumentation to gather data for analysis in all weather conditions, to overcome current constraints to flight testing in dry environments. Flight testing in a relevant environment is planned to take place at the Naval Air Warfare Center Aircraft Division, Patuxent River, MD. The AIST project continued a portable technology development effort using acoustic splash signatures to measure weapon location and attitude to characterize high dynamic weapon end-game maneuvers, and to evaluate impact location & velocity of attacking projectiles and resolving (scoring) very large quantities of impacts occurring closely spaced in position and/or time. This system has participated in at-sea system checkout activities and has been an auxiliary sensor on several at-sea tests of weapon systems impacting the ocean. ***FY 2024 Plans:*** The AIST project will initiate an effort to develop a mobile shallow water range to evaluate unmanned undersea vehicles (UUV) sensors and systems for high-resolution ocean environmental sensing, monitoring, and prediction systems. The AIST project plans to initiate a soft catch system for large caliber munitions to assess munitions internal ballistics, strength of design, and function of critical components, where the munition can be fired at operational velocities, and captured in a way that does not damage the projectile or the environment. ***FY 2025 Plans:*** The AIST project will continue efforts to develop a mobile shallow water range to evaluate unmanned undersea vehicles (UUV) sensors and systems for high-resolution ocean environmental sensing, monitoring, and prediction systems. The AIST project			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation Science and Technology*	**Project (Number/Name)** 094 / *Advanced Instrumentation Systems Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
plans will continue development of a soft catch system for large caliber munitions to assess munitions internal ballistics, strength of design, and function of critical components, where the munition can be fired at operational velocities, and captured in a way that does not damage the projectile or the environment. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** The increase between FY 2024 and FY 2025 provides new test instrumentation technology development technologies.			
Accomplishments/Planned Programs Subtotals	11.938	19.957	21.396

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense			Date: March 2024
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603941D8Z / *Test and Evaluation Science and Technology*	Project (Number/Name) 095 / *Directed Energy Test*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
095: *Directed Energy Test*	114.737	29.938	10.475	10.010	-	10.010	10.257	10.490	10.721	10.935	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Department of Defense (DoD) is exploring the military utility, safety, and suitability of directed energy weapons. A robust test capability to assess directed energy weapons is essential to understanding their effectiveness and limitations, including determining their effectiveness in performing counter improvised explosive device (C-IED) operations and counter UAS operations. Such assessments will depend upon knowledge acquired through the test and evaluation (T&E) of directed energy technologies and testing of operational concepts. Directed energy weapon technologies, primarily consisting of high energy lasers (HEL) and high powered microwaves (HPM), are outpacing available test capabilities. Traditional test techniques for evaluating conventional munitions (with flight times ranging from seconds to minutes) are not sufficient for the T&E of directed energy weapons that place energy on target instantaneously. Consequently, new test technology solutions are needed to ensure that adequate developmental, live-fire, and operational test capabilities are available when directed energy programs are ready to test.

Directed energy system and component testing requires three principal assessments: (1) energy or power on target; (2) the effects on the target; and (3) the propagation of the directed energy to the target through the atmosphere. In addition, the vulnerabilities of DoD systems to directed energy threats are required to be characterized, such as those requirements captured in Military Standard (MIL-STD)-464C. Equally as important, current test capabilities do not provide the detailed data required to understand U.S. directed energy system performance and effects. The technology development efforts within the Directed Energy Test (DET) project have been prioritized to align with DoD guidance on science and technology priority investments. As such, the DET project is developing the technologies necessary for quantitative assessment of United States (U.S.) HEL and HPM performance, as well as the vulnerability of DoD weapon systems to enemy directed energy threats.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Directed Energy Test	11.188	10.475	10.010
Description: The DET project initiated efforts to upgrade directed energy lab and test range infrastructure. The DET project continued efforts to measure HEL energy on small targets such as mortars, rockets, artillery, and UAS. The effort designed a recoverable mortar prototype to address Army and Navy requirements and an Air Force requirement for a missile-mounted target board. The DET project continued efforts to develop M&S capability for assessing effects of threat HEL systems on blue aircraft. The DET project completed efforts to mature a dense plasma focus technology to produce strategically relevant, ultra-short pulse neutron fluence levels for nuclear vulnerability testing. The DET project successfully demonstrated neutron production and dense plasma focus technology development continues to be optimized to support neutron production rates scalable to a test facility to be developed by the Central Test and Evaluation Investment Program (CTEIP). A larger chamber was integrated into the facility to test obtaining higher			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation Science and Technology*	**Project (Number/Name)** 095 / *Directed Energy Test*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
FY 2024 Plans: The DET project will continue developments in HEL test technologies and HPM test technologies to characterize the performance and effectiveness of HEL and HPM systems as they engage small targets, such as enemy rockets, missiles, artillery, and unmanned aerial vehicles, as well as electronic systems and other targets of interest and expand into larger UAS classes. This will include sensor and associated data collection systems that can survive an HPM environment, near surface laser weapon system propagation measurement sensors, atmospheric absorption sensors for high energy lasers, and target swarm tracking. DET will complete efforts to develop modelling and simulation tools to assess survivability and vulnerability of DoD systems to attack from red HPM and HEL weapons. DET will complete efforts to develop atmospheric characterization tools that are integrated with weather models for an HEL predictive performance assessment. DET will continue efforts to upgrade HPM sensor field measurement instrumentation. DET will initiate efforts to measure HPM fields for airborne HPM weapon characterization. DET will continue and initiate new efforts to develop HPM sources for survivability and vulnerability testing as well as to support HPM lethality assessments. DET will continue efforts to develop mobile reusable HPM test assets. ***FY 2025 Plans:*** DET will continue efforts to upgrade HPM sensor field measurement instrumentation. DET will continue efforts to measure HPM fields for airborne HPM weapon characterization. DET will continue efforts to develop HPM sources for survivability and vulnerability testing as well as to support HPM lethality assessments. DET will continue efforts to develop mobile reusable HPM test assets. DET will initiate efforts to improve assessment of HPM survivability and vulnerability of space systems. DET will initiate efforts for cUAS testing instrumentation. DET will initiate efforts to improve HPM Modelling and Simulation in support of lethality assessments and test safety. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Decrease from FY 2024 to FY 2025 is due to program adjustments related to the completion of development efforts.			
Accomplishments/Planned Programs Subtotals	11.188	10.475	10.010

	FY 2023	FY 2024
Congressional Add: Test & Evaluation Science & Technology (TRMC) ***FY 2023 Accomplishments:*** Program increase to develop a directed energy airborne high-power testbed.	18.750	-
Congressional Adds Subtotals	18.750	-

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation Science and Technology*	**Project (Number/Name)** 095 / *Directed Energy Test*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense											Date: March 2024	
Appropriation/Budget Activity 0400 / 3					R-1 Program Element (Number/Name) PE 0603941D8Z / *Test and Evaluation Science and Technology*				Project (Number/Name) 096 / *C4I & Software Intensive Systems Test*			
COST ($ in Millions)	**Prior Years**	**FY 2023**	**FY 2024**	**FY 2025 Base**	**FY 2025 OCO**	**FY 2025 Total**	**FY 2026**	**FY 2027**	**FY 2028**	**FY 2029**	**Cost To Complete**	**Total Cost**
096: *C4I & Software Intensive Systems Test*	193.356	12.933	13.246	13.436	-	13.436	13.711	13.982	14.261	14.546	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Command, Control, Communications, Computers, Intelligence (C4I) and Software Intensive Systems (SIS) (C4T) project addresses test technology for next generation resilient, survivable, federated networks and information ecosystems (information superiority) from the tactical level up to strategic planning. The technology development efforts within the C4T project have been prioritized to align with DoD guidance of S&T Communities of Interest (CoIs) and the National Defense Strategy. Gaps are driven by more complex warfare environments and distributed systems; large quantities of data and intelligence (e.g., Big Data, Artificial General Intelligence (AGI) and Machine Learning Algorithms (MLA)); and more software intensive systems (e.g. F-35, CVN, IBCS)).

C4T addresses gaps in Big Data Analytics technologies to gain knowledge from massive amounts of structured and unstructured data collected over a single test, but also expanded to look at the systems' performance over the acquisition lifecycle. The technologies are required when testing sensor platforms, command and control systems and weapon platforms that support the kill chain in a Joint multi-domain operation. These systems must be evaluated for their ability to provide the accurate, timely transfer of data (e.g., target tracks, weapons allocation, mission tasking, and situational awareness) as the data passes among the Services, Warfighting Domains, and Coalition Partners.

C4T also addresses gaps in Live and Simulated Environments, these technologies are required to increase the use of a distributed test environment for new warfare concepts leveraging simulated entities (e.g. modeling and simulation) for more thorough joint mission context platform T&E (e.g., Anti-Access Arial Denial (A2AD)and Manned and Unmanned Systems (MUM-T)). The technologies within C4T will remove undesired distributed testing biases while improving test agility and the tester's ability to effectively support knowledge management, rapid analysis of "Big Data," and automated test reporting. The C4T project advances these test technologies as well as Big Data collection, analysis, and visualization that enable the virtual integration of Department of Defense (DoD) weapon laboratories and open air ranges. Using Modeling and Simulation (M&S) along with hardware-in-the-loop (HWIL) laboratories, the effectiveness of Joint missions can be assessed in terms of system-of-systems interoperability and effectiveness in executing Joint mission operations, including testing of weapons and C4I and SIS systems accessing and providing information.

Lastly C4T addresses technologies to support C2 Analysis in Multi-Domain Operations (MDO), specifically at scale and density to fully assessed the mission kill web with new test design, planning and assessment technologies utilizing artificial intelligence and machine learning to not only plan assessments within a domain, but also to enable assessments of "what-if" testing cascading across the other domains of warfare. This will enable full assessment of multi-domain operations to ensure information superiority to accomplish mission objectives. New intelligent testing technologies are required for assessment of MDO missions for our future warfighter AI/ML-enabled C2 Warfighter Systems to ensure the battlefield will not be the testing field. These new MDO focused technologies are vital to creation of a robust operationally relevant Joint Service All Domain Test Range.

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation Science and Technology*	**Project (Number/Name)** 096 / *C4I & Software Intensive Systems Test*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: C4I and Software Intensive Systems Test	12.933	13.246	13.436

Description: The C4T Threat Submarine Modeling Validation project transitioned advanced modeling and simulation technology capabilities to the Naval Undersea Warfare Center (NUWC) Weapons Analysis Facility (WAF) validated (by COTF and DOT&E) modeling capabilities that resulted in over $150 million of saving by reducing the number of live in-water runs required for the MK 48 Heavy Torpedo. These technologies will be instrumental to all future next generation torpedo developments as well as current torpedo system upgrades. With these advanced M&S capabilities we can now finally assess performance of torpedoes in all underwater bathometry (e.g. deep, shallow, and varying ocean ecology). Recent work included increasing model fidelity and validating target models to support additional transition opportunities to the Navy Undersea Weapons Program Office and the Office of Naval Intelligence

The C4T MultiVariate Data Workbench (MVDW) is transitioning to the US Army Fort Sills Test Directorate providing advanced AI/ML technologies to support near real-time data collection and validation for the US Army indirect fire doctrine. Data collection includes structured and unstructured datasets which currently requires multiple days to validate after collection and often resulting in retesting cycles as anomalies are not recognized during execution. MVDW will provide these answers after the completion of each test day. This technology was used to support US Army Bold Quest 2022. Recent activities involved extensive stability, usability, and use-case-driven testing and its successful participation in EDGE23.

The C4T Multivariate Algorithms for Optimized Test Heuristics and Real-time Analysis (MAOTHRA) is transitioning to the Redstone Test Center ATEC providing advanced statistical analytic techniques in a parallel processing computing environment to automatically calibrate cameras (low-cost, high-speed) to support generation of TSPI on weapon systems test events, resulting in cost savings from existing high-cost cameras with lengthy (hours) calibration techniques to low-cost cameras that are calibrated within minutes. MAORTHRA AI/ML techniques for analysis of large multivariant data sets to provide valuable insights from time-series weapon systems supported the US Army Project Convergence 2022. MAOTHRA successfully participated in Army EDGE23 and Northern Edge 23, has begun initial integration with Cloud Hybrid Edge-to-Enterprise Evaluation and Test Analysis Suite (CHEETAS) for transition.

The C4T project continued the development of several big data analytics (BDA) efforts implementing artificial intelligence/ machine learning (AI/ML) techniques for multi-variant time series sensor datasets, unstructured dataset analytics (audio, video, and imagery), and advanced visualizations of large T&E datasets.

These efforts include traditional statistical and machine learning/artificial intelligence (ML/AI) techniques to deal with massive complex datasets; the software execution has been focused on the use of containerized microservices architecture for ease

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation Science and Technology*	**Project (Number/Name)** 096 / *C4I & Software Intensive Systems Test*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
of technology transfer across all T&E organizations. Common technologies across C4T project also supports advanced data synchronization and fusion frameworks to automate development of assessment metrics and to quickly recall synchronized segments from large T&E datasets (e.g., multivariate time series, audio, video, and imagery. Lastly, C4T project is creating advanced visualization techniques; to support the presentation of information by abstracting data into particles to optimally exploit current vision and neuroscience research. This allows the T&E analyst to visualize anomalies, trends, patterns, and failure conditions found across the entirety of the T&E dataset and not be focused on an individual dataset. These technologies are being developed to support test and evaluation of future warfighter C4I and Software Intensive Systems (4th and 5th generation military platforms). ***FY 2024 Plans:*** The C4T project will continue development of technologies to enable the next generation resilient, survivable, federated networks and information ecosystems (information superiority) from the tactical level up to strategic planning. The C4T project will continue to focus on testing more advanced BDA technologies to support rapid data-to-decisions across complex and distributed warfighter systems environments and in support of each warfighter platform's acquisition lifecycle. The C4T project will initiate investments to support C2 Analysis in Multi-Domain Environments and investigate the increased use of test automation utilizing virtualization and cloud environments. C4T will initiate test technology development to enable a test, training, and experimentation continuum supporting all aspects of multi-domain operations. The C4T project will investigate the increased use of live and simulated test participants using test environment driven M&S validation techniques. ***FY 2025 Plans:*** The C4T project will initiate transition of technologies to enable the next generation resilient, survivable, federated networks and information ecosystems (information superiority) from the tactical level up to strategic planning. The C4T project will begin transition of more advanced BDA technologies to support rapid data-to-decisions across complex and distributed warfighter systems environments and in support of each warfighter platform's acquisition lifecycle. The C4T project will continue investments to support C2 Analysis in Multi-Domain Environments and investigate the increased use of test automation utilizing virtualization and cloud environments. C4T will continue test technology development to enable a test, training, and experimentation continuum supporting all aspects of multi-domain operations. The C4T project will continue to investigate the increased use of live and simulated test participants using test environment driven M&S validation techniques. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Increase from FY 2024 to FY 2025 is due to program adjustments related to the transition of technologies for the C4T project.			
Accomplishments/Planned Programs Subtotals	12.933	13.246	13.436

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation Science and Technology*	**Project (Number/Name)** 096 / *C4I & Software Intensive Systems Test*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense			Date: March 2024
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603941D8Z / *Test and Evaluation Science and Technology*	Project (Number/Name) 097 / *Autonomy and Artificial Intelligence Test*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
097: *Autonomy and Artificial Intelligence Test*	95.599	97.938	47.379	40.985	-	40.985	43.714	44.192	47.676	48.630	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Unmanned and autonomous systems support every domain of warfare -- operating in space, in air, on land, on the sea surface, undersea, and in subterranean conditions to support a vast variety of missions. The emergence of Artificial Intelligence (AI) brings a host of revolutionary capabilities that will profoundly influence warfare, and bring special challenges for testers of Artificial Intelligence systems. The Unmanned Autonomous System Test (UAST) project addresses current and emerging challenges associated with the test and evaluation (T&E) of unmanned systems, particularly in testing autonomy, artificial intelligence, and machine learning. As such, the UAST project is developing test technologies to simulate, stimulate, instrument, measure, and assess an autonomous system's ability to perceive its environment, process information, adapt to dynamic conditions, make decisions, and effectively act on those decisions in the context of mission execution.

The AAIT project will provide the test technologies to effectively measure performance and characterize risk, thereby increasing warfighter trust in autonomous systems and artificial intelligence tools. This program will improve DoD test capabilities and methodologies to address the testing of increasingly autonomous units operating in unstructured, dynamic, battlespace environments. Furthermore, advancements are being made in developing collaborating, system-of-autonomous-systems that will work in concert as a swarm or pack, and in close proximity with humans. New test technologies are needed to stress the collective set of autonomous systems under realistic conditions, predict emergent behavior of autonomous systems, emulate the complex environment, and assess mission performance of these highly-coupled and artificially-intelligent systems.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Autonomy and Artificial Intelligence Test	21.688	47.379	40.985
Description: The Autonomy and Artificial Intelligence Test (AAIT) Project continued test technology development supporting testers in the DoD of Unmanned and Artificial Intelligence-Based Systems. AAIT develops technology to improve ability to develop salient and high-value test plans, increasing safety during live test, to identify safety defects deep inside complex autonomy software, and to improve performance of machine vision systems. The AAIT project collaborated with the Autonomy Community of Interest (COI) Test and Evaluation, Verification and Validation (TEVV) Working Group to ensure that the AAIT project is investing in technologies relevant to the future of autonomous systems. The AAIT Project seeks solutions for legacy topics (test planning, test execution, safety, and performance assessment) but has also expanded interest to find solutions for Artificial Intelligence and Machine Learning systems, topics identified by the intelligence community, and any other topics that are priority for TRMC and OUSD(R&E).			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
The AAIT project continued the Assured DevSecOps of Autonomous Systems (ADAS) effort. ADAS addresses the unique challenges of Autonomy test & evaluation to provide enterprise solutions in support of future programs and joint initiatives. ADAS addresses autonomy test and evaluation verification and validation (TEV&V) needs across the life cycle beginning with mission analysis and engineering and ending with the mission operations. ADAS is a leading pathfinder effort to address gaps identified by the National Security Commission on Artificial Intelligence. The AAIT Project continued investments in robustness testing technology to detect and predict safety-related vulnerabilities and failures within UAS software, in advance of live test. The AAIT project provided the key S&T technology as a basis for the Navy-led CTEIP, “Autonomy, Integration, and Teaming” (AIT), which developed test capabilities to be demonstrated on the Airborne Collision Avoidance System (ACAS-Xu) on Triton, and as a basis for Guardian, a Ground Based Detect and Avoid system, which will allow UAS to achieve certification for use during live test (DO-278A/NAVAIR Cert). The same core technologies are used as a basis for the Army-led CTEIP “Autonomous Systems Test Capability” (ASTC). The AAIT project give testers a more comprehensive means of identifying and reporting on safety vulnerabilities found deep within the UAS software, allowing testers to test for defects that may not have ever been found by traditional testing techniques. The AAIT Project completed development of test technology to improve test planning for surface, sub-surface, ground, and airborne autonomy using optimization algorithms to rapidly generate salient test scenarios. The AAIT project provided the key S&T technology (for test planning) as a basis for the Navy-led CTEIP, “Autonomy, Integration, and Teaming” (AIT). The same core technologies are used as a basis for the Army-led CTEIP “Autonomous Systems Test Capability” (ASTC). The AAIT project, via the CTEIP programs, give testers information about how to choose high-value test conditions. AAIT technology shows exactly where software-based systems are on a performance edge (between mission success and mission failure) and a safety edge (between safety success and safety failure). AAIT helps testers see critical test conditions that they might not have chosen by traditional means. The AAIT Project initiated development of technology to create machine-learned, behavioral copies of autonomy software. This technology creates faster-than-real-time versions of a given autonomy that can then be tested in an accelerated timeline in a simulated environment, and can also be cloned to be tested in parallel-processing fashion. This technology will provide faster, better, and more statistically significant testing data for testers. This technology can also capture human performance, for example a pilot, or a ground radar operator) to be used as more realistic elements of a simulated environment. The AAIT project developed machine vision test technologies to identify where a machine vision system shows brittleness – inconsistent identification – of elements in its field of view. This technology can be used to improve performance of machine vision systems by identifying test data (images or video) to be used for focused testing and also can be used to re-train a brittle system for improved performance.			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation Science and Technology*	**Project (Number/Name)** 097 / *Autonomy and Artificial Intelligence Test*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
The AAIT Project developed technology to use functional architecture data to identify safety faults, and build safety fault trees) for complex autonomy software systems. Fault tree development has been traditionally built by hand. This technology will identify faults and build a fault tree more comprehensively and thoroughly than humanly possible, saving resources and improving the identification of safety risks in advance of live test. The AAIT Project developed technology to assist with the validation and verification of a learning-in-the-field AI-based system. This technology will assist testers by advising when a learning system has learned sufficiently different information to the point where it is no longer valid for use. This technology can also be used to determine if a system trained in one domain (urban, for example) is valid for use in another domain (desert). The AAIT project initiated technology development to support AI hubs verification, validation, test and evaluation. ***FY 2024 Plans:*** The AAIT Project will continue development of test technology for machine vision systems, learning systems, and improved safety awareness, and synthetic imagery generation. AAIT will initiate technology development for measures of trust/confidence in autonomous/AI-based systems, also measures of effectiveness of human/machine teams. The AAIT project will develop AI test and evaluation (T&E) high-performance computing resources to support continued enhancement of artificial intelligence hubs technology. The AAIT project will continue technology development within the ADAS effort The AAIT Project will continue to initiate and develop technologies to support test planning, test execution, and performance assessment of unmanned, autonomous, artificial intelligence, and machine learning systems. ***FY 2025 Plans:*** The AAIT Project will transition test technology for machine vision systems, learning systems, and improved safety awareness, and synthetic imagery generation. AAIT will initiate technology development for measures of trust/confidence in autonomous/AI-based systems, also measures of effectiveness of human/machine teams. The AAIT project will begin transition of technology development initiated in the ADAS effort. The AAIT project will continue development of AI test and evaluation (T&E) high-performance computing resources to support continued enhancement of artificial intelligence hubs technology. The AAIT Project will continue to initiate and develop			

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Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation Science and Technology*	**Project (Number/Name)** 097 / *Autonomy and Artificial Intelligence Test*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
technologies to support test planning, test execution, and performance assessment of unmanned, autonomous, artificial intelligence, and machine learning systems ***FY 2024 to FY 2025 Increase/Decrease Statement:*** The decrease from FY 2024 to FY 2025 is a result of the completion of projects.			
Accomplishments/Planned Programs Subtotals	21.688	47.379	40.985

	FY 2023	FY 2024
Congressional Add: Test & Evaluation Science & Technology (TRMC) ***FY 2023 Accomplishments:*** Program increase to support the initiation of AI hubs, all-domain autonomous M&S technology development	76.250	-
Congressional Adds Subtotals	76.250	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense			Date: March 2024
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603941D8Z / *Test and Evaluation Science and Technology*	Project (Number/Name) 098 / *Cyberspace Test*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
098: *Cyberspace Test*	91.071	18.138	14.707	14.619	-	14.619	14.900	15.198	15.475	15.784	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Department of Defense (DoD) ability to use cyberspace for rapid communication and information sharing in support of operations is a critical enabler of DoD military missions. Advancements in utilizing cyberspace are outpacing the technologies needed for test and evaluation (T&E). The Cyberspace Test Technology (CTT) project develops advanced technologies and methodologies to test and evaluate DoD capabilities and information networks to defend and conduct full-spectrum military operations across cyberspace. This program will improve cyberspace T&E capabilities to support the continual experimental, contractor, developmental, operational, and live-fire testing requirements of warfighter systems operating in cyberspace. Many of the test tools and infrastructure items required for systems in cyberspace will require advancement and maturation of nascent test technologies. The CTT project will address test technology shortfalls in cyberspace testing, including planning cyberspace tests, creating representative cyberspace threats and test environments, executing cyberspace tests, and performing cyberspace test analysis and evaluation.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Cyberspace Test	14.138	14.707	14.619
Description: The CTT project developed a next generation Traffic Generation and Content System that used modern Artificial Intelligence techniques and detailed network, human social, and workflow models to generate traffic. This technology development worked to ensure host and network traffic that was not easily distinguished from human generated traffic. The CTT project developed the novel capability to fuzz targets' virtual machine state. This technology enabled exploring an entirely new class of attacks compared to existing fuzzers which fuzzed only the program inputs. The CTT project developed a capability to address fuzzing technical challenges by building on the VADER Modular Open Source Architecture (MOSA) framework that will enable fuzzing for critical DoD cyber-physical systems. The CTT project developed a framework to provide the red team and other DoD test organizations an automated attack capability. This technology development enabled red team personnel to focus on more challenging problems and other test organizations to conduct automated testing. The CTT developed methods to automate the enumeration of vulnerable services on a host that enabled red team personnel to automate common attack patterns. The CTT developed frameworks to support the ability of red teams to rapidly create and deploy capabilities to abuse existing functionality in applications and operating systems that enabled adversary emulation the use of automated attack suites. The CTT project developed tools to measure the efficacy of cyber testing events and share anonymized results for all DoD testing. This technology enabled more thorough testing and improved testing efficiency.			
FY 2024 Plans:			

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Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation Science and Technology*	**Project (Number/Name)** 098 / *Cyberspace Test*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
The CTT project will continue developing and demonstrating technology to address needs in the Cyber-Physical Systems, Tactical Edge Components, and Enterprise Information Systems domains. This includes tools for the automation of creating Virtual Machines (VMs) for reasonable fidelity test universes and tools to enable the use of Formal Methods throughout the Development, Security, and Operations (DevSecOps) process. ***FY 2025 Plans:*** The CTT project will continue developing and demonstrating technology to address needs in the Cyber-Physical Systems, Tactical Edge Components, and Enterprise Information Systems domains. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Increase from FY 2024 to FY 2025 supports the continual experimental, contractor, developmental, operational, and live-fire testing requirements of warfighter systems operating in cyberspace.			
Accomplishments/Planned Programs Subtotals	14.138	14.707	14.619

	FY 2023	FY 2024
Congressional Add: Test & Evaluation Science & Technology (TRMC) ***FY 2023 Accomplishments:*** Program increase to advance cybersecurity signal generation.	4.000	-
Congressional Adds Subtotals	4.000	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense			Date: March 2024
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603941D8Z / *Test and Evaluation Science and Technology*	Project (Number/Name) 099 / *Space Test*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
099: *Space Test*	0.000	32.000	0.830	0.760	-	0.760	0.990	1.010	1.030	1.050	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The space domain has become a competitive, congested, and contested environment dominated by global economics and key to national security. With the creation of the United States Space Force, the Department of Defense (DoD) is prioritizing investments to maintain space superiority and increase resiliency of space systems. Current testing infrastructure and methodologies to assess space system resilience against emerging threats is limited. The Space Test (ST) project mission is to address national test capability gaps by providing accurate, robust, and efficient T&E solutions to successfully develop, validate, and inform the employment of new space control systems. The ST project addresses test technology needs for adequate realism for space systems and aligns with the DoD S&T priority investments and is developing a strategic roadmap and investment strategy to establish live and virtual range environments, develop space and ground-based threat emulation capabilities. The ST project seeks to develop technologies that will enable robust, accurate, and timely T&E of future space weapon systems

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Space Test	0.600	0.830	0.760
Description: The Space Test (ST) project has conducted a test infrastructure analysis of space systems test needs and developed a time-phased investment strategy based on those requirements. Work included engaging the space test community on needs and gaps to ensure traceability of test technology development to strategic objectives. Space Test continued development of a Space Based Telemetry (SBTM) system to support long rang flight test needs. Work continued to develop the Tactical Aerospace Laser Optical Simulator – High Altitude (TALOS-High). The ST project has started a combined NASA/DoD study to identify upgrades to facilitate classified system testing at existing NASA facilities. A mobile space EW testbed has begun phase 1 development with LLNL.			
FY 2024 Plans: The Space Test project SBTM payload/bus integration and initial deployment to support long rang flight test needs is planned. The next phase of the mobile space system test bed is planned to start in FY 2024 to enhance capacity and capability of the test bed. A mobile space EW testbed has begun phased technology development with LLNL.			
FY 2025 Plans: The Space Test project SBTM prototype is planned to launch onboard a SDA vehicle in FY 2025. Continued development of a mobile space EW testbed is planned.			
FY 2024 to FY 2025 Increase/Decrease Statement:			

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Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603941D8Z / *Test and Evaluation Science and Technology*	**Project (Number/Name)** 099 / *Space Test*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Increase from FY 2024 to FY 2025 supports the launch of a SBTM prototype.			
Accomplishments/Planned Programs Subtotals	0.600	0.830	0.760

	FY 2023	FY 2024
Congressional Add: Test & Evaluation Science & Technology (TRMC) ***FY 2023 Accomplishments:*** Program increase to improve space based range tracking.	31.400	-
Congressional Adds Subtotals	31.400	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A