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Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Defense Advanced Research Projects Agency **Date:** March 2024

Appropriation/Budget Activity 0400: <i>Research, Development, Test & Evaluation, Defense-Wide / BA 3: Advanced Technology Development (ATD)</i>	R-1 Program Element (Number/Name) PE 0603766E / <i>NETWORK-CENTRIC WARFARE TECHNOLOGY</i>
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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	-	662.126	885.425	886.511	-	886.511	863.388	440.126	286.821	273.926	-	-
NET-01: <i>JOINT WARFARE SYSTEMS</i>	-	48.046	110.335	44.996	-	44.996	126.535	105.577	69.272	63.322	-	-
NET-02: <i>MARITIME SYSTEMS</i>	-	116.826	160.050	149.654	-	149.654	154.702	144.603	195.238	210.604	-	-
NET-06: <i>NETWORK-CENTRIC WARFARE TECHNOLOGY</i>	-	497.254	615.040	691.861	-	691.861	582.151	189.946	22.311	0.000	-	-

A. Mission Description and Budget Item Justification

The efforts described in this Program Element (PE) address the Advanced Technology Development associated with the Network-Centric Warfare Technology Program that addresses high payoff opportunities to develop and rapidly mature advanced technologies and systems required for today's network-centric warfare concepts. It is imperative for the future of the U.S. forces to operate flawlessly with each other, regardless of which services and systems are involved in any particular mission. The overarching goal of this PE is to enable technologies at all levels, regardless of service component, to operate as one system.

The objective of the Joint Warfare Systems project is to create enabling technologies for seamless joint operations, from strategic planning to tactical and urban operations. Joint Warfare Systems leverage current and emerging network, robotic, and information technology and provide next generation U.S. forces with greatly increased capability, lethality, and rapid responsiveness. Critical issues facing this project are: (1) U.S. opponents using systems that are flexible, robust, and difficult to neutralize; and (2) U.S. doctrine that limits the use of firepower to lessen the impact of operations on noncombatants. These problems are magnified in urban and semi-urban areas where combatants and civilians are often co-located and in peacekeeping operations where combatants and civilians are often indistinguishable. Meeting these challenges places a heavy burden on joint war planning. Understanding opponent networks is essential so that creative options can be developed to counter their strategies. Synchronization of air and ground operations to apply force only where needed and with specific effects is required. This project supports all levels of the force structure including: (1) the strategic/operational level by generating targeting options against opponents' centers of gravity that have complex networked relationships; (2) the tactical/operational level by managing highly automated forces with tight coupling between air and ground platforms; and (3) the focused tactical level by developing platforms and tools, which acquire targets of opportunity and cue network-based analysis of likely enemy operations thus maximizing the effectiveness of ground forces in stability and support operations.

The Maritime Systems project is identifying, developing and rapidly maturing critical advanced technologies and system concepts for the naval forces' role in today's network-centric warfare concept. Improvements in communications between and among submarines, surface ships and naval aircraft have allowed these forces to operate seamlessly with each other and with other Service's network-centric systems. Naval forces will play an ever-increasing role in network-centric warfare because of their forward deployed nature, their unique capability to operate simultaneously in the air, on the sea and under the sea, and their versatile ability to provide both rapid strike and project sustained force. The technologies developed under this project will capitalize on these attributes, improve them and enable them to operate with other network-centric forces.

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Defense Advanced Research Projects Agency	Date: March 2024
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Appropriation/Budget Activity 0400: <i>Research, Development, Test & Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	R-1 Program Element (Number/Name) PE 0603766E / NETWORK-CENTRIC WARFARE TECHNOLOGY
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B. Program Change Summary (\$ in Millions)	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
Previous President's Budget	673.562	885.425	941.270	-	941.270
Current President's Budget	662.126	885.425	886.511	-	886.511
Total Adjustments	-11.436	0.000	-54.759	-	-54.759
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	9.208	0.000			
• SBIR/STTR Transfer	-20.644	0.000			
• TotalOtherAdjustments	-	-	-54.759	-	-54.759

Change Summary Explanation

FY 2023: Decrease reflects SBIR/STTR transfer offset by reprogrammings.

FY 2024: N/A

FY 2025: Decrease reflects completion of the DARPA Assault Breaker II (ABII), Autonomous Multi-domain Adaptive Swarms-of-Swarms (AMASS), No Manning Required Ship (NOMARS), Manta Ray, Sea Train and Timely Information for Maritime Engagements (TIMEly) programs, as well as a shift from initial flight testing to technology transition activities in the Air Combat Evolution (ACE) program.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2025 Defense Advanced Research Projects Agency										Date: March 2024		
Appropriation/Budget Activity 0400 / 3					R-1 Program Element (Number/Name) PE 0603766E / NETWORK-CENTRIC WARFARE TECHNOLOGY				Project (Number/Name) NET-01 / JOINT WARFARE SYSTEMS			
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
NET-01: JOINT WARFARE SYSTEMS	-	48.046	110.335	44.996	-	44.996	126.535	105.577	69.272	63.322	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The objective of the Joint Warfare Systems project is to create enabling technologies for seamless joint operations, from strategic planning to tactical and urban operations. Joint Warfare Systems leverage current and emerging network, robotic, and information technology and provide next generation U.S. forces with greatly increased capability, lethality, and rapid responsiveness. Critical issues facing this project are: (1) U.S. opponents using systems that are flexible, robust, and difficult to neutralize; and (2) U.S. doctrine that limits the use of firepower to lessen the impact of operations on noncombatants. These problems are magnified in urban and semi-urban areas where combatants and civilians are often co-located and in peacekeeping operations where combatants and civilians are often indistinguishable. Meeting these challenges places a heavy burden on joint war planning. Understanding opponent networks is essential so that creative options can be developed to counter their strategies. Synchronization of air and ground operations to apply force only where needed and with specific effects is required. This project supports all levels of the force structure including: (1) the strategic/operational level by generating targeting options against opponents' centers of gravity that have complex networked relationships; (2) the tactical/operational level by managing highly automated forces with tight coupling between air and ground platforms; and (3) the focused tactical level by developing platforms and tools, which acquire targets of opportunity and cue network-based analysis of likely enemy operations thus maximizing the effectiveness of ground forces in stability and support operations.

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

	FY 2023	FY 2024	FY 2025
Title: Air Combat Evolution (ACE)	20.070	19.627	7.996
<p>Description: As the Services develop new Joint Multi-Domain Battle warfighting concepts, there is a strong demand for innovative ways to assess architectures, advance technology, and support operators developing advanced multi-domain tactics. The Air Combat Evolution (ACE) program will apply technologies and principles of distributed autonomy and artificial intelligence (AI) to aerial within-visual-range (WVR) maneuvering, colloquially known as a dogfight, in modeling and simulation (M&S), surrogate, and ultimately full-scale vehicles. The program will deliver an initial instantiation of a scalable AI controller enabling aircraft autonomy at levels ranging from an advanced tactical autopilot for dynamic maneuver to a form of multi-domain mosaic battle management controller. Experiments will explore both augmentation of existing manned platforms and enhanced future unmanned systems. ACE will provide an early opportunity to build operator trust in combat autonomy and demonstrate adaptive human-machine teaming tools and architectures. Technology developed by this program will transition to the Services.</p> <p>FY 2024 Plans:</p> <ul style="list-style-type: none"> - Conduct flight test of WVR algorithms on full-scale aircraft with progression to more complex scenarios. - Integrate combat autonomy for more complex campaign scenarios with real world data. 			

UNCLASSIFIED

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Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603766E / NETWORK-CENTRIC WA RFARE TECHNOLOGY	Project (Number/Name) NET-01 / JOINT WARFARE SYSTEMS		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2023	FY 2024	FY 2025
<ul style="list-style-type: none"> - Execute F-16 aircraft modifications to enable combat autonomy. - Conduct full-scale aircraft flight evaluations of combat autonomy. <p>FY 2025 Plans:</p> <ul style="list-style-type: none"> - Demonstrate human machine interfaces that support appropriate trust in WVR combat autonomy on full-scale aircraft. - Transition autonomy technologies to Air Force partners. <p>FY 2024 to FY 2025 Increase/Decrease Statement: The FY 2025 decrease reflects a shift from initial flight testing to technology transition.</p>				
<p>Title: Autonomy Standards and Ideals with Military Operational Values (ASIMOV)</p> <p>Description: The Autonomy Standards and Ideals with Military Operational Values (ASIMOV) program will develop autonomy benchmarks to objectively and quantitatively measure the ethical readiness of future autonomous systems and the ethical difficulty of proposed use-cases in support of military operational values (e.g., international humanitarian law, rules of engagement, etc.) in increasingly complex and changing scenarios. In order to accelerate the development and eventual use of ethical autonomous systems, an implementable measurement and benchmarking framework of military autonomy must be developed. Based on technologies developed in the Urban Reconnaissance through Supervised Autonomy (URSA) program (budgeted in PE 0602702E, Project TT-04), ASIMOV's benchmark will enable future autonomous systems that undergo the intensive testing to be evaluated and scored with autonomy readiness levels (ARL) much like how technology readiness levels (TRL) and manufacturing readiness levels (MRL) are used to describe the maturity of technology and manufacturing processes, respectively. ASIMOV will decompose the five Department of Defense's Responsible Artificial Intelligence (AI) Ethical Principles (Responsibility, Equitability, Reliability, Traceability, and Governability) in a structured, observable, and independently verifiable manner to measure the readiness of specific autonomous systems to perform ethically within those scenarios. Technology developed under ASIMOV will be transitioned to the demonstration and operational testing (DT/OT) community, the Director of Operational Test and Evaluation (DOT&E), and the Services.</p> <p>FY 2024 Plans:</p> <ul style="list-style-type: none"> - Develop initial autonomy benchmark through decomposition of quantifiable values for the five Responsible AI Ethical Principles. <p>FY 2025 Plans:</p> <ul style="list-style-type: none"> - Develop initial framework for the quantitative benchmark. - Develop ethical and complex scenarios for benchmarking Autonomous Weapon Systems (AWS). - Develop synthetic data in various sensor modalities. - Enhance the generative environment to be capable of rapidly generating synthetic scenes and scenarios. <p>FY 2024 to FY 2025 Increase/Decrease Statement:</p>		-	5.000	22.000

UNCLASSIFIED

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2023	FY 2024	FY 2025
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The FY 2025 increase reflects a shift from initial benchmark development to development of framework, scenarios, and data.

<p>Title: Awareness in Joint Warfighting Technology</p> <p>Description: The Awareness in Joint Warfighting Technology thrust will develop and demonstrate advanced technologies to project power and identify and deliver capabilities in deeply denied areas. Future joint warfighting will rely increasingly on autonomy and explore new environments and domains. In deeply denied areas, challenges to conduct collaborative battlefield operations among multiple networked autonomous systems remain. This autonomy will need to overcome an active adversary's ability to adapt while delivering enough awareness to enable trust in achieving the desired goal. In order to project power in novel ways, this area will also develop technologies and toolsets to detect new sets of indicators and actions to impact an adversary's capabilities. Lastly, joint warfighting in denied areas will require forward deployed operators to exploit local resources to support and sustain ongoing operations. This includes the forward-deployed use of resources, leveraging existing infrastructure for sensing and communications and exploring expeditionary advanced manufacturing techniques and live, virtual, and constructive experimentation and technology/system demonstration to support technology transition objectives and provide data that supports transition partners' investment decisions.</p> <p>FY 2025 Plans:</p> <ul style="list-style-type: none"> - Initiate studies for logistics and industrial base network dynamics. - Establish collaborative information exchange forums with industry, DoD, and inter-agency logistical partners. - Perform analytics and experimentation to identify potential projects dealing with industry and DoD network performance improvement. - Integrate industrial base analytics with comparable analytic efforts dealing with warfighting operational concepts. <p>FY 2024 to FY 2025 Increase/Decrease Statement: The FY 2025 increase reflects program initiation.</p>	-	-	15.000
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<p>Title: Assault Breaker II (ABII)</p> <p>Description: Assault Breaker II (ABII) seeks to change the current warfighting paradigm of reliance on a Service-specific and platform centric force that executes prescribed kill chains to a highly adaptable and capability-based force. This new paradigm operates as a disaggregated kill web able to execute rapidly composable, joint, and all domain kill chains. ABII will exploit both existing and emerging technologies across the Services to address known capability gaps, opportunities, and threats. ABII will conduct mission-centric, multi-Service and multi-domain analyses, modeling & simulation (M&S), and experimentation to inform research and development and program of record recommendations. ABII will build an enduring, multi-service M&S environment to support complex mission level kill web analysis. ABII will also design and develop a Vanguard Force DevOps Environment</p>	26.515	65.097	-
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UNCLASSIFIED

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2023	FY 2024	FY 2025
<p>(VFDE) and battle management enclave with physical nodes that will enable the transition of ABII technologies, concepts and architectures to the Services. ABII is completing development and will be transitioning to the Office of the Secretary of Defense.</p> <p>FY 2024 Plans:</p> <ul style="list-style-type: none"> - Design kill web architecture study-based scenarios for M&S and experimentation validation. - Conduct model and simulation execution and analysis. - Complete validation of multi-level security environment. - Re-align experimentation architecture to the Office of the Secretary of Defense and Services. - Transition battle management software capabilities to the Office of the Secretary of Defense. - Re-align M&S system to the Office of the Secretary of Defense and Services. - Complete final recommendations for validated warfighting architectures. <p>FY 2024 to FY 2025 Increase/Decrease Statement: The FY 2025 decrease reflects program completion.</p>			
<p>Title: Autonomous Multi-domain Adaptive Swarms-of-Swarms (AMASS)</p> <p>Description: Autonomous Multi-domain Adaptive Swarms-of-Swarms (AMASS) builds on the successes of SESU (budgeted in this PE/Project) and on related Service programs to create a scalable, robust, and interoperable system-of-systems, capable of defeating adversary Anti-Access/Area Denial (A2/AD) capabilities at the theatre level. The SESU program leveraged a large number of cost-imposing, autonomous drones with a small footprint in order to degrade, disrupt, deceive, or destroy an adversary's A2/AD capabilities at the operational level. The program focused on command and control (C2) to plan and execute mission level effects (e.g., open corridors for conventional force employment) in contested environments, swarm behaviors, and control of payloads required to sense and effect. The AMASS C2 software and architecture will coordinate the operations of a heterogenous mix of autonomous air, ground, and surface assets, developed by different Services and vendors, running different swarm behavior software, with different payloads, in order to deliver distributed sensing, kinetic and non-kinetic effects, information operations, and other hybrid effects. AMASS planning and execution software will enable disparate autonomous platforms to collaborate and negotiate with each other to complete complex counter-A2/AD missions and to dynamically adapt to changes in the environment such as attrition, targeting errors, and unanticipated adversary actions, as well as changes in missions or target sets. The planned transition partners for the capability are Service Programs of Record.</p> <p>FY 2024 Plans:</p> <ul style="list-style-type: none"> - Enhance SESU C2 to support planning and execution of missions leveraging multiple disparate airborne, waterborne (surface), and ground-based drone swarms. - Design and develop C2 software enabling swarms (airborne, waterborne (surface), and ground-based) to negotiate with each other in order to achieve mission objectives. 	1.461	20.611	-

UNCLASSIFIED

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Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603766E / NETWORK-CENTRIC WARFARE TECHNOLOGY	Project (Number/Name) NET-01 / JOINT WARFARE SYSTEMS

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2023	FY 2024	FY 2025
<ul style="list-style-type: none"> - Apply AMASS technologies to new threats and geographies in simulation for inclusion in future efforts. - Update C2 architecture based on simulation results to support different swarm (airborne, waterborne (surface), and ground-based) behaviors. <p><i>FY 2024 to FY 2025 Increase/Decrease Statement:</i> The FY 2025 decrease reflects program completion.</p>			
Accomplishments/Planned Programs Subtotals	48.046	110.335	44.996

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

N/A

Remarks

D. Acquisition Strategy

N/A

UNCLASSIFIED

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Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603766E / NETWORK-CENTRIC WARFARE TECHNOLOGY	Project (Number/Name) NET-02 / MARITIME SYSTEMS
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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
NET-02: MARITIME SYSTEMS	-	116.826	160.050	149.654	-	149.654	154.702	144.603	195.238	210.604	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Maritime Systems project is identifying, developing and rapidly maturing critical advanced technologies and system concepts for the naval forces' role in today's network-centric warfare concept. Improvements in communications between and among submarines, surface ships and naval aircraft have allowed these forces to operate seamlessly with each other and with other Service's network-centric systems. Naval forces will play an ever-increasing role in network centric warfare because of their forward deployed nature, their unique capability to operate simultaneously in the air, on the sea and under the sea, and their versatile ability to provide both rapid strike and project sustained force. The technologies developed under this project will capitalize on these attributes, improve them and enable them to operate with other network-centric forces.

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

	FY 2023	FY 2024	FY 2025
<p>Title: Advanced Propulsor, Experimental (APEX)*</p> <p>Description: *Formerly Advanced Propulsors, Experimental (APEX)</p> <p>Current submarine propulsor and propeller designs have reached the technical limits of achieving significant improvements, constrain ship layouts, and maneuvering capabilities. The Advanced Propulsor, Experimental (APEX) program is developing and demonstrating a new generation of submarine propulsor designs enabling revolutionary improvements in submarine design, maneuverability, speed, and quieting that will transform future submarine designs. The APEX program is building upon technologies developed in the Advanced Maritime Defense Technologies Concepts budgeted in PE 0602702E, Project TT-03. The anticipated transition is to the Navy.</p> <p>FY 2024 Plans:</p> <ul style="list-style-type: none"> - Complete mechanical design space exploration (DSE) feasibility studies. - Design and fabricate 1/20th scale demonstrator. - Complete Conceptual Design Review (CoDR) for objective system. <p>FY 2025 Plans:</p> <ul style="list-style-type: none"> - Complete Preliminary Design Review (PDR) for demonstrator system. - Conduct detailed design for the APEX full and quarter scale designs and purchase long-lead items. - Initiate development of a quarter scale (demonstrator) vehicle and conduct initial testing. - Conduct subsystem modeling, simulation and analysis activities. 	2.000	41.413	83.318

UNCLASSIFIED

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Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603766E / NETWORK-CENTRIC WARFARE TECHNOLOGY	Project (Number/Name) NET-02 / MARITIME SYSTEMS		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2023	FY 2024	FY 2025
<ul style="list-style-type: none"> - Develop, build, and test the quarter scale vehicle subsystems. <p>FY 2024 to FY 2025 Increase/Decrease Statement: The FY 2025 increase reflects a shift to detailed design, fabrication, and test activities.</p> <p>Title: Willow</p> <p>Description: The Willow program will develop innovative payloads to conduct Acoustic Warfare (AW) to counter active surface sonars using a unique combination of acoustic hardware and waveforms provided by advanced sonar signal processing algorithms. Willow will provide a robust capability to help the Navy respond to active sonar threats. No current method exists to challenge adversary active sonars. Willow will use advanced hardware-in-the-loop simulations, Independent Verification and Validation (IV&V), and stressing at-sea testing to create this capability. Technology developed under this program will transition to the Navy.</p> <p>FY 2024 Plans:</p> <ul style="list-style-type: none"> - Define operational concepts based on selected performer systems. - Develop prototype acoustic projector payload hardware commensurate with operational concepts. - Develop software and waveforms to provide acoustic effects to support counter sonar capabilities. - Conduct end-to-end performer software simulations to provide interim analysis against program metrics. - Conduct IV&V to verify performer simulations, hardware, and waveforms. - Conduct in-water engineering tests of critical hardware components. <p>FY 2025 Plans:</p> <ul style="list-style-type: none"> - Conduct Critical Design Review of prototype acoustic projector payloads prior to at-sea testing. - Conduct at-sea test to verify prototype system performance and modeling efficacy. - Conduct in-water node coordination test to verify node-to-node handoff autonomy. - Select prototype payloads for further development based on performance against metrics in at-sea testing. - Conduct IV&V to verify performer updates to simulations, hardware and waveforms based on lessons learned from initial at-sea testing. <p>FY 2024 to FY 2025 Increase/Decrease Statement: The FY 2025 increase reflects the shift from software development and hardware testing to at-sea testing.</p>		5.000	27.002	31.691
<p>Title: Goblin</p> <p>Description: The undersea domain has significant importance to national security and military operations, but manned missions are restricted in their operational ranges. The Goblin program will enhance U.S. autonomous capabilities in the challenging undersea domain by developing and demonstrating complex underwater systems able to search, locate, and execute mission</p>		22.378	25.838	30.645

UNCLASSIFIED

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Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603766E / NETWORK-CENTRIC WARFARE TECHNOLOGY	Project (Number/Name) NET-02 / MARITIME SYSTEMS

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2023	FY 2024	FY 2025
<p>objectives without the need for human control. Navigation approaches will focus on the use of commercial, low-cost navigation hardware combined with environmental feature-based algorithm approaches to eliminate reliance on the Global Positioning System (GPS) for long-duration missions. Key Goblin technical challenges include sensing techniques that provide high-resolution navigation without GPS, perception and effector strategies for objects with unknown parameters, long-duration autonomy approaches to support mission execution, and autonomy approaches that do not rely on human interaction. The anticipated transition is to the Navy.</p> <p>FY 2024 Plans:</p> <ul style="list-style-type: none"> - Conduct testing of new sensor and payload configurations that incorporate lessons learned throughout FY 2023. - Begin development, fabrication, and testing of the vehicle that will support subsequent transition. <p>FY 2025 Plans:</p> <ul style="list-style-type: none"> - Complete fabrication and testing of the vehicle to support transition. - Deliver the vehicle to the Navy for further development. - Test the government-owned system in a representative maritime environment. <p>FY 2024 to FY 2025 Increase/Decrease Statement: The FY 2025 increase reflects transition partnership for continued developmental testing and fielding. The transition partnership required rigorous testing in highly unstructured and dynamic environments.</p>			
<p>Title: Awareness in Maritime Systems</p> <p>Description: The envisioned future fleet of Uncrewed Surface Vehicles (USVs) is not survivable in a contested environment unless it can plan and execute mission maneuvers without the enemy easily detecting, tracking and localizing their positions. Current USV autonomy can't respond and adapt to a changing threat environment, making USVs highly vulnerable. The Awareness in Maritime Systems thrust will develop and demonstrate platform autonomy technologies that can enable operations in emission-controlled environments or when communications have been compromised. Platform awareness of both the external environment and of its own internal health and operating status, and the ability to make decisions based on this awareness, will become an enabling capability for future autonomous systems. Cooperative operation of Uncrewed Air Vehicles (UAVs) will be explored to extend the awareness envelope for maritime platforms, as well as the use compact, plug-in modular autonomy control systems that can rapidly adapt commercial UAVs for military missions.</p> <p>FY 2025 Plans:</p> <ul style="list-style-type: none"> - Conduct spiral development of plug-in autonomy controllers. - Develop and laboratory test advanced behaviors for maritime autonomy. <p>FY 2024 to FY 2025 Increase/Decrease Statement:</p>	-	-	4.000

UNCLASSIFIED

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2023	FY 2024	FY 2025
FY 2025 increase reflects program initiation.			
<p>Title: No Manning Required Ship (NOMARS)</p> <p>Description: No Manning Required Ship (NOMARS) is developing small, low-cost, disaggregated naval platforms to demonstrate the ability to perform persistent power projection and force application combat missions currently conducted from large, high-value capital ships. The NOMARS program will design a ship that can operate autonomously for long durations at sea, enabling a ship design process that eliminates considerations associated with crew. NOMARS focuses on exploring novel approaches to the design of the sea frame (the ship without mission systems) while accommodating representative payload size, weight, and power. The goal of the program is to demonstrate the feasibility of Unmanned Surface Vessels (USVs) that operate autonomously for months to years without human intervention, in large numbers, with only periodic, depot-based maintenance. This capability will enable disaggregated persistent USVs, allowing the surface fleet to credibly threaten peer adversaries and negate their investments in high-cost weapon systems designed to counter large naval targets such as aircraft carriers. A successful NOMARS program will prove feasibility of a small unmanned ship with significantly improved reliability and functional performance over current USVs providing a pathway to allow a distributed lethality concept to become viable: small ships, in large numbers, each of which is individually low-cost and low-value, but in aggregate presents a significant deterrent. The anticipated transition partner is the Navy.</p> <p>FY 2024 Plans:</p> <ul style="list-style-type: none"> - Complete subsystem verification and validation. - Complete build of the demonstrator vessel. - Conduct Test Readiness Reviews. - Perform ship-level verification and validation activities. - Initiate at-sea demonstrations. <p>FY 2024 to FY 2025 Increase/Decrease Statement: The FY 2025 decrease reflects program completion.</p>	28.000	27.548	-
<p>Title: Manta Ray</p> <p>Description: The Manta Ray program is developing and demonstrating a new class of long-duration, long-range unmanned underwater vehicles (UUVs) at an acquisition and lifecycle cost significantly less than current payload-capable UUVs. This new class of UUV will give the combatant commander an amplification of capacity without disrupting current operations by remaining independent of manned vessels and ports once deployed. The primary goal of the Manta Ray program is to open a design space for future UUVs capable of both long-duration missions and large payload capacity. A secondary goal of the program is to advance key technologies benefiting other naval designs such as low lifecycle cost UUV operations, energy management</p>	25.069	19.800	-

UNCLASSIFIED

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2023	FY 2024	FY 2025
<p>technologies to enable long-duration operations, biofouling reduction technologies, and long-duration navigational enablers. The anticipated transition partner is the Navy.</p> <p>FY 2024 Plans:</p> <ul style="list-style-type: none"> - Complete integration of full-scale vehicle. - Conduct preliminary testing of full-scale vehicle in controlled maritime environments. - Conduct at-sea demonstration of full-scale vehicle performing full range of behaviors and capabilities. - Refurbish and transition full-scale vehicle. <p>FY 2024 to FY 2025 Increase/Decrease Statement: The FY 2025 decrease reflects program completion.</p>			
<p>Title: Sea Train</p> <p>Description: The Sea Train program will support the delivery of masses of Unmanned Surface Vessels (USVs) into theater, without reliance on large, manned capital assets. The Sea Train program is developing and demonstrating approaches to exploit the efficiencies of longer slender hulls, while enabling a distributed fleet of tactical USVs. The Sea Train concept enables vessels that are efficient for transoceanic transport while enabling dispersed operations as individual vessels. The Sea Train program is also developing and demonstrating connectors and approaches to couple the vessels, the control laws required to drive the vessel in open ocean conditions, sensor approaches to understand the wave environment to efficiently navigate the vessel, and the autonomy required to connect and disconnect the vessels without human intervention. The goal of this effort is to improve transport efficiency over what can be achieved with current monohull designs. This allows for the efficient transport of smaller vessels into and out of theater, an operation that is normally accomplished today by carrying smaller vessels on board larger vessels or reliance on at-sea refueling of smaller vessels. The anticipated transition partner is the Navy.</p> <p>FY 2024 Plans:</p> <ul style="list-style-type: none"> - Complete demonstration of fleet representative missions with third-scaled demonstrators to include aggregation, disaggregation and operations within complex seaways. - Complete transition of Sea Train demonstration models and sub system technologies to Navy/Marine Corps/Army for follow-on testing and demonstration. <p>FY 2024 to FY 2025 Increase/Decrease Statement: The FY 2025 decrease reflects program completion.</p>	17.331	15.949	-
<p>Title: Timely Information for Maritime Engagements (TIMEly)</p> <p>Description: Integration of undersea elements for joint cross-domain operations is critical for developing the most effective distributed kill webs. The Timely Information for Maritime Engagements (TIMEly) program is creating a heterogeneous</p>	4.548	2.500	-

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Exhibit R-2A, RDT&E Project Justification: PB 2025 Defense Advanced Research Projects Agency		Date: March 2024
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603766E / NETWORK-CENTRIC WA RFARE TECHNOLOGY	Project (Number/Name) NET-02 / MARITIME SYSTEMS

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2023	FY 2024	FY 2025
<p>underwater network architecture that will span the ocean and bridge to other operating domains. TIMEly will provide an adaptive, heterogeneous, scalable communications capability to link undersea and cross-domain assets together into kill webs with minimal operator burden. The program will focus on developing architectures with the capability to transfer the right information to its intended recipient. TIMEly will work within commonly understood limitations, with a focus on protocols, quality of service, and information exchange. The program will leverage developments demonstrating short-range and long-range acoustic communications at higher bandwidth and greater reliability, while minimizing detectability. The program will also leverage recent developments in network interoperability to manage heterogeneous undersea and cross-domain networks. Technology developed by this program will transition to the Navy.</p> <p>FY 2024 Plans:</p> <ul style="list-style-type: none"> - Conduct end-to-end demonstration with operational mission partners. - Conduct post-test analysis to evaluate TIMEly operational effectiveness. - Transition TIMEly hardware and software products to the Navy. <p>FY 2024 to FY 2025 Increase/Decrease Statement: The FY 2025 decrease reflects program completion.</p>			
<p>Title: Multi-Azimuth Defense Fast Intercept Round Engagement System (MAD-FIRES)</p> <p>Description: The Multi-Azimuth Defense Fast Intercept Round Engagement System (MAD-FIRES) program developed technologies for a point defense system against today's most stressing threats by developing a highly maneuverable, medium caliber, guided projectile, and fire sequencing and control system capable of neutralizing large threat raids of high speed, highly maneuverable targets. Leveraging recent advancements in gun hardening, miniaturization of guided munition components, and long-range sensors, MAD-FIRES advanced fire control technologies, medium caliber gun technologies, and guided projectile technologies enabling the multiple, simultaneous target, kinetic engagement mission at greatly reduced costs. MAD-FIRES achieved lethality overmatch through accuracy rather than size, thus expanding the role of smaller combat platforms into missions where they have been traditionally outgunned. MAD-FIRES, sized as a medium caliber system, enhanced flexibility for installment as a new ship self-defense system. This program was also funded in PE 0602702E, Project TT-03.</p>	6.500	-	-
<p>Title: Hunter</p> <p>Description: The Hunter program developed novel concepts for Extra Large Unmanned Undersea Vehicles (XLUUVs) to deliver complex payloads. The program explored efficient encapsulation and buoyancy control concepts to be implemented with advanced fiber handling capabilities for high bandwidth communications in order to create a highly modular and adaptable ocean interface. The interface significantly increased the payload handling ability of the XLUUVs, allowing them to deliver completely new capabilities previously delivered only by manned platforms. The Hunter program established a new capability for integration</p>	6.000	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2025 Defense Advanced Research Projects Agency		Date: March 2024
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603766E / NETWORK-CENTRIC WA RFARE TECHNOLOGY	Project (Number/Name) NET-02 / MARITIME SYSTEMS

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2023	FY 2024	FY 2025
into maritime system of systems warfare architectures. Technologies developed under the Hunter program transitioned to the Navy.			
Accomplishments/Planned Programs Subtotals	116.826	160.050	149.654

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

N/A

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2025 Defense Advanced Research Projects Agency **Date:** March 2024

Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603766E / NETWORK-CENTRIC WARFARE TECHNOLOGY	Project (Number/Name) NET-06 / NETWORK-CENTRIC WARFARE TECHNOLOGY
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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
NET-06: NETWORK-CENTRIC WARFARE TECHNOLOGY	-	497.254	615.040	691.861	-	691.861	582.151	189.946	22.311	0.000	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

This project funds classified DARPA programs that are reported in accordance with Title 10, United States Code, Section 119(a)(1) or its successor.

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

	FY 2023	FY 2024	FY 2025
Title: Classified DARPA Program	497.254	615.040	691.861
Description: This project funds Classified DARPA Programs. Details of this submission are classified.			
FY 2024 Plans: Details will be provided under separate cover.			
FY 2025 Plans: Details will be provided under separate cover.			
FY 2024 to FY 2025 Increase/Decrease Statement: Details will be provided under separate cover.			
Accomplishments/Planned Programs Subtotals			691.861

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

N/A

Remarks

D. Acquisition Strategy

N/A