Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Navy	Date: May 2021
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 2: *Applied Research*	**R-1 Program Element (Number/Name)** PE 0602750N *I Future Naval Capabilities Applied Research*

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	0.000	147.050	170.681	173.356	-	173.356	-	-	-	-	-	-
0000: *Future Naval Capabilities Applied Research*	0.000	143.189	162.681	173.356	-	173.356	-	-	-	-	-	-
9999: *Congressional Adds*	0.000	3.861	8.000	0.000	-	0.000	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Office of Naval Research (ONR) works closely across the Department of the Navy (DON) and Naval Research Enterprise (NRE) to develop high priority technological capabilities needed by the operational forces. From their beginnings, the U.S. Navy and Marine Corps have leveraged technology innovation to gain decisive advantage. However, breakthroughs don't happen overnight. Critical to sustaining the pipeline of new capabilities, is maintaining a priority-driven portfolio of naval science and technology (S&T) to deliver solutions to known requirements, and experiment with potential game-changing ideas. The Naval S&T budget supports higher guidance defined by the National Defense Strategy, and responds to requirements identified by the Secretary of the Navy. This PE funds Future Naval Capabilities (FNC) Technology Candidates, which are at lower TRLs, and is focused on maturing technologies to higher TRLs to reduce FNC transition risk. Efforts in this PE are coordinated with related work in the USMC Technology Candidates Activity of PE 0602131M Marine Corps Landing Force Technology.

This Program Element (PE) funds Applied Research, which is the systematic study to understand the means to meet a recognized and specific need. Most of the work in this PE can be classified between Technology Readiness Level (TRL) 2 (technology concept and/or application formulation) and TRL 4 (component and/or breadboard validation in laboratory environments).

Due to the number of efforts in this PE, the programs described herein are representative of the work included in this PE.

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	152.012	167.590	180.900	-	180.900
Current President's Budget	147.050	170.681	173.356	-	173.356
Total Adjustments	-4.962	3.091	-7.544	-	-7.544
• Congressional General Reductions	-	-0.043			
• Congressional Directed Reductions	-	-4.866			
• Congressional Rescissions	-	-			
• Congressional Adds	-	8.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-2.001	0.000			
• SBIR/STTR Transfer	-2.961	0.000			
• Program Adjustments	0.000	0.000	-7.049	-	-7.049
• Rate/Misc Adjustments	0.000	0.000	-0.495	-	-0.495

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Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2020	FY 2021
Project: 9999: *Congressional Adds*		
Congressional Add: *C4ISR and special projects*	3.861	0.000
Congressional Add: *Cooperative Engagement Capability Mission Based Networking for Data Distribution*	0.000	3.000
Congressional Add: *Improved Detection of Submarine Threats*	0.000	5.000
Congressional Add Subtotals for Project: 9999	3.861	8.000
Congressional Add Totals for all Projects	3.861	8.000

Change Summary Explanation

Funding: The decrease in FY 2022 is associated with reduced investment in Manpower, Personnel, Training, and Education (MPT&E) studies and applied research.

Technical: Not applicable.

Schedule: Not applicable.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy			Date: May 2021
Appropriation/Budget Activity 1319 / 2	R-1 Program Element (Number/Name) PE 0602750N / *Future Naval Capabilities Applied Research*	Project (Number/Name) 0000 / *Future Naval Capabilities Applied Research*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
0000: *Future Naval Capabilities Applied Research*	0.000	143.189	162.681	173.356	-	173.356	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Future Naval Capabilities (FNC) budget activity (BA) 2 investments develop candidate FNC technologies in an agile fashion by exploiting technology advances that respond rapidly to Naval needs. This approach facilitates an optimum response when developing and maturing the technology options that can be developed further in Program Element (PE) 0603673N, Future Naval Capabilities Advanced Technology Development.

The FNC Program favors a high level of collaboration. PE R-2 activities are mostly organized by the Office of Naval Research (ONR) Science and Technology Departments, which are tasked to collaborate with the acquisition stakeholders and their resource sponsors. A complete accounting of the technology candidates being developed and a full disposition of each technology development effort funded in this PE is provided annually to the Congressional oversight committees.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Expeditionary Maneuver Warfare (EMW) and Combating Terrorism	11.499	14.605	16.168	0.000	16.168
Description: The objective of this activity is to develop and mature technologies in asymmetric and irregular warfare, distributed operations, information warfare, survivability and self-defense to a point where they can be proposed and continued as FNCs in PE 0603673N, Future Naval Capabilities Advanced Technology Development. ***FY 2021 Plans:*** - Extend focus on the technologies that will enhance long-range fires capabilities so warfighters employed in small distributed units will have the tools they need to locate and decisively destroy larger enemy forces. - Progress and expand in the area of providing new training technologies, knowledge products, architectures, and systems that can accelerate mental, emotional and cognitive decision-making skill, to include human-machine teaming and greater naval capability to detect, localize and neutralize mines and improvised explosive devices that challenge the naval forces ability to operate in contested maritime environments. - Establish novel technologies and innovative concepts that will improve the maneuverability of the Marine Corps Air Ground Task Force by enhancing the movement of troops and equipment from shipboard to inland objective. Emerging technologies for future intelligence, surveillance and reconnaissance systems will transition to the Future Naval Capabilities program.					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602750N / *Future Naval Capabilities Applied Research*	**Project (Number/Name)** 0000 / *Future Naval Capabilities Applied Research*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Efforts to enhance expeditionary forces use of artificial intelligence, autonomy, and material development in areas of naval logistics will be initiated. This includes developing technologies to improve warfighter effectiveness in command, control, computers and communication for small unit naval expeditionary warfighters. ***FY 2022 Base Plans:*** - Extend focus on the technologies that will enhance long-range fires capabilities so warfighters employed in small distributed units will have the tools they need to locate and decisively destroy larger enemy forces. - Progress and expand in the area of providing new training technologies, knowledge products, architectures, and systems that can accelerate mental, emotional and cognitive decision-making skill, to include human-machine teaming and greater naval capability to detect, localize and neutralize mines and improvised explosive devices that challenge the naval forces ability to operate in contested maritime environments. - Continue novel technologies and innovative concepts that will improve the maneuverability of the Marine Corps Air Ground Task Force (MAGTF) by enhancing the movement of troops and equipment from shipboard to inland objectives. - Develop technologies to improve warfighter effectiveness in command, control, computers and communication, intelligence, surveillance and reconnaissance for small unit naval expeditionary warfighters to include multi-domain sensing of the electronic spectrum. -Investigate ways to reduce the length of the supply chain for small units to include alternative local shipping and delivery methods and storage and power production and storage. -Develop methods to defend against adversarial unmanned vehicles to include swarming attacks. ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** The increase from FY21 to FY22 is due to expansion in the area of providing new training technologies, knowledge products, architectures, and systems that can accelerate mental, emotional and cognitive decision-making skill.					
Title: C4ISR and Special Projects ***Description:*** The objective of this activity is to develop and mature technologies in data science, mathematical optimization, computational and information sciences, quantum information sciences, electronics, command and control, combat systems, communications, cyber security, cyber operations, electronic warfare, sensing and surveillance, and precision timing and navigation, as well as technologies for surface and airborne vehicles,	54.658	56.418	47.581	0.000	47.581

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
and cruise missile defense weapons to a point where they can be proposed and continued as Future Naval Capabilities (FNC) in program element (PE) 0603673N, Future Naval Capabilities Advanced Technology Development. ***FY 2021 Plans:*** Future Naval Capabilities (FNC) Technology Candidate development in FY 2021 will continue to focus on the following thrust areas: Communications and Networking; Decision Tools; Cyber; Sensor Deception and Defeat; Advanced Sensing and Processing; Cross Platform Technologies, and Advanced Systems and Components. The objectives of Communications and Networking include maturing promising communications and networking technologies to enable distributed maritime operations. The objectives of Sensor Deception and Defeat include maturing the underlying technologies, techniques and algorithms that degrade, neutralize, or destroy an adversary's C4ISR capability. The objectives of Decision Tools include dedicating applied research to develop decision tools to allow Commanders to rapidly and confidently move from data-to-options-to-informed decisions. The objectives of Cyber include maturing innovative cyber approaches to enhance the resilience, safety, reliability, and efficiency of cyber systems in warfighting platforms. The objectives of Advanced Sensing and Processing include maturing sensing system and processing technologies to deliver enhanced operational capabilities for Intelligence, Surveillance, Reconnaissance and Targeting applications. The objectives of Cross Platform Technologies include maturing electro-magnetic enabling technologies that rely on geographic separation of platform sensors to deliver enhanced operational capabilities. The objectives of Advanced Systems and Components include maturing the underlying components and systems for improved Electro Optical (EO), Radio Frequency (RF) and Precision, Navigation, and Timing (PNT) systems. Extend efforts in developing: - Government Off the Shelf (GOTS) software router and apps to meet Fleet resilient networking objectives in contested warfighting scenarios. - A low-cost, high-fidelity network deception framework (CyberMoat) that lies to attackers on-demand and automated tools to coerce malware agents to deceive adversary Command and Control. - An operating system that enables automatic and efficient use of heterogeneous computing architectures for cyber resilience without requiring change to legacy source code. - Key technologies for off-board RF illumination sources to enable Multi-Input Multi-Output and receive-only sensing in a distributed environment. - Ultra-efficient neural network hardware.					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602750N / *Future Naval Capabilities Applied Research*	**Project (Number/Name)** 0000 / *Future Naval Capabilities Applied Research*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Initiate the development of new Technology Candidates selected to start in FY 2021 in the areas of Communications and Networking, Sensor Deception and Defeat, Decision Tools, Cyber, Advanced Sensing and Processing, Cross Platform Technologies, and Advanced Systems and Components.					
FY 2022 Base Plans: Future Naval Capabilities (FNC) Technology Candidate development in FY 2022 will initiate efforts in: - Implementing novel hardware and development of modern algorithms for the signal processing to enable detection of advanced maritime threats. - Evolving electro-optic and infrared capabilities for threat detection and passive surveillance. - Developing tools for convergence of cyber and EW effects. - Developing frameworks with intelligent resource management for system resilience. - Understanding and analyzing Fifth generation (5G) security and protocol to identify vulnerabilities and close security gaps to increase resiliency and robustness against any adversarial actions Continue efforts in: - Communications and Networking to mature promising over the horizon communications and low probability of detection technologies to enable distributed maritime operations. - Sensor Deception and Defeat to mature the underlying technologies, techniques and algorithms that degrade, neutralize, or destroy an adversary's C4ISR capability. - Decision Tools to develop capabilities through applied research efforts that allow Commanders to rapidly and confidently move from data-to-options-to-informed decisions. - Cyber to mature innovative cyber approaches to enhance the resilience, safety, reliability and efficiency of cyber systems in warfighting platforms. - Advanced Sensing and Processing to mature sensing system and processing technologies to deliver enhanced operational capabilities for Intelligence, Surveillance, Reconnaissance and Targeting applications. - Cross Platform Technologies to mature electro-magnetic enabling technologies that rely on geographic separation of platform sensors to deliver enhanced operational capabilities. - Advanced Systems and Components to mature the underlying components and systems for improved Electro Optical (EO), Radio Frequency (RF) and Precision, Navigation, and Timing (PNT) systems. - Developing Government Off the Shelf (GOTS) software router and apps to meet Fleet resilient networking objectives in contested warfighting scenarios					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
- Developing key technologies for off-board RF illumination sources to enable Multi-Input Multi-Output and receive-only sensing in a distributed environment. - Developing ultra-efficient neural network hardware. Complete efforts in: - A low-cost, high-fidelity network deception framework (CyberMoat) that lies to attackers' on-demand, and automated tools to coerce malware agents to deceive adversary Command and Control. - An operating system that enables automatic and efficient use of heterogeneous computing architectures for cyber resilience without requiring change to legacy source code. ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** The decrease from FY21 to FY22 is due to the maturation of Technology Candidates and associated reduction in investment in the areas of Communications and Networking, Sensor Deception and Defeat, Decision Tools, Cyber, Advanced Sensing and Processing, Cross Platform Technologies, and Advanced Systems and Components; and specifically the completion of network deception and heterogeneous computing architecture efforts.					
Title: Ocean Battlespace Sensing ***Description:*** The objective of this activity is to enable maritime domain access and distributed operations for Naval forces in contested ocean environments through superior maritime battlespace awareness and undersea threat detection, identification and neutralization. Specifically, activities will develop and mature technologies that ultimately support undersea warfare, subsurface/seabed warfare, antisubmarine warfare, and mine warfare including mine countermeasures and naval mining. Activities will also develop and mature methods and technological approaches for environmental sensing and prediction for the maritime battlespace. The desired outcome for efforts in this activity is to mature the applied research results to a point where they can be focused on particular enabling capabilities and proposed to be continued as Future Naval Capabilities (FNC) in program element (PE) 0603673N, Future Naval Capabilities Advanced Technology Development. Additionally, a subset of technologies explored herein are intended to support expeditionary access and will be further matured, focused, and ultimate demonstrated under the USMC's Advanced Technology Demonstration effort in PE 0603640M MC Advanced Technology Demo.	24.009	24.299	28.544	0.000	28.544

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
FY 2021 Plans: Continue efforts in: - Technologies for precise localization and neutralization of fully buried mines; understanding how to achieve noise reduction for expeditionary Surveillance Towed Array Sensor System (SURTASS) including sensing approaches and noise rejection algorithm development. Conclude efforts in: - Understanding how to potentially miniaturize and marinize existing fuel cells for use in a large- diameter unmanned underwater vehicle; algorithm development for theater-level Anti-Submarine Warfare (ASW) battle management; integrated minefield planning where specific efforts include evaluation of prototype algorithms for staff-level planning of mixed minefields, multiple minefields, and alternative delivery techniques; and studying air-sea process impacts for in-air Electromagnetic (EM) propagation. Initiate efforts in: - High temperature superconducting approaches to minesweeping; innovative naval mine delivery methods; advanced acoustic sources for floating and mobile ASW sensing systems as well as expeditionary SURTASS; and storm surge and inundation forecasting models.					
FY 2022 Base Plans: Continue efforts in: - Advanced minesweeping including development of compact, efficient approaches for sweeping advanced influence mines. The objective is to increase the safe standoff of various tactical platforms and surface ships. - Development of robotic technologies to respond to detected targets including work on dexterity, haptics and algorithms to achieve human-like behaviors. The objective is to interact with the mine and/or obstacle to achieve neutralization, clearance, render-safe or removal for exploitation. - Development of advanced acoustic arrays for floating ASW active sonar sensing systems. - Developing a large, low-noise volumetric array that can be deployed in an A-size sonobuoy that will have superior detection performance against relevant targets. Complete efforts in: - High temperature superconducting approaches to minesweeping; innovative naval mine delivery methods; advanced acoustic sources for floating and mobile ASW sensing systems as well as expeditionary SURTASS; and storm surge and inundation forecasting models.					

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
- Algorithm development for theater-level Anti-Submarine Warfare (ASW) battle management and techniques to achieve noise reduction for expeditionary Surveillance Towed Array Sensor System (SURTASS). Initiate efforts in: - Prototype autonomous system to enhance detection and classification of emerging and novel threats in challenging operating environments. Efforts will develop and mature adaptive object recognition algorithms, modeling and simulation tools, and self-assessment autonomous behaviors. These technologies will improve MCM UUV object detection and recognition capabilities. - Compact broadband acoustic sources for floating and mobile ASW sensing systems. ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** The increase from FY2021 to FY2022 is due to an increased investment in prototype autonomous systems to enhance detection and classification of emerging and novel threats and broadband acoustic sources for floating and mobile ASW sensing systems.					
Title: Sea Warfare and Weapons ***Description:*** The objective of this activity is to develop and mature technologies that enable superior warfighting capabilities for surface and sub-surface naval platforms and undersea weaponry to a point where they can be proposed and continued as Future Naval Capabilities in program element (PE) 0603673N, Future Naval Capabilities Advanced Technology Development. ***FY 2021 Plans:*** Initiate efforts in: - Addressing platform endurance, survivability, and resiliency; naval force sustainment; and logistics. These efforts include signature management, undersea weapons improvements, digital twin development and ship hull-based coatings. Continue efforts in: - Undersea platform signature management and control to support the tactical submarine evolution science and technology plan. - Technologies to improve the long-range operational capabilities of undersea weapons.	20.522	25.104	33.715	0.000	33.715

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
- "Digital twin" development with the expansion to integrate condition-based maintenance; and power and energy to improve overall platform resiliency. - Methods to produce rapidly low cost, high performance autonomous unmanned platforms. - Improved environmentally benign platform coatings to reduce maintenance costs and improve platform hydrodynamic efficiency. Conclude efforts in: - Precision lift in austere at-sea environments. These efforts were transitioned to an OSD funded effort for at-sea test and evaluation. - The unmanned vehicle commercial battery effort anticipating transition into ongoing development programs. - Offboard Refueling and Data Transfer for Unmanned Surface Vehicles and Robust Combat Power Control as the efforts will be proposed as candidates for Future Naval Capabilities. - Tech Candidate Innovation and Prototype Activities. Specific efforts are being covered under another program element to more closely align work with the Navy's innovation initiative.					
FY 2022 Base Plans: Initiate efforts in: - Addressing platform design and engineering, power energy and propulsion, materials, manufacturing and sustainment and logistics. Continue efforts in: - Addressing platform endurance, survivability and resiliency; naval force sustainment; and logistics. These efforts include signature management, undersea weapons improvements, digital twin development and ship hull-based coatings. Complete efforts in: - Undersea platform signature management and control to support the tactical submarine capabilities evolution plan. - Technologies to improve the long-range operational capabilities of undersea weapons. - "Digital twin" development with the expansion to integrate condition-based maintenance; and power and energy to improve overall platform resiliency. - Methods to produce rapidly low cost, high performance autonomous unmanned platforms.					

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
- Improved environmentally benign platform coatings to reduce maintenance costs and improve platform hydrodynamic efficiency. ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** The funding increase from FY 2021 to FY 2022 is due to increased emphasis on the undersea platform signature management and control to support the tactical submarine capabilities evolution plan and increased investment to complete "digital twin" development.					
Title: Warfighter Performance ***Description:*** The objective of this activity is to research and mature technologies that enhance Naval warfighting effectiveness and efficiency within the broad array of Warfighter Performance science and technology domains (Undersea Medicine, Biological Sciences, Bio-robotics, Capable Manpower, Command Decision Making, Force Health Protection, Human/Robot Interaction, Noise-Induced Hearing Loss, and Training and Simulation) to a point where they can be proposed and continued as Future Naval Capabilities (FNC) in program element (PE) 0603673N, Future Naval Capabilities Advanced Technology Development. ***FY 2021 Plans:*** Initiate efforts in: - Applied Human-level artificial intelligence and autonomy that enables the ability for each operator to control multiple autonomous platforms and payloads - Social media incorporation for command, control, communications, intelligence, surveillance, and reconnaissance (C4ISR) - Multi-media, forecasting, and Live, Virtual, and Constructive capabilities to improve manpower selection, training, education, and job performance - Human protection, performance, and biomedical capabilities to increase warfighter lethality and survivability and biotechnologies to provide alternatives to conventional material resources. Continue efforts on: - Modeling and simulation of warfighting environments and systems for training and rehearsal, including cyber and information warfare operations and use of new autonomous systems, technologies for monitoring and	9.957	12.161	16.617	0.000	16.617

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
forecasting human performance during training and operations, and technologies for a non-rigid 1 atmosphere dive suit. Conclude efforts on: - Energy harvesting using microbial fuel cells, data analytics for workplace behavior capture and trend analysis, and detailed physiological human modeling for injury prediction.					
FY 2022 Base Plans: Continue efforts in: - Information model for expressing and managing mission priorities and authorities between unmanned systems, autonomy, and warfighters to enable transfer of tactical control of vehicles and/or payloads during routine missions in contested communications environments. This continuing effort is derived from applied human-level artificial intelligence and autonomy research identified in FY21. - Modular Live-Virtual-Constructive information environment for training, experimentation, wargaming and assessment. This continuing effort is derived from social media incorporation for C4ISR research identified in FY21. - Dive suit capability to enable mobility for divers to work on the bottom of the ocean while accomplishing majority of tasks that previously required a 'wet diver' and cannot be accomplished by robotics. This continuing effort is derived from modeling and simulation of warfighting environments and systems research identified in FY21. Complete efforts in: - Developing a customizable bio-fidelic model of the warfighter to improve risk assessment, injury and incapacitation prediction to enable better testing criterion for PPE and platforms development. This effort will transition to PE 0603673N Future Naval Capabilities for continued development in FY22. This concluding effort is derived from biomedical capabilities to increase warfighter lethality and survivability research identified in FY21. - Decision support system to evaluate alternative manpower courses of action across Manpower, Personnel, Training and Education (MPTE) enterprise. This concluding effort is derived from modeling and simulation of warfighting environments and systems research identified in FY21. - Analytic tool to reduce the number of counter-productive workplace behaviors and correlating indicators through data mining and analytics. This concluding effort is derived from modeling and simulation of warfighting environments and systems research identified in FY21.					

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
- Communication platform to monitor health status of military personnel in operational environments. This concluding effort is derived from modeling and simulation of warfighting environments and systems research identified in FY21. Initiate efforts in: - Maturing a low viscosity corrosion preventative wash primer to increase paint adhesion for the repair of tiles on submarines. - Integrating automated data fusion and asset allocation techniques into a single Battle Management Aid for real-time decision support for operations and training. - Evidence-based, model-driven integrated software solution that will support, reinforce, and enhance career forecasting and manpower modeling by providing necessary data, differentiating metrics, and providing modern decision support to those involved in the selection and assignment processes. ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** The increase in funding from FY 2021 to FY 2022 is due to an increased investment in capabilities that will enhance manpower modeling, career development and forecasting, and provide real-time decision support tools for both training and operational settings.					
Title: Naval Air Warfare and Weapons ***Description:*** The objective of this activity is to develop and mature technologies in directed energy, energetic materials, autonomy, electromagnetic launch, and high speed conventional air and surface weapons to a point where they can be proposed and continued as Future Naval Capabilities in PE 0603673N, Future Naval Capabilities Advanced Technology Development. ***FY 2021 Plans:*** Initiate efforts on: - Investigate solid fuel ramjet technology applications to missiles and projectiles for increased range, speed and maneuverability - Leverage ongoing collaborative weapons technologies for application to additional munitions and weapons - Leverage ongoing reactive materials initiatives for application to additional munitions and weapons.	22.544	30.094	30.731	0.000	30.731

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
- Leverage ongoing studies on high-speed sensor, discrimination/identification algorithm technologies for use in hypersonic speed regime. - Evaluation of manned-unmanned teaming technology in modeling and simulation environment, with expansion to hardware-in-the-loop testing. Continues efforts on: - Developing, designing and testing solid state, High-Power Microwave (HPM) systems for enhanced lethality - Development of advanced technologies leading to kinetic-kill defenses against adversary hypersonic weapons - Development of a pulsed laser to defeat advanced threats. Complete efforts on: - The investigation of advanced air-to-surface/ground seeker technologies; - Advanced technologies for the development of Naval hypersonic weapons and improved high value, low density aircraft self-defense against next generation air-to-air threats. ***FY 2022 Base Plans:*** Initiate efforts in: - Developing novel energy/power generation, management and storage technologies applicable to advanced future missile capabilities and requirements. - Investigating novel concepts for solid rocket motor initiation, safety and thrust profile management. - Investigating advanced material and structural capabilities in aerodynamics for high-speed/hypersonic weapons. Continue efforts in: - Mature key solid fuel ramjet technologies identified in FY21 to increasing range, speed and maneuverability for missiles and projectiles. - Leverage ongoing collaborative weapons technologies for application to additional munitions and weapons - Leveraging ongoing reactive materials initiatives for application to additional munitions and weapons. - The investigation of advanced air-to-surface/ground seeker technologies, focusing largely on efficacy in a hypersonic regime. - Investigating and maturing system of systems concepts and associated technologies necessary to fully implement manned-unmanned teaming operations.					

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Complete efforts in: - Maturing technologies leading to development of kinetic kill and/or directed energy for self-defense of high value, low density aircraft against next generation air-to-air threats. Includes solid state, High-Power Microwave (HPM) systems and kinetic-kill defenses against adversary hypersonic weapons research. Initiate/Complete efforts in: - Maturation of mission planning software that is able to aggregate, manage and optimize all data input for maximum effectiveness of Naval strike operations. ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** There is no significant change between FY 2021 and FY 2022.					
Accomplishments/Planned Programs Subtotals	143.189	162.681	173.356	0.000	173.356

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy			Date: May 2021
Appropriation/Budget Activity 1319 / 2	R-1 Program Element (Number/Name) PE 0602750N / *Future Naval Capabilities Applied Research*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
9999: *Congressional Adds*	0.000	3.861	8.000	0.000	-	0.000	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Congressional Interest Items not included in other Projects.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021
Congressional Add: C4ISR and special projects ***FY 2020 Accomplishments:*** N/A ***FY 2021 Plans:*** N/A	3.861	0.000
Congressional Add: Cooperative Engagement Capability Mission Based Networking for Data Distribution ***FY 2020 Accomplishments:*** N/A ***FY 2021 Plans:*** Conduct applied research for CEC mission based networking for data distribution systems.	0.000	3.000
Congressional Add: Improved Detection of Submarine Threats ***FY 2020 Accomplishments:*** N/A ***FY 2021 Plans:*** Conduct applied research for improved detection of submarine threats.	0.000	5.000
Congressional Adds Subtotals	3.861	8.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A