Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Navy											Date: February 2020	
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 2019**	**FY 2020**	**FY 2021 Base**	**FY 2021 OCO**	**FY 2021 Total**	**FY 2022**	**FY 2023**	**FY 2024**	**FY 2025**	**Cost To Complete**	**Total Cost**
Total Program Element	0.000	135.523	152.012	167.590	-	167.590	180.900	184.622	188.333	192.100	Continuing	Continuing
0000: *Future Naval Capabilities Applied Research*	0.000	135.523	148.012	167.590	-	167.590	180.900	184.622	188.333	192.100	Continuing	Continuing
9999: *Congressional Adds*	0.000	0.000	4.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.000

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. Specifically, this PE develops component technologies in the Future Naval Capabilities (FNC) Program primarily to address cost, schedule and performance challenges in acquisition programs, accelerating delivery. The term Technology Candidate refers to component applied research efforts, which contingent on success, will continue development as FNCs in PE 0603673N Advanced Technology Development. Efforts in this PE are coordinated with related work in the USMC Technology Candidates Activity of PE 0602131M Marine Corp 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.

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Navy	Date: February 2020
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*

B. Program Change Summary ($ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	137.701	154.755	167.590	-	167.590
Current President's Budget	135.523	152.012	167.590	-	167.590
Total Adjustments	-2.178	-2.743	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-6.743			
• Congressional Rescissions	-	-			
• Congressional Adds	-	4.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-2.178	0.000			
• Rate/Misc Adjustments	0.000	0.000	0.000	-	0.000

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2019	FY 2020
Project: 9999: *Congressional Adds*		
Congressional Add: *C4ISR and special projects*	0.000	4.000
Congressional Add Subtotals for Project: 9999	0.000	4.000
Congressional Add Totals for all Projects	0.000	4.000

Change Summary Explanation

Funding: No significant change.

Technical: Not applicable.

Schedule: Not applicable.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy			Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
0000: *Future Naval Capabilities Applied Research*	0.000	135.523	148.012	167.590	-	167.590	180.900	184.622	188.333	192.100	Continuing	Continuing

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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Expeditionary Maneuver Warfare (EMW) and Combating Terrorism	6.639	11.723	14.613	0.000	14.613
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 2020 Plans:*** Future Naval Capabilities (FNC) Technology Candidate development in FY 2020 will continue to focus on the technologies noted in the FY 2019 plans. Investments include technologies that: improve warfighter effectiveness in command, control, computers and communication for small unit naval expeditionary warfighters; enhance fires capabilities so warfighters employed in small, distributed units will have the tools they need to locate and decisively destroy larger enemy forces; improve force protection for small units and individual warfighters against a myriad of enemy attack modes; improve human performance by developing new training technologies, knowledge products, architectures, and systems that can accelerate mental, emotional and cognitive decision-making skill; mature emerging technologies for future intelligence, surveillance and reconnaissance systems; develop and mature new maintenance technologies for expeditionary combat systems; develop new expeditionary energy technologies that support distributed operations from the individual Marine to small units; develop 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					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
inland objectives; and mature new technologies that will improve the standoff detection and neutralization of improvised explosive devices. ***FY 2021 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 - 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. 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 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** The FY 2020 to FY 2021 increase is due to increased investment in the areas of expeditionary logistics, training to improve human performance and decision making, and mine countermeasures.					
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, and cruise missile defense weapons to a point where they can be proposed and continued as Future Naval	64.908	55.720	56.429	0.000	56.429

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Capabilities (FNC) in program element (PE) 0603673N, Future Naval Capabilities Advanced Technology Development. ***FY 2020 Plans:*** Future Naval Capabilities (FNC) Technology Candidate development in FY 2020 will continue to focus on technologies noted in the FY 2019 plans. Investments include technologies that: advance techniques and algorithms for information processing and integration, information operations, information assurance, cyber protection, communications and networking, computational decision-making, accurate decision making, and command and control technologies with a specific focus on enabling rapid; exploit advancements in electronics, sensors and network technologies enabling new and innovative uses of the electromagnetic spectrum in areas of surface and aerospace surveillance, communications, electronic combat, and precision time and navigation; improve adaptive persistent surveillance capabilities; develop new digital radio frequency technologies supporting active aperture, phased arrays capable of performing multiple functions simultaneously; improve soft-kill performance and real-time assessment, as well as provide multiple means to detect and measure incoming threats. FY20 investments focuses on the following areas: communications and networking; decision tools; cyber; sensor deception and defeat; advanced sensing, counter ISR and processing; cross platform technologies; and advanced systems and components. The objectives of communications and networking include maturing promising communications and networking technologies and enable rapid transition to the fleet. The objectives of sensor deception and defeat include maturing the underlying technologies, techniques and algorithms that degrade, neutralize, or destroy an adversary's combat 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 resilience, safety, reliability, and efficiency of cyber systems in warfighting platforms. The objectives of advanced sensing and processing thrust is to 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					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
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. ***FY 2021 Base 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 2021 Navy		Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 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 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** The FY20 to FY21 increase is due to initiation 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.					
Title: Ocean Battlespace Sensing	20.399	24.476	24.299	0.000	24.299
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. ***FY 2020 Plans:*** Future Naval Capabilities (FNC) Technology Candidate development in FY 2020 will continue technologies noted previously in the FY 2019 plans with a primary focus on improving the ability to exploit environmental sensing, modeling and prediction to enable more effective anti-submarine warfare (ASW) and mine warfare (MIW) applications. ***FY 2021 Base Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
- 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 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** There is no significant change between FY 2020 and FY 2021.					
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 2020 Plans:*** The focus in FY 2020 will be on maturing technologies for future FNCs (Future Naval Capabilities) involving off-board refueling and data transfer, autonomous situational awareness, hazard avoidance, and high temperature superconducting magnetic influence sweep payloads for unmanned surface vehicles; advanced batteries to increase torpedo range and endurance; robust power control for integrated surface ship power and combat systems; precision lift in austere at-sea environments for surface ship replenishment and weapons reload; digital tools to automate operation and control of unmanned platforms integrated with manned platforms in mission environments; and in situ repair of shipboard copper-nickel heat exchanger tubing. Additionally, applied	16.738	20.921	27.565	0.000	27.565

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
research will begin on emerging technologies in the areas of autonomy, digital analytics for platforms and logistics, platform maintenance and sustainability, undersea weapons, advanced manufacturing, and energy systems.					
FY 2021 Base Plans: Initiate efforts in: - Addressing platform endurance 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. - "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 2021 OCO Plans: N/A					
FY 2020 to FY 2021 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
The FY 2020 to FY 2021 increase is due to initiation of efforts in addressing platform endurance and resiliency; naval force sustainment; and logistics. These efforts include signature management, undersea weapons improvements, digital twin development and ship hull-based coatings.					
Title: Warfighter Performance	8.115	10.150	14.590	0.000	14.590
Description: The objective of this activity is to develop 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 2020 Plans:*** Technologies developed under this activity enhance Naval operators use of: Autonomy, Artificial Intelligence, and Robotics (AAR), including cross-domain facilitated communication between operators and unmanned vehicles; Communications and Networking/Cyber (CN/C) technologies such as expeditionary command, control, communications, intelligence, surveillance, and reconnaissance (C4ISR); Advanced Analytics and Decision Making (AADM) capabilities including Naval training tools and decision-assist technologies for denied and degraded environments; Manpower, Performance, Protection, and Medical support (MPPM) capabilities such as directed energy bioeffects, monitoring performance in austere environments, and predictors of blast injury. ***FY 2021 Base 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:					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
- 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 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 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** The FY 2020 to FY 2021 increase is due to increased investment in autonomous vehicle control improvement, innovative social media applications and biotechnology development for alternative material resources.					
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 2020 Plans:*** The focus of FY2020 will be on maturing technologies for future FNCs that will improve kinetic and non-kinetic capabilities of existing and future naval weapon systems, as well as introduce technological advancements into core Naval operations. Technology investments will be made to introduce artificial intelligence and machine learning into mission planning, make generational enhancements to rocket motor propulsion, investigate sub-system advancement for hypersonic weapons, mature directed energy applications for defense, expand aircraft and ship self-defense capabilities, create alternate aircraft repair methodologies, and improve aircraft-ship interoperability. ***FY 2021 Base Plans:*** Initiate efforts on: - Investigate solid fuel ramjet technology applications to missiles and projectiles for increased range, speed and maneuverability	18.724	25.022	30.094	0.000	30.094

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
- Leverage ongoing collaborative weapons technologies for application to additional munitions and weapons - Leverage ongoing reactive materials initiatives for application to additional munitions and weapons. 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 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** The FY 2020 to FY 2021 increase is due to increased investments for investigations in semi-autonomous collaborative weapons technologies, greatly expanded reactive materials application to warheads, and non-traditional rocket motor technologies.					
Accomplishments/Planned Programs Subtotals	135.523	148.012	167.590	0.000	167.590

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

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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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
9999: *Congressional Adds*	0.000	0.000	4.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.000

A. Mission Description and Budget Item Justification

Congressional Interest Items not included in other Projects.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020
Congressional Add: C4ISR and special projects	0.000	4.000
FY 2019 Accomplishments: N/A		
FY 2020 Plans: Conduct applied research in C4ISR and special projects		
Congressional Adds Subtotals	0.000	4.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A