Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Navy											Date: April 2022	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603801N *I Innovative Naval Prototypes (INP) Adv Tec Dev*							
COST ($ in Millions)	**Prior Years**	**FY 2021**	**FY 2022**	**FY 2023 Base**	**FY 2023 OCO**	**FY 2023 Total**	**FY 2024**	**FY 2025**	**FY 2026**	**FY 2027**	**Cost To Complete**	**Total Cost**
Total Program Element	0.000	154.712	161.444	144.122	-	144.122	125.431	127.939	130.496	133.105	Continuing	Continuing
2481: *EMRG*	0.000	8.953	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	8.953
2731: *High Energy Laser Counter ASCM Project (HELCAP)*	0.000	27.799	13.960	22.460	-	22.460	0.000	0.000	0.000	0.000	0.000	64.219
2958: *Cyberspace Activities*	0.000	15.537	15.893	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	31.430
3400: *Innovative Naval Prototypes (INP) Adv Tech Dev*	0.000	0.000	0.000	11.800	-	11.800	9.000	24.694	56.796	85.664	Continuing	Continuing
3416: *HIJENKS*	0.000	13.630	7.621	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	21.251
3423: *LOCUST*	0.000	12.184	3.373	6.000	-	6.000	0.000	0.000	0.000	0.000	0.000	21.557
3450: *AMOS*	0.000	4.264	3.457	4.480	-	4.480	0.000	0.000	0.000	0.000	0.000	12.201
3451: *CLAWS*	0.000	14.390	14.285	7.812	-	7.812	0.000	0.000	0.000	0.000	0.000	36.487
3452: *ELEKTRA*	0.000	10.242	12.876	9.847	-	9.847	4.924	5.022	0.000	0.000	0.000	42.911
3454: *MDUSV*	0.000	2.514	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.514
3455: *MINERVA*	0.000	10.307	12.876	11.816	-	11.816	6.894	7.031	0.000	0.000	0.000	48.924
3456: *Full Spectrum Undersea Warfare*	0.000	0.000	0.000	8.910	-	8.910	9.900	9.900	9.900	10.098	Continuing	Continuing
3457: *Long Range Targeting*	0.000	7.425	15.941	24.750	-	24.750	44.400	29.300	22.500	0.000	0.000	144.316
3458: *Undersea Warfare Efforts*	0.000	2.356	6.967	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	9.323
3459: *Super Swarm (SS)*	0.000	5.804	9.957	14.850	-	14.850	19.800	19.800	0.000	0.000	0.000	70.211
3461: *MASS*	0.000	0.000	0.988	3.960	-	3.960	4.950	4.950	0.000	0.000	0.000	14.848
3462: *DEALRS*	0.000	0.000	0.987	4.950	-	4.950	5.940	5.940	7.920	8.078	Continuing	Continuing
3463: *MATes*	0.000	0.000	0.987	3.960	-	3.960	4.950	4.950	13.860	14.137	Continuing	Continuing
3464: *REDCAT*	0.000	0.000	3.976	8.000	-	8.000	6.000	6.000	0.000	0.000	0.000	23.976
5899: *Precision Fire Control*	0.000	0.000	0.000	0.527	-	0.527	8.673	10.352	19.520	15.128	Continuing	Continuing
9999: *Congressional Adds*	0.000	19.307	37.300	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	56.607

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Navy	Date: April 2022
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603801N *I Innovative Naval Prototypes (INP) Adv Tec Dev*

A. Mission Description and Budget Item Justification

The Office of Naval Research (ONR) portfolio includes efforts that solve problems and respond to mission requirements, as well as, exploratory research for new ideas and breakthrough capabilities. Larger in scope, scale and risk Innovative Naval Prototypes (INP) are selected for their high-payoff and potential to revolutionize operational concepts. The efforts described in this Program Element (PE) continue the Applied Research work in PE 0602792N for promising INPs with Advanced Technology Development activities. INP investments define the future of U.S. naval forces. Due to high technical risk, INPs often have long trial-and-error timeframes to work through challenges, but typically no more than three years between decision points. INP efforts mature technologies from a Technology Readiness Level (TRL) of 2 or 3 to a TRL of 6. As such, INPs require applied and advanced technology development funding to bridge from concept to working prototype. INPs prove technological and capability potential, validate production feasibility, and acquisition potential. ONR demonstrates INPs in relevant environments. Successful experimentation and demonstrations present the Department of the Navy with disruptive capabilities that may lead to a new acquisition programs. INPs are selected by senior leadership in the Department of the Navy.

This Program Element (PE) funds Advanced Technology Development (ATD) that includes development of subsystems and components and efforts to integrate subsystems and components into system prototypes for field experiments and/or tests in a simulated environment. Efforts in this PE generally have Technology Readiness Levels TRL) of 4 (component and/or breadboard validation in laboratory environment.), 5 (component and/or breadboard validation in relevant environment.), or 6 (system/subsystem model or prototype demonstration in a relevant environment).

INP investments represent game changing technologies with the potential to revolutionize operational concepts. They are disruptive in nature, as they would dramatically change the way naval forces fight. Due to high technical risk, INPs typically have long duration but have no more than three years between decision points. INPs do not develop hardware for service use, rather they prove technological and production feasibility, and show naval utility and acquisition potential. The Office of Naval Research (ONR) demonstrates INPs in relevant environments. Successful experimentation and demonstrations present the Department of the Navy with disruptive capabilities that may lead to the obsolescence of existing capabilities and acquisition programs. The Department of the Navy would have to make significant acquisition decisions to integrate the new technological capabilities into naval warfighting systems. INPs are selected by a process that involves senior leadership in the Department of the Navy.

Information security concerns preclude fully detailed descriptions of project efforts, research activities, and technology development plans. Specific information on each project and activity will be provided separately to the Congressional oversight committees.

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Navy	Date: April 2022
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603801N *I Innovative Naval Prototypes (INP) Adv Tec Dev*

B. Program Change Summary ($ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	159.338	133.779	0.000	-	0.000
Current President's Budget	154.712	161.444	144.122	-	144.122
Total Adjustments	-4.626	27.665	144.122	-	144.122
• Congressional General Reductions	-	-0.169			
• Congressional Directed Reductions	-	-9.466			
• Congressional Rescissions	-	-			
• Congressional Adds	-	37.300			
• Congressional Directed Transfers	-	-			
• Reprogrammings	1.847	0.000			
• SBIR/STTR Transfer	-6.471	0.000			
• Program Adjustments	0.000	0.000	0.000	-	0.000
• Rate/Misc Adjustments	-0.002	0.000	0.000	-	0.000
• Adjustments to Budget Year	-	-	144.122	-	144.122

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2021	FY 2022
Project: 9999: *Congressional Adds*		
Congressional Add: *Electromagnetic Railgun*	19.307	0.000
Congressional Add: *High speed laser cooling systems*	0.000	6.000
Congressional Add: *Advanced ATRT SBIR enterprise capabilities*	0.000	16.300
Congressional Add: *Energetics renaissance*	0.000	10.000
Congressional Add: *Group 3 advanced autonomous*	0.000	5.000
Congressional Add Subtotals for Project: 9999	19.307	37.300
Congressional Add Totals for all Projects	19.307	37.300

Change Summary Explanation

Funding: not applicable.

Schedule: not applicable.

Technical: not applicable

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Navy	Date: April 2022
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603801N *I Innovative Naval Prototypes (INP) Adv Tec Dev*

FY 2023 funding increase reflects the fact that the FY 2022 President's Budget request did not include out-year funding.

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy			Date: April 2022
Appropriation/Budget Activity 1319 / 3	R-1 Program Element (Number/Name) PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	Project (Number/Name) 2481 / *EMRG*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
2481: *EMRG*	0.000	8.953	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	8.953
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Electro-Magnetic Railgun (EMRG) is a high-power, kinetic energy weapon capable of launching precision guided projectiles using electricity instead of chemical propellants. This multi-year effort will build a Railgun Weapon System (RGWS) by designing, fabricating and integrating EMRG subsystems and components into a weapon system that brings new capabilities, increased capacity and improved operational economy to fleet operations at sea. With its increased velocity and extended range, EMRG provides multi-mission potential for hypersonic missile defense, anti-air & surface warfare, and naval surface fire support. The Activity identified in Project Unit 2481 specifically addresses Advanced Technology Development in support of the EMRG high-power, kinetic energy weapon prototype development Innovative Naval Prototype (INP) effort.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: Electro-Magnetic Railgun (EMRG)	8.953	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: The Electro-Magnetic Railgun (EMRG) is a high-power, kinetic energy weapon capable of launching precision guided projectiles using electricity instead of chemical propellants. This multi-year effort will build a Railgun Weapon System (RGWS) by designing, fabricating and integrating EMRG subsystems and components into a weapon system that brings new capabilities, increased capacity and improved operational economy to fleet operations at sea. With its increased velocity and extended range, EMRG provides multi-mission potential for hypersonic missile defense, anti-air & surface warfare, and naval surface fire support.					
FY 2022 Plans: N/A					
FY 2023 Base Plans: N/A					
FY 2023 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	8.953	0.000	0.000	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	**Project (Number/Name)** 2481 / *EMRG*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy			Date: April 2022
Appropriation/Budget Activity 1319 / 3	R-1 Program Element (Number/Name) PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	Project (Number/Name) 2731 / *High Energy Laser Counter ASCM Project (HELCAP)*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
2731: *High Energy Laser Counter ASCM Project (HELCAP)*	0.000	27.799	13.960	22.460	-	22.460	0.000	0.000	0.000	0.000	0.000	64.219
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The High Energy Laser Counter ASCM Project (HELCAP) will expedite the development, experimentation, integration and demonstration of critical technologies to defeat crossing Anti-Ship Cruise Missiles (ASCM) by addressing the remaining technical challenges, e.g.: atmospheric turbulence, automatic target identification and aim point selection, precision target tracking with low jitter in high clutter conditions, advanced beam control, and higher power HEL development.
HELCAP will assess, develop, experiment, and demonstrate the various laser weapon system technologies and methods of implementation required to defeat ASCMs in a crossing engagement.

HELCAP activities in this project (0603801N) include technology assessments, laser lethality investigations, and advanced beam control. Component and Subsystem level operability is being conducted under this project specifically the Beam Control subsystem including active tracking and advanced atmospheric compensation using Adaptive Optics. The Beam Director subsystem testing will occur in a simulated environment (land based) against surrogate ASCM targets. Other subsystems being developed and tested under this project include the automated engagement sequencing, HEL targets and diagnostics subsystems, and an HEL interface compatible with a range of competing HEL source technologies. This project passes technology to follow on HELCAP activities under Program Element (PE) 0603925N Directed Energy and Electric Weapon Systems.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: HELCAP	27.799	13.960	22.460	0.000	22.460
Articles:	-	-	-	-	-
Description: The High Energy Laser Counter ASCM Project (HELCAP) expedites the development, experimentation, integration and demonstration of critical technologies to defeat crossing Anti-Ship Cruise Missiles (ASCM) by addressing the remaining technical challenges, e.g.: atmospheric turbulence, automatic target identification and aim point selection, precision target tracking with low jitter in high clutter conditions, advanced beam control, and higher power HEL development. HELCAP will assess, develop, experiment, and demonstrate various laser weapon system technologies and methods of implementation required to defeat ASCMs in a crossing engagement.					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	**Project (Number/Name)** 2731 / *High Energy Laser Counter ASCM Project (HELCAP)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
HELCAP activities conducted in this project (0603801N) include technology assessments, laser lethality investigations, and advanced beam control. Component and Subsystem level operability is being conducted under this project specifically the Beam Control subsystem including active tracking and advanced atmospheric compensation using Adaptive Optics. The Beam Director subsystem tested will occur in a simulated environment (land based) against surrogate ASCM targets. Other subsystems being developed and tested under this project include the automated engagement sequencing, HEL targets and diagnostics subsystems, and an HEL interface compatible with a range of competing HEL source technologies. This project passes technology to follow on HELCAP activities conducted under Program Element (PE) 0603925N Directed Energy and Electric Weapon Systems. ***FY 2022 Plans:*** Continue in the integration phase of an overall multi-year effort whose objective is to conduct development, experimentation, and demonstration of critical technologies to defeat crossing Anti-Ship Cruise Missiles (ASCM) including laser lethality, advanced beam control, and high energy laser sources. Continue ASCM defeat analysis and assessments including lethality, engagement modeling, atmospheric propagation characterization, and beam control. Continue to design and develop critical beam control testbed technology. Continue laser/materiel component interaction testing and support beam control tracker and adaptive optics verification experimentation. ***FY 2023 Base Plans:*** Continue: - Integration phase of an overall multi-year effort whose objective is to conduct development, experimentation, and demonstration of critical technologies to defeat crossing Anti-Ship Cruise Missiles (ASCM) including laser lethality, advanced beam control, and high energy laser sources. Continue: - Integration phase of an overall multi-year effort whose objective is to conduct development, experimentation, and demonstration of critical technologies to defeat crossing Anti-Ship Cruise Missiles (ASCM) including laser lethality, advanced beam control, and high energy laser sources. Complete:					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	**Project (Number/Name)** 2731 / *High Energy Laser Counter ASCM Project (HELCAP)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
- Laser/materiel component interaction testing and support beam control tracker and adaptive optics verification experimentation. - ASCM defeat analysis and assessments including lethality, engagement modeling, atmospheric propagation characterization, and beam control. Continue: - High Power System Integration and Anti-Ship Cruise Missile Detect to Defeat Demonstration preparations - High power system integration demonstration (Demo 2) at White Sands Missile Range (WSMR). Demo 2 serves to prove the technological feasibility and assessments of subsystem and component operability in a simulated land-based environment. Demo 2 will demonstrate subsystem operability to receive and process target tracking, adherence to range safety protocols and user control, and demonstrate laser deconfliction against space assets in user-defined regions. Testing planned includes static and dynamic ground and air-based targets. ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** The FY22 to FY23 increase in funding is due to planned HELCAP high power system integration and maritime ASCM detect to defeat demonstrations to include surrogate subsonic ASCM targets engaged over land as well as simulated open ocean environments.					
Accomplishments/Planned Programs Subtotals	27.799	13.960	22.460	0.000	22.460

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
• RDTEN/ 0603925N/2731: *High Energy Laser Counter ASCM Project*	29.847	25.964	6.598	-	6.598	6.853	3.611	3.647	3.270	Continuing	Continuing

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy			Date: April 2022
Appropriation/Budget Activity 1319 / 3	R-1 Program Element (Number/Name) PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	Project (Number/Name) 2958 / *Cyberspace Activities*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
2958: *Cyberspace Activities*	0.000	15.537	15.893	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	31.430
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project contains all Advanced Technology Development Innovative Naval Prototype (INP) investments that are developing new technologies for cyber warfare. Potential adversaries are investing in advanced technologies that will challenge our advantages in the critical information domain. Nation states and non-state actors seek to degrade our command and control capabilities, networks and computer systems. Cyber threats continue to grow and rapidly proliferate. Technologies developed in this Project will enable the warfighter to take immediate, appropriate action at any time against any desired adversary, target or network by assuring that autonomous, continuous analyses of intelligence, persistent surveillance and open information sources have, at all times, optimized the possible courses of action based on commander's guidance. Technologies within this activity will foster operational endurance and enable sustained operations and resiliency for warfighters and platforms through enhanced cyber security/protection.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: Cyber	15.537	15.893	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: This R2 Activity contains all Advanced Technology Development Innovative Naval Prototype (INP) investments that are developing new technologies for cyber warfare. Potential adversaries are investing in advanced technologies that will challenge our advantages in the critical information domain. Nation states and non-state actors seek to degrade our command and control capabilities, networks and computer systems. Cyber threats continue to grow and rapidly proliferate. Technologies developed in this R2 Activity will enable the warfighter to take immediate, appropriate action at any time against any desired adversary, target or network by assuring that autonomous, continuous analyses of intelligence, persistent surveillance and open information sources have, at all times, optimized the possible courses of action based on commander's guidance. Technologies within this activity will foster operational endurance and enable sustained operations and resiliency for warfighters and platforms through enhanced cyber security/protection.					
FY 2022 Plans: - Complete Advanced Technology Development of tools and techniques that enable compelling new cyber capabilities for automated, systematic reduction and dynamic reshaping of any computing system's attack surface. Continue conducting rapid demonstrations of the technologies in multiple Naval combat and C4I					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	**Project (Number/Name)** 2958 / *Cyberspace Activities*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
systems to evaluate tool efficacy, study system integration and workflow techniques, and to demonstrate inventive new capabilities for acquisition programs. - Complete advanced capability analysis of software debloat projects for Java, compiled C/C++, and low-level system firmware. This task is necessary to study system integration techniques for the tooling and to demonstrate capabilities for acquisition programs. - Complete development of communications protocol subsetting and automated dialect generation to reshape cyber attack surface. - Complete development of non-destructive microelectronics inspection methods that would provide a critical new capability for scalable cyber supply chain protection.stem integration and workflow techniques, and to demonstrate inventive new capabilities for acquisition programs. ***FY 2023 Base Plans:*** N/A ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** The decrease in funding is due to program completion.					
Accomplishments/Planned Programs Subtotals	15.537	15.893	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
• RDTEN/0602792N/2958: *CYBERSPACE ACTIVITIES*	26.867	25.988	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	52.855

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy			Date: April 2022
Appropriation/Budget Activity 1319 / 3	R-1 Program Element (Number/Name) PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	Project (Number/Name) 3400 / *Innovative Naval Prototypes (INP) Adv Tech Dev*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
3400: *Innovative Naval Prototypes (INP) Adv Tech Dev*	0.000	0.000	0.000	11.800	-	11.800	9.000	24.694	56.796	85.664	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The efforts described in this Project address the Advanced Technology Development associated with the Innovative Naval Prototypes (INP) Program. These investments represent game-changing technologies with the potential to revolutionize operational concepts. They are disruptive in nature, as they would dramatically change the way naval forces fight. Due to high technical risk, INPs typically have long duration but have no more than three years between decision points. They mature technologies from a Technology Readiness Level (TRL) of 2 or 3 to a TRL of 6. As such, INPs require both Budget Activity (BA) 2 and BA3 funding. The BA3 INP funds are specified in a separate Program Element (PE), 0603801N Innovative Naval Prototypes (INP) Adv Tec Dev. INPs do not develop hardware for service use; rather they provide feeder technology that can be demonstrated in prototypes in the 6.3 portion of the INP program. Developing INPs requires a systematic expansion and application of knowledge to develop useful materials, devices, and systems oriented toward the design and development of prototypes applicable to specific mission area requirements. The efforts funded within this PE is focuses on continuing the technology development from the BA2 efforts in order to develop full-scale technology/ operational demonstrations. The Department of the Navy would have to make significant acquisition decisions to integrate the new technological capabilities into naval warfighting systems. INPs are selected by a process that involves senior leadership in the Department of the Navy.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: Innovative Naval Prototypes (INP) Adv Tech Dev	0.000	0.000	11.800	0.000	11.800
Articles:	-	-	-	-	-
Description: The efforts described in this Project address the Advanced Technology Development associated with the Innovative Naval Prototypes (INP) Program. These investments represent game-changing technologies with the potential to revolutionize operational concepts. They are disruptive in nature, as they would dramatically change the way naval forces fight. Due to high technical risk, INPs typically have long duration but have no more than three years between decision points. They mature technologies from a Technology Readiness Level (TRL) of 2 or 3 to a TRL of 6. As such, INPs require both Budget Activity (BA) 2 and BA3 funding. The BA3 INP funds are specified in a separate Program Element (PE), 0603801N Innovative Naval Prototypes (INP) Adv Tec Dev. INPs do not develop hardware for service use; rather they provide feeder technology that can be demonstrated in prototypes in the 6.3 portion of the INP program. Developing INPs requires a systematic expansion and application of knowledge to develop useful materials, devices, and systems oriented toward the design and development of prototypes applicable to specific mission area requirements. The efforts funded within this PE is focuses on continuing the technology development from the BA2 efforts in order to develop full-scale technology/					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	**Project (Number/Name)** 3400 / *Innovative Naval Prototypes (INP) Adv Tech Dev*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
operational demonstrations. The Department of the Navy would have to make significant acquisition decisions to integrate the new technological capabilities into naval warfighting systems. INPs are selected by a process that involves senior leadership in the Department of the Navy. ***FY 2022 Plans:*** N/A ***FY 2023 Base Plans:*** Continue to explore promising advanced technology development efforts and identify the best candidates capable of resulting in full-scale technology/operational demonstrations which will inform future INP investment decisions in this activity. This includes identifying technologies that will provide scalable lethality through enabling multi-domain, integrated, scalable kinetic and non-kinetic systems for offensive of defensive purposes. ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** The increase in funding from FY 2022 to FY 2023 in Proj: 3400 INP Adv Tech Dev is to provide increased opportunities to identify promising advanced technology concepts for further development as INPs.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	11.800	0.000	11.800

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy			Date: April 2022
Appropriation/Budget Activity 1319 / 3	R-1 Program Element (Number/Name) PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	Project (Number/Name) 3416 / *HIJENKS*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
3416: *HIJENKS*	0.000	13.630	7.621	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	21.251
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The HIgh-power Joint Electromagnetic Non-Kinetic Strike (HIJENKS) INP effort is a non-kinetic High Power Microwave (HPM) payload integrated on an airborne platform will enable the prosecution of multiple targets with area coverage across each target and open targets previously restricted due to collateral damage. HIJENKS increases operational access by disrupting land-based infrastructure facilities tied to adversary systems, decreases cost exchange ratios through non-kinetic engagement, and addresses targets previously restricted due to collateral damage concerns/moral hardening. It expands the competitive space in the electromagnetic spectrum to disrupt, degrade, and destroy critical electronic targets. The Activity identified in Project Unit 3416 specifically addresses Advanced Technology Development in support of the HIJENKS INP effort.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: HIJENKS	13.630	7.621	0.000	0.000	0.000
Articles:	-	-	-	-	-

Description: The High Power Joint Electromagnetic Non-Kinetic Strike (HIJENKS) program is a proof-of-concept demonstration of a multi-target, advanced airborne High Power Microwave (HPM) payload capable of disrupting electronic targets non-kinetically. HIJENKS is capable of disrupting land-based electronic system infrastructure and engaging multiple targets with a single airborne weapon, increasing operational access/ decreasing cost exchange ratios, providing area lethality with increased pulse rate, providing options to address limitations on collateral damage, increasing standoff range and expanding magazine depth. HIJENKS will advance the current state-of-the-art in HPM technology and demonstrate the near-term operational benefits of integrating HPM-based Electronic Warfare/Electronic Attack (EW/EA) into the current force structure.

FY 2022 Plans:

- Complete effort to develop an integration-ready HPM payload and TDP to enable future platform integration. Continue development of HPM payload adaptable to multiple airborne systems, including system design studies and modeling of alternative HPM payload technologies. Develop and deliver two duplicate payload pods for use by both Navy and AF in static and emulated dynamic flight testing. Complete full payload system integration and multiple test events to demonstration functionality of first payload unit. Complete system level test with builds of additional payload units. Complete environmental testing, shock and vibration testing, Electromagnetic Interference (EMI), and Weapon Effectiveness testing. Validate payload performance requirements including

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	**Project (Number/Name)** 3416 / *HIJENKS*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Effective Radiated Power (ERP), number of pulses-per-engagement, number of engagements, and Electronic Damage Battle Indication (EDBI). Complete static demonstration of the world's most advanced HPM payload - highest power level achieved for aperture size and system volume. ***FY 2023 Base Plans:*** N/A ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** The decrease in funding is due to program completion.					
Accomplishments/Planned Programs Subtotals	13.630	7.621	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
• RDTEN/0602792N/3416: *HIJENKS*	21.033	9.916	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	30.949

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy			Date: April 2022
Appropriation/Budget Activity 1319 / 3	R-1 Program Element (Number/Name) PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	Project (Number/Name) 3423 / *LOCUST*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
3423: *LOCUST*	0.000	12.184	3.373	6.000	-	6.000	0.000	0.000	0.000	0.000	0.000	21.557
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Adversary military modernization and increasing contested domains require a shift in approach "...to strike diverse targets inside adversary air and missile defense networks to destroy mobile power-projection platforms. This will include capabilities to enhance close combat lethality in complex terrain." LOCUST will develop and deliver autonomy, C2 architecture, and a series of modular payloads on a robust, scalable, flexible, multifunctional UAV system; employable from surface, sub-surface, airborne, and ground manned and un-manned systems to provide a dispersed, resilient, and adaptive capability to gain a competitive military advantage. LOCUST will provide ISR and precision loitering munitions capable of being launched from air, surface, ground, and sub-surface platforms to conduct both singular and swarm operations across battlespace in conjunction with Joint and manned operations. It will demonstrate multi-domain launch and strike operations, heterogeneous air platform payloads, unmanned from unmanned operations, distributed control of the strike mission, and refined cost elements for critical technologies that have supply chain assurance addressed. The Activity identified in Project Unit 3423 specifically addresses Advanced Technology Development in support of the LOCUST INP effort.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: LOCUST	12.184	3.373	6.000	0.000	6.000
Articles:	-	-	-	-	-
Description: Adversary military modernization and increasing contested domains require a shift in approach "...to strike diverse targets inside adversary air and missile defense networks to destroy mobile power-projection platforms. This will include capabilities to enhance close combat lethality in complex terrain." LOCUST will develop and deliver autonomy, C2 architecture, and a series of modular payloads on a robust, scalable, flexible, multifunctional UAV system; employable from surface, sub-surface, airborne, and ground manned and un-manned systems to provide a dispersed, resilient, and adaptive capability to gain a competitive military advantage. LOCUST will provide ISR and precision loitering munitions capable of being launched from air, surface, ground, and sub-surface platforms to conduct both singular and swarm operations across battlespace in conjunction with Joint and manned operations. It will demonstrate multi-domain launch and strike operations, heterogeneous air platform payloads, unmanned from unmanned operations, distributed control of the strike mission, and refined cost elements for critical technologies that have supply chain assurance addressed.					
FY 2022 Plans: Complete advanced technology development efforts associated with development and flight testing of mission-oriented payloads in which cost, size, weight, and power reductions play a significant role in their utility will					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	**Project (Number/Name)** 3423 / *LOCUST*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
complete. The primary focus of the efforts will be on conducting field swarm demonstration in an operationally relevant environment. This activity represents a significant component needed for the air element under the associated Super Swarm multi-domain activity. ***FY 2023 Base Plans:*** Continue advanced technology development in support of the LOCUST INP. Specific efforts include the following: - Continue Advanced Technology Development activities to support participation live-fire Fleet experimentation venues. - Initiate payload development that is specific to a Fleet requested operational scenario. This payload is being adapted from applied research conducted under a non-LOCUST activity. The utilization of this technology in the LOCUST concept introduces additional technical risk that will be addressed. - Initiate platform design modifications to increase payload capacity, integrate mission specific payload, and conduct live flight testing. ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** The increase in funding from FY 2022 to FY 2023 in Proj: 3423 LOCUST is due to the need to address a critical technology element for a Fleet requested operational scenario.					
Accomplishments/Planned Programs Subtotals	12.184	3.373	6.000	0.000	6.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
• RDTEN/0602792N/3423: *LOCUST*	20.776	8.031	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	28.807
• RDTEN/0603382N/3423: *LOCUST*	2.123	3.371	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	10.257

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy			Date: April 2022
Appropriation/Budget Activity 1319 / 3	R-1 Program Element (Number/Name) PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	Project (Number/Name) 3450 / *AMOS*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
3450: *AMOS*	0.000	4.264	3.457	4.480	-	4.480	0.000	0.000	0.000	0.000	0.000	12.201
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Arctic Mobile Observing System (AMOS) INP effort will develop a prototype mobile sensing system that can be deployed anywhere in the Arctic via the development of a sea ice-based buoy node that will enable the critical infrastructure (power, communication, environmental intelligence) to provide the Navy with a persistent Arctic presence at lower cost than manned platforms. AMOS is a mobile observing system of systems node that enables 2-way communications, under-ice vehicle navigation, and extended-duration autonomy in the complex Arctic environment. AMOS will provide a persistent, mobile, autonomous capability to monitor the operational environment and maritime operations of potential adversaries in the Arctic Ocean. The Activity identified in Project Unit 3450 specifically addresses Advanced Technology Development in support of the AMOS INP effort.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: AMOS	4.264	3.457	4.480	0.000	4.480
Articles:	-	-	-	-	-
Description: The Arctic Mobile Observing System (AMOS) INP effort will develop a prototype mobile sensing system that can be deployed anywhere in the Arctic via the development of a sea ice-based buoy node that will enable the critical infrastructure (power, communication, environmental intelligence) to provide the Navy with a persistent Arctic presence at lower cost than manned platforms. AMOS is a mobile observing system of systems node that enables 2-way communications, under-ice vehicle navigation, and extended-duration autonomy in the complex Arctic environment. AMOS will provide a persistent, mobile, autonomous capability to monitor the operational environment and maritime operations of potential adversaries in the Arctic Ocean.					
FY 2022 Plans: Continue advanced technology development efforts associated with the following: - Constructing instrumented AMOS gliders and float prototypes for deployments - Constructing prototype nodes with meteorological sensors and command and for deployment in Arctic experiments. - Testing extended-duration of AMOS nodes and platforms through year-long Arctic deployments. - Demonstrating navigation and 2-way communications of AMOS platforms and vehicles					
FY 2023 Base Plans: Continue advanced technology development efforts:					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	**Project (Number/Name)** 3450 / *AMOS*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
- Demonstration of navigation and 2-way communications of AMOS platforms and vehicles. Complete All AMOS prototype system and subsystem builds in preparation for end of FY23 deployment. This includes: - Complete construction of all ice tethered buoys, navigation buoys, floats, gliders and UUVs that meet the AMOS prototype requirements and operational concept. - Complete construction of prototype AMOS communication node with final meteorological sensors. - Complete the situational awareness/command and control system to monitor prototype performance during final test and evaluation period. - Initiate final Arctic deployment of full AMOS prototype for test and evaluation ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** The increase in funding from FY22 to FY23 is to support logistic costs related to the final deployment of prototype observing system components for test and evaluation in the Arctic Ocean.					
Accomplishments/Planned Programs Subtotals	4.264	3.457	4.480	0.000	4.480

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
• RDTEN/0602792N/3450: *AMOS*	7.918	6.446	8.320	-	8.320	0.000	0.000	0.000	0.000	0.000	22.684

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy			Date: April 2022
Appropriation/Budget Activity 1319 / 3	R-1 Program Element (Number/Name) PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	Project (Number/Name) 3451 / *CLAWS*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
3451: *CLAWS*	0.000	14.390	14.285	7.812	-	7.812	0.000	0.000	0.000	0.000	0.000	36.487
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The CLAWS INP effort will develop an autonomous unmanned undersea weapon system capable of providing offensive effects to the Combatant Commanders beyond Phase 0 inside the first island chain. It will clandestinely extend the reach of large UUVs and increase the mission areas into kinetic effects. CLAWS will deliver algorithms to enable all families of UUVs to operate in complex, dynamic and degraded environments. CLAWS will demonstrate autonomous missions in denied waters, develop and demonstrate autonomous technologies for survivability of large UUVs, and develop autonomy and launch capabilities for special mission payloads. CLAWS will be able to complete missions 1&2 against near peer adversary defenses, maintain critical communication with Navy C2/Fires and provide critical ISR information. The Activity identified in Project Unit 3451 specifically addresses Advanced Technology Development in support of the CLAWS INP effort.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: CLAWS	14.390	14.285	7.812	0.000	7.812
Articles:	-	-	-	-	-
Description: The CLAWS INP effort will develop an autonomous unmanned undersea weapon system capable of providing offensive effects to the Combatant Commanders beyond Phase 0 inside the first island chain. It will clandestinely extend the reach of large UUVs and increase the mission areas into kinetic effects. CLAWS will deliver algorithms to enable all families of UUVs to operate in complex, dynamic and degraded environments. CLAWS will demonstrate autonomous missions in denied waters, develop and demonstrate autonomous technologies for survivability of large UUVs, and develop autonomy and launch capabilities for special mission payloads. CLAWS will be able to complete missions 1&2 against near peer adversary defenses, maintain critical communication with Navy C2/Fires and provide critical ISR information.					
FY 2022 Plans: Continue the advanced development of autonomy for classified payload 2. Develop adaptive mission planning for swarm of payload to create kinetic effects. Complete Advanced Technology Development effort in autonomy development for classified payload 1: - Conduct final demonstration with OSD Hydra JCTD - Develop and mature the autonomy for classified payload 1					
FY 2023 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	**Project (Number/Name)** 3451 / *CLAWS*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Continue: Continue the advanced development of autonomy for classified payload 2. Develop adaptive mission planning for swarm of payload to create kinetic effects. In FY 23, technical demostrations for Payload 2 will be completed before final demonstration. Complete: Final report and knowedge transfer of technology to navy acquisition ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** The decrease in funding from FY22 to FY23 is due to the completion of the Advanced Technology Development effort in autonomy development for classified payload 1.					
Accomplishments/Planned Programs Subtotals	14.390	14.285	7.812	0.000	7.812

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
• RDTEN/0602792N/3451: *CLAWS*	19.943	25.871	2.475	-	2.475	0.000	0.000	0.000	0.000	0.000	48.289

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy			Date: April 2022
Appropriation/Budget Activity 1319 / 3	R-1 Program Element (Number/Name) PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	Project (Number/Name) 3452 / *ELEKTRA*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
3452: *ELEKTRA*	0.000	10.242	12.876	9.847	-	9.847	4.924	5.022	0.000	0.000	0.000	42.911
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Complex multi-domain threats can overwhelm the operator and individual platforms ability to defend the force. The ELEKTRA INP effort is developing "Human on the Loop" Artificial Intelligence (AI) enabled algorithms to perform force level kinetic/non-kinetic kill chain optimization and coordination across multiple domains at machine to machine speeds to increase the lethality and survivability of the Force. ELEKTRA will demonstrate AI/ML ability to coordinate kinetic/non kinetic effects autonomously with heterogeneous platforms, the ability to operate in degraded environments for hours and the ability to coordinate and execute domain kill chains simultaneously. It will deploy artificial intelligent (AI) and machine learning (ML) architecture, neural networked computing and large data handling to enable real time, force level effects assignment, coordination and resource management. The Activity identified in Project Unit 3452 specifically addresses Advanced Technology Development in support of the ELEKTRA INP effort.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: ELEKTRA	10.242	12.876	9.847	0.000	9.847
Articles:	-	-	-	-	-
Description: Complex multi-domain threats can overwhelm the operator and individual platforms ability to defend the force. The ELEKTRA INP effort is developing "Human on the Loop" Artificial Intelligence (AI) enabled algorithms to perform force level kinetic/non-kinetic kill chain optimization and coordination across multiple domains at machine to machine speeds to increase the lethality and survivability of the Force. ELEKTRA will demonstrate AI/ML ability to coordinate kinetic/non kinetic effects autonomously with heterogeneous platforms, the ability to operate in degraded environments for hours and the ability to coordinate and execute domain kill chains simultaneously. It will deploy artificial intelligent (AI) and machine learning (ML) architecture, neural networked computing and large data handling to enable real time, force level effects assignment, coordination and resource management.					
FY 2022 Plans: Continuing efforts will focus on advanced technology development and experimentation. This experimentation will include incorporation of new analytics and decision support functionality, additional non-kinetic and kinetic kill chains, new functionality with airborne platforms, and experimentation with tactical systems on surface and airborne platforms during a large scale exercise.					
FY 2023 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	**Project (Number/Name)** 3452 / *ELEKTRA*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Continue: - Development and implementation of artificial intelligence/machine learning functionality for surface and air platforms to include commander's intent, threat evaluation, engage ability and effector management. - Implementation of distributed maritime operations warfare concepts, effects coordination techniques and human-machine teaming concepts. - Demonstrations of complex kinetic/non-kinetic kill chains and battle management functionality in a multi-platform live virtual construct/live experiment. Initiate: - Integration of feedback from FY22 experimentation and identify new analytics and decision support functionality based on results. - Development and demonstration of new human machine interface and effector coordination functionality into airborne platforms. ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** The decrease in funding from FY 2022 to FY 2023 is due to maturation and completion of advanced technology development efforts to include: completion of prototype modifications to a surface combat system to enable the use of Elektra functionality in live/live virtual construct environments; completion of a live virtual construct/test environment to allow for persistent testing of Elektra functionality; and completion of at-sea experimentation for evaluation of current functionality.					
Accomplishments/Planned Programs Subtotals	10.242	12.876	9.847	0.000	9.847

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
• RDTEN/0602792N/3452: *ELEKTRA*	5.686	3.967	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	9.653

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	**Project (Number/Name)** 3452 / *ELEKTRA*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy			Date: April 2022
Appropriation/Budget Activity 1319 / 3	R-1 Program Element (Number/Name) PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	Project (Number/Name) 3454 / *MDUSV*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
3454: *MDUSV*	0.000	2.514	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.514
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Medium Displacement Unmanned Surface Vehicle (MDUSV) Project will develop and test a 132 ft. unmanned surface vehicle with ocean-spanning range, months of endurance, good seakeeping, and substantial payload. The vessel will have a high level of autonomy for independent operations under sparse supervisory control and have utility for a variety of Navy missions. MDUSVs capable of deployed blue-water operations with operator trust in safe, reliable operation, long-range and endurance autonomous operations. This will create a new paradigm for Navy surface force, a hybrid manned/unmanned force, and enable new tactics in performing naval missions. The Activity identified in Project Unit 3454 specifically addresses Advanced Technology Development in support of the MDUSV INP effort.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: MDUSV	2.514	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: The Medium Displacement Unmanned Surface Vehicle (MDUSV) Project will develop and test a 132 ft. unmanned surface vehicle with ocean-spanning range, months of endurance, good seakeeping, and substantial payload. The vessel will have a high level of autonomy for independent operations under sparse supervisory control and have utility for a variety of Navy missions. MDUSVs capable of deployed blue-water operations with operator trust in safe, reliable operation, long-range and endurance autonomous operations. This will create a new paradigm for Navy surface force, a hybrid manned/unmanned force, and enable new tactics in performing naval missions.					
FY 2022 Plans: N/A					
FY 2023 Base Plans: N/A					
FY 2023 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	2.514	0.000	0.000	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	**Project (Number/Name)** 3454 / *MDUSV*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
• RDTEN/0602792N/3454: *MDUSV*	4.570	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.570

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy			Date: April 2022
Appropriation/Budget Activity 1319 / 3	R-1 Program Element (Number/Name) PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	Project (Number/Name) 3455 / *MINERVA*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
3455: *MINERVA*	0.000	10.307	12.876	11.816	-	11.816	6.894	7.031	0.000	0.000	0.000	48.924
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The need to operate in a multiple domain environment against highly capable peers requires improved decision quality and reduced decision timelines. MINERVA will develop AI and Machine-Learning (ML) capabilities to improve mission planning, intelligence gathering, execution and assessment. Minerva will deliver next-generation decision aids by combining operations research with emerging AI capabilities to create learning, self-adaptive automation that supports Composite Warfare Commander's (CWC) and their staffs at the Fleet, Force and Group echelons. It will establish a DevOps environment that includes warfighter staffs in the development and integration of new capabilities. The Activity identified in Project Unit 3455 specifically addresses Advanced Technology Development in support of the MINERVA INP effort.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: MINERVA	10.307	12.876	11.816	0.000	11.816
Articles:	-	-	-	-	-
Description: The need to operate in a multiple domain environment against highly capable peers requires improved decision quality and reduced decision timelines. MINERVA will develop AI and Machine-Learning (ML) capabilities to improve mission planning, intelligence gathering, execution and assessment. Minerva will deliver next-generation decision aids by combining operations research with emerging AI capabilities to create learning, self-adaptive automation that supports Composite Warfare Commander's (CWC) and their staffs at the Fleet, Force and Group echelons. It will establish a DevOps environment that includes warfighter staffs in the development and integration of new capabilities.					
FY 2022 Plans: Continue research on Artificial Intelligence and Machine Learning (AI/ML) methods to infer an enemy course of action and predict enemy locations. In addition, measure mission planning services, mission execution and adjustment services; and human acceptance of AI/ML decision aid services. Develop methods to test and validate AI/ML enabled decision aiding services. Specific FY22 focused development efforts include: negative search feedback to the Common Operational Picture; dynamic adaptive waterspace management; operational level of war planning that accounts for adversary constraints; maneuver planning capability combined with a weapon-sensor-effect-target assignment algorithms; machine learning algorithms to predict and make inferences about enemy intended actions; multi-domain battle management automation planner; demonstration of current					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	**Project (Number/Name)** 3455 / *MINERVA*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
and predicted evaluation of composability of operational systems and force packages; and continue to mature, test, and demonstrate best practices of artificial intelligence and machine learning methods to improve mission planning efficiency. ***FY 2023 Base Plans:*** Continue: - to develop models that exploit intelligence information and tactical contact reporting to generate probabilistic estimates of target location, intended mission, and projected future location even in face of large time gaps between contacts reports and high degrees of uncertainty over intended target mission. - to develop a multi-objective planner (time scale of days, not hours) that optimizes the limited number of Navy and Marine Corps platforms/assets based on an adversary's order of battle. - to develop a dynamic waterspace "area" planner that enables staff planners to evaluate developing plans across the seven joint operational functions (command and control, information, intelligence, fires, movement and maneuver, protection, and sustainment). - to develop advanced analytics and prototyping for operational level of war staff planners to optimize Navy and Marine - to develop mixed linear integer program model that assigns air, surface, and undersea effects to a grouping of moving defended targets that can shoot down incoming salvos that can't be targeted until, say, a sensor window on day three. - to develop reinforcement learning models that learn from in-situ and historical data in predicting the next location of the adversary platform location. - to develop a multi-objective multi-warfare domain planner for Future Operations (FOPS) planners to generate and share products used to convey operational and tactical plans. - to experiment and test in real world events and training exercises to improve Minerva's analytic tools. Measure effectiveness of mission planning services, mission execution and adjustment services; and human acceptance of artificial intelligence / machine learning decision aid services. Complete: - integration of unit readiness data into Minerva applications. Up-to-date readiness data combined with Minerva's planning analytic algorithms will help staff planners evaluate Risk to Force / Risk to Mission. - optimized negative search algorithm to aid Maritime Operations Center staff in understanding tradeoff between sensor placement and risk of missing threat.					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	**Project (Number/Name)** 3455 / *MINERVA*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
- automated analytics tool to monitor, ingest, parse, and exploit naval chat message traffic in real-time with little to no human intervention. The tool extracts and associates events with their arguments and locations from chat messages. The tool monitors chatrooms to answer questions of who/what/when/where from unstructured text (e.g., naval 9-line reports). Initiate: - mission planning tools for Maritime Operations Center (MOC) logistics planning. ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** The decrease in funding from FY2022 to FY2023 is due to automated analytics tools and sensor tradeoff algorithm development.					
Accomplishments/Planned Programs Subtotals	10.307	12.876	11.816	0.000	11.816

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
• RDTEN/0602792N/3455: *MINERVA*	5.710	3.966	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	9.676

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy			Date: April 2022
Appropriation/Budget Activity 1319 / 3	R-1 Program Element (Number/Name) PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	Project (Number/Name) 3456 / *Full Spectrum Undersea Warfare*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
3456: *Full Spectrum Undersea Warfare*	0.000	0.000	0.000	8.910	-	8.910	9.900	9.900	9.900	10.098	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Full Spectrum Undersea Warfare (FSUW) Project will develop new technology for offensive and defensive warfare conducted on the seabed, in the sea (i.e. subsea), and from the sea. This INP focuses on Theatre Undersea Warfare (TUSW), Joint Targeting and Strike, and Subsea and Seabed Warfare (SSW). There are five thrust areas of the FSUW INP that are key to enabling Chief of Naval Operations Guidance (CNOG), Distributed Maritime Operations (DMO), and the Commandant's Stand in Force with manned and unmanned warfighting capability. These thrust areas were specifically chosen in direct collaboration with STRATCOM, INDO-PACOM, Fleet and Undersea Warfare Commanders and validated with regular Flag engagements. These advanced technology developments will enable future undersea weapon systems (e.g., Maritime Strike Tomahawk and ADCAP variants), COCOM campaign, and operational plans. FSUW thrust areas include 1) Undersea effectors, 2) Integrated expeditionary subsea system of systems, 3) Multi-Vehicle Torpedo Tube Development System (MVTTDS) for payload A, 4) Undersea UAV for Over-The-Horizon (OTH) effects and 5) Undersea Launched Devices to enable Commanding Officers and Regional Combatant Commander effects. The thrust areas are technically an operational interconnected. Selected concepts from advanced research will be integrated into viable representative prototypes for field experimentation in a relevant environment. Lessons learned from field experimentation will inform continued applied research spirals to remedy technical shortcomings, expand capability, or define an alternate approach. The Activity identified in Full Spectrum Undersea Warfare, Project 3458, specifically addresses Advanced Technology Development in support of the Full Spectrum Undersea Warfare INP effort. The Applied Research Budget Activity (BA) 2 funding is in a separate Program Element (PE) 0602792N FSUW INP, Project 3456.

Information security concerns preclude fully detailed descriptions of project efforts, research activities, and technology development plans. Specific information on each project and activity will be provided separately to the Congressional oversight committees.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: Full Spectrum Undersea Warfare (FSUW)	0.000	0.000	8.910	0.000	8.910
Articles:	-	-	-	-	-
FY 2022 Plans: N/A					
FY 2023 Base Plans: Continue: Advanced Technology Development associated with the Multi-Vehicle Torpedo Tube Deployment System prototype for Virginia Class submarines including - Prototype construction					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	**Project (Number/Name)** 3456 / *Full Spectrum Undersea Warfare*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
- Full scale prototype testing - Reload scaled testing Complete: Design Multi-Vehicle Torpedo Tube Deployment System (MVTTDS) prototype for Virginia Class submarines. Initiate: - Reload viability and features of the MVTTDS (Reloader) - Joint undersea surveillance and targeting UUV sensors for autonomously conducting specific undersea tasks - Small autonomous undersea launched devices. ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** The increase in funding in Proj: 3456 FSUW is due to placing the Full Spectrum Undersea Warfare (FSUW) INP in a Project Number that complements its BA2 Project number like all other INPs. All funds from Project 3458 Undersea Warfare Efforts are now in this corrected Project, which is now properly named. Funding growth from FY 2022 to FY 2023 is due to the maturing of the Applied Research phase and the planned ramp-up in Advanced Technology Development which will focus on concept and technology demonstrations.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	8.910	0.000	8.910

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy			Date: April 2022
Appropriation/Budget Activity 1319 / 3	R-1 Program Element (Number/Name) PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	Project (Number/Name) 3457 / *Long Range Targeting*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
3457: *Long Range Targeting*	0.000	7.425	15.941	24.750	-	24.750	44.400	29.300	22.500	0.000	0.000	144.316
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Long Range Targeting emphasizes the specific naval use of HF Over the Horizon Radar (OTHR) on maritime platforms and forward-based positive identification technologies to fill gaps in long-range fires kill chains. Technologies within this activity will enable integrated long range naval fires. Investments include technologies for OTH radar antennas, HF antenna arrays, signal processing, and electronic surveillance. Activity identified in Project Unit 3457 specifically addresses Advanced Technology Development in support of the LRT INP effort.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: Long Range Targeting	7.425	15.941	24.750	0.000	24.750
Articles:	-	-	-	-	-
Description: Long Range Targeting emphasizes the specific naval use of HF Over the Horizon Radar (OTHR) on maritime platforms and forward-based positive identification technologies to fill gaps in long-range fires kill chains. Technologies within this activity will enable integrated long range naval fires. Investments include technologies for OTH radar antennas, HF antenna arrays, signal processing, and electronic surveillance. Activity identified in Project Unit 3457 specifically addresses Advanced Technology Development in support of the LRT INP effort.					
FY 2022 Plans: Continue to refine the Long Range Targeting framework/architecture. Continue development efforts to incorporate methods and develop technology for beyond-line-of-sight communications and exploit Over-the-Horizon (OTH) sensors, In-Scene aids, and sense making phenomenology to refine BLOS target detection, track and positive identification. Continue planning for test, integration, demonstration and experiment activities for Long Range Targeting. Begin development of technologies to integrate track data with other sources to feed Battle Management Command and Control (BMC2) kill chain algorithms with the objective of supporting live missions.					
FY 2023 Base Plans: - Continue development efforts to incorporate methods and develop technology to exploit Over-the-Horizon (OTH) sensors, In-Scene aids, and sense making phenomenology to refine BLOS target detection, track and positive identification.					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	**Project (Number/Name)** 3457 / *Long Range Targeting*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
- Continue planning for test, integration, demonstration and experiment activities for Long Range Targeting. - Continue development of technologies to integrate track data with other sources to feed Battle Management Command and Control (BMC2) kill chain algorithms with the objective of supporting live missions. Continue MOTHR software development; Analyze data from recent HF demonstrations. - Complete the refinement of LRT framework/architecture; Initial increment of MOTHR software; and Test planning for In-Scene Aids data collection #2. - Initiate At-sea HF phenomenology data collection. ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Increase in funding from FY 2022 to FY 2023 is due to development of an Afloat Mobile/Maritime Over the Horizon Radar (MOTHR) to support long range sensing and targeting.					
Accomplishments/Planned Programs Subtotals	7.425	15.941	24.750	0.000	24.750

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy			Date: April 2022
Appropriation/Budget Activity 1319 / 3	R-1 Program Element (Number/Name) PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	Project (Number/Name) 3458 / *Undersea Warfare Efforts*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
3458: *Undersea Warfare Efforts*	0.000	2.356	6.967	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	9.323
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Undersea Warfare Efforts Project will develop new technology for offensive and defensive warfare conducted on the seabed, in the sea (i.e. subsea), and from the sea. Undersea Warfare Efforts as part of Full Spectrum Undersea Warfare (FSUSW) focuses on Theatre Undersea Warfare (TUSW), Joint Targeting and Strike, and Subsea and Seabed Warfare (SSW). There are five thrust areas of the Undersea Warfare Efforts that are key to enabling Chief of Naval Operations Guidance (CNOG), Distributed Maritime Operations (DMO), and the Commandant's Stand in Force with manned and unmanned warfighting capability. These thrust areas were specifically chosen in direct collaboration with STRATCOM, INDO-PACOM, Fleet and Undersea Warfare Commanders and validated with regular Flag engagements. These advanced technology developments will enable future undersea weapon systems (e.g., Maritime Strike Tomahawk and ADCAP variants), COCOM campaign, and operational plans. Undersea Warfare Efforts thrust areas include 1) Undersea effectors, 2) Integrated expeditionary subsea system of systems, 3) Multi-Vehicle Torpedo Tube Development System (MVTTDS) for payload A, 4) Undersea UAV for Over-The-Horizon (OTH) effects and 5) Undersea Launched Devices to enable Commanding Officers and Regional Combatant Commander effects. The thrust areas are technically an operational interconnected. Selected concepts from advanced research will be integrated into viable representative prototypes for field experimentation in a relevant environment. Lessons learned from field experimentation will inform continued applied research spirals to remedy technical shortcomings, expand capability, or define an alternate approach. The Activity identified in the Undersea Warfare Efforts, Project 3458, specifically addresses Advanced Technology Development in support of the Full Spectrum Undersea Warfare INP effort. The Applied Research Budget Activity (BA) 2 funding is in a separate Program Element (PE) 060279N FSUSW INP, Project 3456.

Information security concerns preclude fully detailed descriptions of project efforts, research activities, and technology development plans. Specific information on each project and activity will be provided separately to the Congressional oversight committees.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: Undersea Warfare Efforts	2.356	6.967	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: The Undersea Warfare Efforts Project will develop new technology for offensive and defensive warfare conducted on the seabed, in the sea (i.e. subsea), and from the sea. Undersea Warfare Efforts as part of Full Spectrum Undersea Warfare (FSUSW) focuses on Theatre Undersea Warfare (TUSW), Joint Targeting and Strike, and Subsea and Seabed Warfare (SSW). There are five thrust areas of the Undersea Warfare Efforts that are key to enabling Chief of Naval Operations Guidance (CNOG), Distributed Maritime Operations (DMO), and the Commandant's Stand in Force with manned and unmanned warfighting capability. These thrust areas were specifically chosen in direct collaboration with STRATCOM, INDO-PACOM, Fleet and Undersea Warfare					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	**Project (Number/Name)** 3458 / *Undersea Warfare Efforts*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Commanders and validated with regular Flag engagements. These advanced technology developments will enable future undersea weapon systems (e.g., Maritime Strike Tomahawk and ADCAP variants), COCOM campaign, and operational plans. Undersea Warfare Efforts thrust areas include 1) Undersea effectors, 2) Integrated expeditionary subsea system of systems, 3) Multi-Vehicle Torpedo Tube Development System (MVTTDS) for payload A, 4) Undersea UAV for Over-The-Horizon (OTH) effects and 5) Undersea Launched Devices to enable Commanding Officers and Regional Combatant Commander effects. The thrust areas are technically an operational interconnected. Selected concepts from advanced research will be integrated into viable representative prototypes for field experimentation in a relevant environment. Lessons learned from field experimentation will inform continued applied research spirals to remedy technical shortcomings, expand capability, or define an alternate approach. The Activity identified in the Undersea Warfare Efforts, Project 3458, specifically addresses Advanced Technology Development in support of the Full Spectrum Undersea Warfare INP effort. The Applied Research Budget Activity (BA) 2 funding is in a separate Program Element (PE) 060279N FSUSW INP, Project 3456. Information security concerns preclude fully detailed descriptions of project efforts, research activities, and technology development plans. Specific information on each project and activity will be provided separately to the Congressional oversight committees. ***FY 2022 Plans:*** Continued Advanced Technology Development associated with the Multi-Vehicle Torpedo Tube Deployment System prototype for Virginia Class submarines using including - Prototype component tank testing - Assessment of reload viability and features ***FY 2023 Base Plans:*** N/A ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** The decrease in funding in FY 2022 to FY 2023 is due to placing all funds from Project 3458 Undersea Warfare Efforts, which were all associated with the Full Spectrum Undersea Warfare (FSUW) INP, into a new Project					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	**Project (Number/Name)** 3458 / *Undersea Warfare Efforts*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
3456 Full Spectrum Undersea Warfare, that complements the Full Spectrum Undersea Warfare BA2 Project number like all other INPs.					
Accomplishments/Planned Programs Subtotals	2.356	6.967	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy			Date: April 2022
Appropriation/Budget Activity 1319 / 3	R-1 Program Element (Number/Name) PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	Project (Number/Name) 3459 / *Super Swarm (SS)*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
3459: *Super Swarm (SS)*	0.000	5.804	9.957	14.850	-	14.850	19.800	19.800	0.000	0.000	0.000	70.211
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Swarming is a concept that allows for multi-domain, heterogeneous swarms of unmanned systems capable of rendering the counter's ability to scale either inadequate or irrelevant and includes offensive and defensive operations, own and adversarial employment, and a physical battlespace ranging from open ocean to ashore. The Super Swarm (SS) INP effort will develop an autonomous control system for multiple USV's consisting of cooperative task allocation, cooperative route planning/behaviors and shared situational awareness. The Swarm autonomy technology is leveraged by other programs including the Medium Displacement Unmanned Surface Vehicle (MDUSV) and the Autonomous USV FNC program. It will consist of the employment of sustainable large-scale robotic swarm warfare across all domains ahead of our adversaries to obviate costly and vulnerable legacy platforms and to gain a competitive advantage. The Activity identified in Project Unit 3459 specifically addresses Advanced Technology Development in support of the Super Swarm INP effort.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: Super Swarm (SS)	5.804	9.957	14.850	0.000	14.850
Articles:	-	-	-	-	-
Description: Swarming is a concept that allows for multi-domain, heterogeneous swarms of unmanned systems capable of rendering the counter's ability to scale either inadequate or irrelevant and includes offensive and defensive operations, own and adversarial employment, and a physical battlespace ranging from open ocean to ashore. The Super Swarm (SS) INP effort will develop an autonomous control system for multiple USV's consisting of cooperative task allocation, cooperative route planning/behaviors and shared situational awareness. The Swarm autonomy technology is leveraged by other programs including the Medium Displacement Unmanned Surface Vehicle (MDUSV) and the Autonomous USV FNC program. It will consist of the employment of sustainable large-scale robotic swarm warfare across all domains ahead of our adversaries to obviate costly and vulnerable legacy platforms and to gain a competitive advantage.					
FY 2022 Plans: Continue efforts focused on interaction of multiple autonomy architectures across multiple domains and platforms to generate coordinated and optimized behaviors for the delivery of effects on target. Due to increase needed on several technology discovery areas associated with the overarching Super Swarm concept, three activities established to support overall program goals and are addressed separately.					
FY 2023 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	**Project (Number/Name)** 3459 / *Super Swarm (SS)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Continue efforts focused on interaction of multiple autonomy architectures across multiple domains and platforms to generate coordinated and optimized behaviors for the delivery of effects on target. Initiate efforts in dynamic and reactive swarm optimization for complex, highly defended target scenarios. Initiate efforts for heterogeneous platform launch integration onto objective Deployment and Employment of Autonomous Long Range Systems (DEALRS) (Project 3462) swarm delivery marsupial host platform. ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** The increase in funding from FY22 to FY23 is due to the planned increase in both small-scale and full-scale platform development and experimentation.					
Accomplishments/Planned Programs Subtotals	5.804	9.957	14.850	0.000	14.850

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy			Date: April 2022
Appropriation/Budget Activity 1319 / 3	R-1 Program Element (Number/Name) PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	Project (Number/Name) 3461 / *MASS*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
3461: *MASS*	0.000	0.000	0.988	3.960	-	3.960	4.950	4.950	0.000	0.000	0.000	14.848
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

This activity is being broken out from Project Unit 3459 Super Swarm to provide increased visibility and focus on this technical challenge area at the BA3 level.

A. Mission Description and Budget Item Justification

The rising use of air, surface, and sub-surface unmanned and autonomous systems requires a paradigm shift in the development, production, and life-cycle management of these systems in order to gain a competitive advantage against adversarial capabilities as well as allow for fielding of significant numbers (1000's to 10,000's) in an increasingly budget-constrained acquisition environment. The growth in rapid prototyping and additive manufacturing technologies presents an opportunity to capitalize on these advances though technical development and demonstration efforts focused on scale-up both in terms of rapid production of relevant quantities as well as greatly increasing the physical size of platforms produced far beyond what is currently achievable. Manufacturing of Autonomous Systems at Scale (MASS) efforts will utilize wide range of advanced manufacturing methods combined with adaptive digital design processes with "Design for Low-Cost Platform Attriteability" as a major attribute to avoid the platform cost growths normally associated with exquisite systems development. This also represents the ability to rapidly modify platform attributes based on evolving operational needs and quickly insert into build process without costly retooling. Secondary goals focus on increasing commonality of critical components across platforms and design of these in modular fashion in order to manage supply chain vulnerability. Lastly, the project will look at ability to place manufacturing capability as far forward/afloat as possible to reduce the logistics tail and speed delivery of capability at-scale into the fleet. The activity identified in Project Unit 3461 MASS specifically addresses Advanced Technology Development in support of the MASS effort.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: Manufacture of Autonomous Systems at Scale (MASS)	0.000	0.988	3.960	0.000	3.960
Articles:	-	-	-	-	-
FY 2022 Plans: Continue Manufacturing of Autonomous Systems at Scale (MASS) experimentation and demonstration efforts to build and employ the use of advanced manufacturing methods combined with Designed for Attriteability platforms as the enablers for Project Unit 3459 - Super Swarm - Overwhelming Swarm Effects.					
FY 2023 Base Plans: Continue Manufacturing of Autonomous Systems at Scale (MASS) efforts to utilize wide range of advanced manufacturing methods based on design for affordable attritability.					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	**Project (Number/Name)** 3461 / *MASS*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Continue MASS digital design efforts to couple rapid adaptive processes focused on large scale (both size and quantity) Super Swarm (Project 3459) and Deployment and Employment of Autonomous Long Range Systems (DEALRS) (Project 3462) platforms of interest. Complete MASS experimentation and demonstration efforts of sub/small scale platform concept demonstrators. Initiate rapidly reconfigurable tooling for large scale structures to enable rapid design iteration / evolution in response to threats. Initiate low-rate batch manufacturing of small-scale platforms in field environments. Initiate initial exploration of application of methodologies to larger-scale structures, components, and platforms across all domains. ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** The increase in FY 2023 is due to increasing research of manufacturing methods as applied to various types of platforms in order to achieve the goals of the program and an FY22 congressional mark.					
Accomplishments/Planned Programs Subtotals	0.000	0.988	3.960	0.000	3.960

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
• RDTEN/0602792N/3461: *MASS*	0.000	4.487	4.950	-	4.950	7.920	0.000	0.000	0.000	0.000	17.357

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy			Date: April 2022
Appropriation/Budget Activity 1319 / 3	R-1 Program Element (Number/Name) PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	Project (Number/Name) 3462 / *DEALRS*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
3462: *DEALRS*	0.000	0.000	0.987	4.950	-	4.950	5.940	5.940	7.920	8.078	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

This activity is being broken out from Project Unit 3459 Super Swarm to provide increased visibility and focus on this technical challenge area at the BA3 level.

A. Mission Description and Budget Item Justification

Adversary Anti-Access and Area Denial (A2/AD) capabilities continue to improve but remain focused on targeting specific US and joint force capabilities. The Deployment and Employment of Autonomous Long Range Systems (DEALRS) project will develop technologies that sidestep, operate below the threshold, or deplete adversary A2/AD capabilities. DEALRS will specifically develop technologies to enable low-cost unmanned systems that can maneuver across theater-level ranges to penetrate, operate within, and launch strikes from within adversary A2/AD system coverage. This project will develop technologies to increase the range and endurance of autonomous systems while maintaining tactically relevant speeds, loiter times, and signatures with low cost. It will also address technologies that enable the marsupial launch of terminal engagement autonomous unmanned systems across all domains from larger and/or longer-range host systems that bring them to the launch area and the associated technologies needed to ensure roboticized and autonomous startup and launch of the marsupial systems without human intervention. The Activity identified in Project Unit 3462 DEALRS specifically addresses Advanced Technology Development in support of the INP effort.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: Deployment & Employment of Autonomous Long Range Systems (DEALRS)	0.000	0.987	4.950	0.000	4.950
Articles:	-	-	-	-	-
Description: Adversary Anti-Access and Area Denial (A2/AD) capabilities continue to improve but remain focused on targeting specific US and joint force capabilities. The Deployment and Employment of Autonomous Long Range Systems (DEALRS) project will develop technologies that sidestep, operate below the threshold, or deplete adversary A2/AD capabilities. DEALRS will specifically develop technologies to enable low-cost unmanned systems that can maneuver across theater-level ranges to penetrate, operate within, and launch strikes from within adversary A2/AD system coverage. This project will develop technologies to increase the range and endurance of autonomous systems while maintaining tactically relevant speeds, loiter times, and signatures with low cost. It will also address technologies that enable the marsupial launch of terminal engagement autonomous unmanned systems across all domains from larger and/or longer-range host systems that bring them to the launch area and the associated technologies needed to ensure roboticized and autonomous startup and launch of the marsupial systems without human intervention. The Activity identified in					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	**Project (Number/Name)** 3462 / *DEALRS*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Project Unit 3462 DEALRS specifically addresses Advanced Technology Development in support of the INP effort. ***FY 2022 Plans:*** Continue efforts to demonstrate concepts for the Deployment and Employment of Autonomous Long Range Systems (DEALRS) across all domains. Efforts will focus on scaling up promising concepts to demonstrate trans-Oceanic deployment and employment of large numbers of unmanned systems to deliver desired effects in the areas of operation. ***FY 2023 Base Plans:*** - Continue efforts to explore concepts for the Deployment and Employment of Autonomous Long Range Systems (DEALRS) across all domains. Efforts will focus on platforms enhancements as well as marsupial concepts to allow extremely large numbers of systems to traverse long distances with minimal human intervention to bring them into the operations area. - Continue efforts to demonstrate concepts for DEALRS across all domains. Efforts will focus on scaling up promising concepts to demonstrate trans-Oceanic deployment and employment of large numbers of unmanned systems to deliver desired effects in the areas of operation. - Initiate efforts on scaling up promising concepts to demonstrate trans-Oceanic deployment of low-cost attritable swarm agents and platforms. This will be informed by FY22 and early FY23 Super Swarm (Project 3459), Manufacture of Autonomous Systems at Scale (MASS) (Project 3461) and Manned / Autonomous Teams (MATes) (Project 3463) activities. BA3 efforts will focus on swarm agent range/ endurance enhancements and swarm delivery marsupial host platform development beyond the BA2 level. ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** FY2022 to FY2023 increase associated with initiating efforts on scaling up promising concepts to demonstrate trans-Oceanic deployment of low-cost attritable swarm agents and platforms. Efforts will focus on swarm agent range/ endurance enhancements and swarm delivery marsupial host platform development.					
Accomplishments/Planned Programs Subtotals	0.000	0.987	4.950	0.000	4.950

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	**Project (Number/Name)** 3462 / *DEALRS*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
• RDTEN/0602792N/3462: *DEALRS*	0.000	5.983	6.930	-	6.930	10.890	6.930	0.000	0.000	0.000	30.733

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy			Date: April 2022
Appropriation/Budget Activity 1319 / 3	R-1 Program Element (Number/Name) PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	Project (Number/Name) 3463 / *MATes*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
3463: *MATes*	0.000	0.000	0.987	3.960	-	3.960	4.950	4.950	13.860	14.137	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

This activity is being broken out from Project Unit 3459 Super Swarm to provide increased visibility and focus on this technical challenge area at the BA3 level.

A. Mission Description and Budget Item Justification

Traditionally, the utilization of autonomous systems is either operationally segregated from manned operations or requires a significant amount of human oversight when operating in conjunction with manned assets, which mitigates some of the advantage from using them. The goal of the Manned and Autonomous Teams (MATes) project is to develop autonomic robotic technology and collaborative autonomous behaviors that seamlessly operate across all domains in conjunction with manned units, allowing for real-time adaptation and optimization in a manner that streamlines the element of human interaction needed to share mission goals. This technology will monitor human or manned system teammate state, behavior, mission, and adversary threat status to anticipate and act in a tactically appropriate manner that is predictable, communicable, and trusted by the human/manned teammates and which enables autonomous system optimization in coordination with the human/manned teammate and mission objectives. Intuitive human/autonomous system interfaces will be developed to allow focus on higher-order decision-making tasks by the operators allowing for large numbers of autonomous systems (100's or 1000's) to be managed in support of manned operations. The activity identified in Project Unit 3463 MAtes specifically addresses Advanced Technology Development in support of the MATes effort.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: Manned and Autonomous Teams (MATes)	0.000	0.987	3.960	0.000	3.960
Articles:	-	-	-	-	-
FY 2022 Plans: Continue efforts to explore autonomy, perception, and command and control (C2) concepts for Manned and Autonomous Teams (MATES) conducting complex multi-domain operations in proximity to each other along a spectrum of missions. Missions range from fully autonomous to highly supervised requiring an agile optimization as real-world factors change.					
FY 2023 Base Plans: Continue efforts to explore autonomy, perception, and command and control (C2) concepts for Manned and Autonomous Teams (MATES) conducting complex multi-domain operations in proximity to each other along a spectrum of missions. Missions range from fully autonomous to highly supervised requiring an agile optimization as real-world factors change.					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	**Project (Number/Name)** 3463 / *MATes*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Continue efforts to explore autonomy, perception, and command and control (C2) concepts for MATES conducting complex multi-domain operations in proximity to each other along a spectrum of missions. Initiate demonstration of multiple autonomy architectures across multiple domains conducting re-optimizing behaviors based on changing mission parameters and perception data. Agents will be Super Swarm (Project 3459) agents, and efforts will mutually inform tactical behavior, perception, and autonomy schemas. Initiate experiments to validate command and control with different levels of human oversight and trust. ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** The increase in funding from FY2022 and FY2023 is due to initiation of demonstrations of multiple autonomy architectures across multiple domains conducting re-optimizing behaviors based on changing mission parameters and perception data. Funding increase also support experiments to validate command and control with different levels of human oversight and trust.					
Accomplishments/Planned Programs Subtotals	0.000	0.987	3.960	0.000	3.960

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
• RDTEN/0602792N/3463: *MATes*	0.000	4.986	6.435	-	6.435	9.900	9.900	4.950	5.049	Continuing	Continuing

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy			Date: April 2022
Appropriation/Budget Activity 1319 / 3	R-1 Program Element (Number/Name) PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	Project (Number/Name) 3464 / *REDCAT*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
3464: *REDCAT*	0.000	0.000	3.976	8.000	-	8.000	6.000	6.000	0.000	0.000	0.000	23.976
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Remote Electromagnetic Disruption of Critical Advanced Threats (REDCAT) will demonstrate High Power Microwave (HPM) integration onto Naval platforms for air defense missions. The objective of the REDCAT rapid prototyping effort is to demonstrate that the REDCAT system is able to detect, track, engage, defeat and assess advanced threats to the ship in a maritime environment. This HPM payload capability will supplement and conserve the ships kinetic defensive weapons. In addition to advancing the HPM source and antenna technologies, this program will also enhance sensor systems well as common weapon console with ongoing laser programs. REDCAT will also develop novel Radio Frequency (RF) waveforms to improve HPM effectiveness. When combined with other non-kinetic capabilities and integrated with the ship's command and control (C2), REDCAT will provide a low cost-per-shot, deep magazine capability for significantly expanding the self-defense capabilities of US Navy platforms. Rapid engagement of targets for large threat raid defeat is a major feature of the system. The system will demonstrate full kill chain integration from find to assess. The payoffs for the REDCAT program include integrated non-kinetic air defense systems to improve the layered defense, optimized use of defensive kinetic weapons and improved sensor and control systems.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: REDCAT HPM Test Bed	0.000	3.976	8.000	0.000	8.000
Articles:	-	-	-	-	-
Description: Remote Electromagnetic Disruption of Critical Advanced Threats (REDCAT) will demonstrate High Power Microwave (HPM) integration onto Naval platforms for air defense missions. The objective of the REDCAT rapid prototyping effort is to demonstrate that the REDCAT system is able to detect, track, engage, defeat and assess advanced threats to the ship in a maritime environment. This HPM payload capability will supplement and conserve the ships kinetic defensive weapons. In addition to advancing the HPM source and antenna technologies, this program will also enhance sensor systems well as common weapon console with ongoing laser programs. REDCAT will also develop novel Radio Frequency (RF) waveforms to improve HPM effectiveness. When combined with other non-kinetic capabilities and integrated with the ship's command and control (C2), REDCAT will provide a low cost-per-shot, deep magazine capability for significantly expanding the self-defense capabilities of US Navy platforms. Rapid engagement of targets for large threat raid defeat is a major feature of the system. The system will demonstrate full kill chain integration from find to assess. The payoffs for the REDCAT program include integrated non-kinetic air defense systems to improve the layered defense, optimized use of defensive kinetic weapons and improved sensor and control systems. This effort will also develop and HPM test bed and perform capability demonstrations to fill gaps in effects and mission					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	**Project (Number/Name)** 3464 / *REDCAT*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
modeling of HPM weapons. This includes providing specific measurable data to inform the Terminal Defense NIF gap assessment & closure plans. The goal of the government-developed HPM test bed is to: - Evaluate existing REDCAT prototype hardware for performance and suitability evaluation - Develop detailed effects understanding of HPM lethality capability and thresholds - Inform HPM system requirements and a ship deployable HPM system design ***FY 2022 Plans:*** Complete HPM payload build, system level performance analysis and mission level modeling. Complete full HPM, sensor and control console system integration. Complete full system land based testing as a risk reduction to at sea testing. Perform capability demonstration in operationally relevant maritime environment against representative threat surrogates. Demonstrate full kill chain integration from find to assess. ***FY 2023 Base Plans:*** Continue advanced technology development in support of the REDCAT INP. Specific efforts include the following: - Complete the HPM test bed - Begin integration testing for HPM/EW effects based requirements development. - Contract for antenna completion. - Effects testing initiation and analysis across Navy labs, JHU-APL, and Raytheon. Key Deliverables: Test bed hardware and drawings, Pulsed power assessment test report, EW techniques test report, Mission modeling analysis report, Effects based modeling framework ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** The increase in funding from FY 2022 to FY 2023 in Proj: 3464 REDCAT is to complete the test bed and begin integration testing for HPM/EW effects-based requirements development.					
Accomplishments/Planned Programs Subtotals	0.000	3.976	8.000	0.000	8.000

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	**Project (Number/Name)** 3464 / *REDCAT*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy			Date: April 2022
Appropriation/Budget Activity 1319 / 3	R-1 Program Element (Number/Name) PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	Project (Number/Name) 5899 / *Precision Fire Control*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
5899: *Precision Fire Control*	0.000	0.000	0.000	0.527	-	0.527	8.673	10.352	19.520	15.128	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Precision Fire Control (PFC) effort will develop a fire control architecture that delivers high precision, high update rate guidance solutions to enable cruise missile defense with small, low-cost interceptors and dramatically increase number of interceptors per ship or Expeditionary Advanced Base. It will develop fire control capability for multiple interceptors (missiles and gun projectiles) that contribute to layered defense of surface combatants, expeditionary forces, and homeland protection. Develop PFC-enabled low-cost missile (LCM) based on existing 2.75" rocket components.

The Activity identified in Proj: 5899 Precision Fire Control (PFC) specifically addresses Advanced Technology Development in support of the PFC INP effort.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: Precision Fire Control	0.000	0.000	0.527	0.000	0.527
Articles:	-	-	-	-	-
FY 2022 Plans: N/A					
FY 2023 Base Plans: Initiate Advanced Technology Development in support of the Precision Fire Control (PFC)INP. Specific efforts include the following: - Begin prototyping of PFC fire control elements and Hyper Velocity Projectile (HPV) flight test units.					
FY 2023 OCO Plans: N/A					
FY 2022 to FY 2023 Increase/Decrease Statement: The increase in funding from FY22 to FY23 in Proj: 5899 Precision Fire Control (PFC) is due to the initiation of this Project.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	0.527	0.000	0.527

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	**Project (Number/Name)** 5899 / *Precision Fire Control*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy			Date: April 2022
Appropriation/Budget Activity 1319 / 3	R-1 Program Element (Number/Name) PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
9999: *Congressional Adds*	0.000	19.307	37.300	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	56.607
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Congressional Interest Items not included in other Projects.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022
Congressional Add: Electromagnetic Railgun ***FY 2021 Accomplishments:*** FY21 Congressional Add funds were used to complete Railgun INP final demonstrations and continue demonstrating Railgun and Hypervelocity Projectile (HVP) capabilities. Funding also advanced HVP development with tests to demonstrate HVP survivability and maneuverability, alternative fire control techniques, and Naval Surface Fire Support. Railgun technology and knowledge attained was documented and preserved. Railgun hardware was realigned to maximize its sustainability to facilitate potential future use. ***FY 2022 Plans:*** N/A	19.307	0.000
Congressional Add: High speed laser cooling systems ***FY 2021 Accomplishments:*** N/A ***FY 2022 Plans:*** Conduct high speed laser cooling systems advanced technology development	0.000	6.000
Congressional Add: Advanced ATRT SBIR enterprise capabilities ***FY 2021 Accomplishments:*** N/A ***FY 2022 Plans:*** Conduct advanced ATRT SBIR enterprise capabilities advanced technology development	0.000	16.300
Congressional Add: Energetics renaissance ***FY 2021 Accomplishments:*** N/A ***FY 2022 Plans:*** Conduct energetics renaissance advanced technology development	0.000	10.000
Congressional Add: Group 3 advanced autonomous	0.000	5.000

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 3	**R-1 Program Element (Number/Name)** PE 0603801N / *Innovative Naval Prototypes (INP) Adv Tec Dev*	**Project (Number/Name)** 9999 / *Congressional Adds*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022
FY 2021 Accomplishments: N/A ***FY 2022 Plans:*** Conduct advanced technology development supporting group 3 advanced autonomous efforts		
Congressional Adds Subtotals	19.307	37.300

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A