Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0304240N *I (U)Advanced Tactical Unmanned Aircraft System*

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	0.000	0.000	9.300	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	9.300
3429: *TERN UAS*	0.000	0.000	9.300	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	9.300

A. Mission Description and Budget Item Justification

The Navy has identified capability gaps in the Navy's Distributed Maritime Operations (DMO) concept that could be filled with a next generation, sea-based Medium Altitude Long Endurance (MALE) Unmanned Aerial Vehicle (UAV) operating from Surface Combatant Ships. This program element provides for the maturation, prototyping, and demonstration of advanced platform, payload, networking, and enabling technologies in advance of a future program of record. Technologies that require further maturation include advanced Vertical Take-off and Landing air vehicles, advanced data networks that support distributed unmanned operations, and other technologies that enable maritime over the horizon targeting and early warning at safe stand-off distances. These prototypes will be assessed for military utility through fleet experimentation events and large force exercises. Results will be combined with analytical studies to refine requirements for the next generation of maritime aviation Family of Systems (FOS) and will directly support capability gaps associated with the Future Surface Combatant (FSC). This project is a Military Intelligence Program.

This project provides for trade studies, analysis, and continued prototype development, testing, fleet experimentation, and concept refinement for next generation manned-unmanned aviation technologies to meet Navy Fleet and Combatant Commander (COCOM) classified warfighter gaps in a DMO construct. This project will also conduct requirements analysis and studies for allocation of requirements for manned/unmanned platforms needed for DMO and for operations on Future Surface Combatants (FSC). Candidate technologies are focused on developing new DMO platforms and the required sensors and communications relay payloads that are enabling technologies for DMO. Technologies currently being developed and assessed for military utility include Advanced Vertical Take-off airframes to include the Tern MALE UAV Advanced Technology Concept Demonstrator (ATCD), developed primarily by Defense Advanced Research Projects Agency (DARPA) and the Office of Naval Research (ONR).

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	0.000	9.300	14.400	-	14.400
Current President's Budget	0.000	9.300	0.000	-	0.000
Total Adjustments	0.000	0.000	-14.400	-	-14.400
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Program Adjustments	0.000	0.000	-14.397	-	-14.397

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy					Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*		R-1 Program Element (Number/Name) PE 0304240N *I (U)Advanced Tactical Unmanned Aircraft System*			
• Rate/Misc Adjustments	0.000	0.000	-0.003	-	-0.003

Change Summary Explanation

The Department of the Navy terminated TERN UAS in FY 2020.

Schedule: Not Applicable
Technical: Not applicable

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0304240N / *(U)Advanced Tactical Unmanned Aircraft System*	Project (Number/Name) 3429 / *TERN UAS*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
3429: *TERN UAS*	0.000	0.000	9.300	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	9.300
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The goal of this program is to develop technologies to allow for their evaluation in the Distributed Maritime Operations (DMO) construct to support requirements refinement for aviation support to current and future surface combatants to include the Future Surface Combatant (FSC) program. This program will conduct studies and analysis of requirements to determine the most effective allocation of mission requirements to aviation platforms and between manned and unmanned platforms to enable future DMO and FSC operations. Areas of analysis will include, but are not limited to, over-the horizon communications, targeting, distributed maneuvering, manned-unmanned platform mix, and optimized sensor payload configurations to satisfy DMO mission gaps. The program will demonstrate organic shipboard platforms capable of providing persistent 24/7 Intelligence, Surveillance, and Reconnaissance (ISR), targeting, early warning, and anti-surface strike capabilities at long radius orbits. To achieve these goals, the program will investigate new concepts for aircraft launch and recovery, logistics, and maintenance in maritime operating conditions. This effort will assist in funding mission utility technical assessment of a Medium-Altitude, Long-Endurance Unmanned Aerial Vehicle (MALE UAV) technology demonstrators intended for surface combatants.

This program will demonstrate an over the horizon communications ISR network to address joint service wireless high data rate communications, interoperability, and targeting gaps for Navy's DMO roadmap. The ISR communications network will provide cross-domain connectivity, including prototyping of systems such as the joint service Manned-Unmanned Distributed Lethality Airborne Network (MUDLAN), for Navy specific platforms. This payload provides information exchange between multi-domain platforms at very high data rates in a spectrum challenged environment without reliance on space-based capabilities and provides an alternate Precision Navigation and Timing (PNT) capability for operating in a GPS-denied environment. This effort includes fleet experimentation of the technology with manned-unmanned assets in a cross-domain, joint service DMO environment.

This program funds continuing advancement and experimentation of the enabling sensor technologies required to operate in the DMO environment, such as demonstrating sense and avoid sensors and autonomy software in real world environments and advanced ice detection systems to avoid potential loss of aircraft when operating at extreme ranges. Additionally, the project will support prototype development and fleet experimentation of other mission payloads required for DMO gaps. Prototypes will be demonstrated in Fleet exercises to inform requirements for an aviation family of systems to support the FSC Program of Record and Fleet operations in a DMO construct.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: MALE (TERN) UAV Technical Maturation and Experimentation	0.000	7.150	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0304240N / *(U)Advanced Tactical Unmanned Aircraft System*	**Project (Number/Name)** 3429 / *TERN UAS*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Commence aircraft trade studies, concept refinement, technology maturation, aircraft experimentation and testing, envelope expansion, and potential payload integration for meeting Navy mission requirements to inform the Navy's future Family of Systems (FOS). Test and evaluate Tern UAV in ground and flight test events. Refine objective performance requirements, initial Key Performance Parameters (KPP), CONOPS, concepts, tactics, doctrine, and reduce risk for the future ship-based UAV FOS. Provides architecture assessments for integrating the MALE UAV ground and air segments to support interoperability with Navy Common Control System (CCS). ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The Department of the Navy terminated TERN UAS in FY 2020.					
Title: Technical and Engineering Services ***Articles:*** ***FY 2019 Plans:*** Initiate and provide Government engineering support, contractor support, program support and travel for continued experimentation and analysis. ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The Department of the Navy terminated TERN UAS in FY 2020.	0.000 -	2.150 -	0.000 -	0.000 -	0.000 -
Accomplishments/Planned Programs Subtotals	0.000	9.300	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0304240N / *(U)Advanced Tactical Unmanned Aircraft System*	**Project (Number/Name)** 3429 / *TERN UAS*

D. Acquisition Strategy

The program will continue experimentation efforts leveraging DARPA/ONR contracts for Tern. SBIR contracts will be used for safety and mission systems payloads that were originally awarded under small business contract actions. Maturation of other payloads will be acquired in accordance with program office acquisition plans

E. Performance Metrics

Performance metrics include successful completion of trade studies, successful demonstration of the minimum design criteria identified in the contracts, and Fleet/ COCOM assessment of compliance with Measures of Effectiveness (MOEs).

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0304240N / *(U)Advanced Tactical Unmanned Aircraft System*	Project (Number/Name) 3429 / *TERN UAS*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MALE (TERN) UAV Technical Maturation & Experimentation	C/CPIF	Northrop Grumman : San Diego, CA	0.000	0.000		7.150	Dec 2018	0.000		-		0.000	0.000	7.150	7.150
UAS Sensors and Autonomy	C/CPIF	Varioius : Various	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
Advanced Data Networks	C/CPIF	Various : Various	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
Technical and Engineering Services	WR	NAWCAD : Patuxent River, MD	0.000	0.000		1.200	Oct 2018	0.000		-		0.000	0.000	1.200	-
		Subtotal	0.000	0.000		8.350		0.000		-		0.000	0.000	8.350	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Range Cost	WR	NAWCWD : Point Mugu, CA	0.000	0.000		0.300	Nov 2018	0.000		-		0.000	0.000	0.300	-
		Subtotal	0.000	0.000		0.300		0.000		-		0.000	0.000	0.300	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Engineering Support	WR	NAWCAD : Patuxent River, MD	0.000	0.000		0.310	Oct 2018	0.000		-		0.000	0.000	0.310	-
Program Management Support	Various	Various : Various	0.000	0.000		0.250	Oct 2018	0.000		-		0.000	0.000	0.250	-
Travel	WR	NAWCAD : Patuxent River, MD	0.000	0.000		0.090	Nov 2018	0.000		-		0.000	0.000	0.090	-
		Subtotal	0.000	0.000		0.650		0.000		-		0.000	0.000	0.650	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0304240N / *(U)Advanced Tactical Unmanned Aircraft System*	Project (Number/Name) 3429 / *TERN UAS*	

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		9.300		0.000		-		0.000	0.000	9.300	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0304240N / *(U)Advanced Tactical Unmanned Aircraft System*	**Project (Number/Name)** 3429 / *TERN UAS*

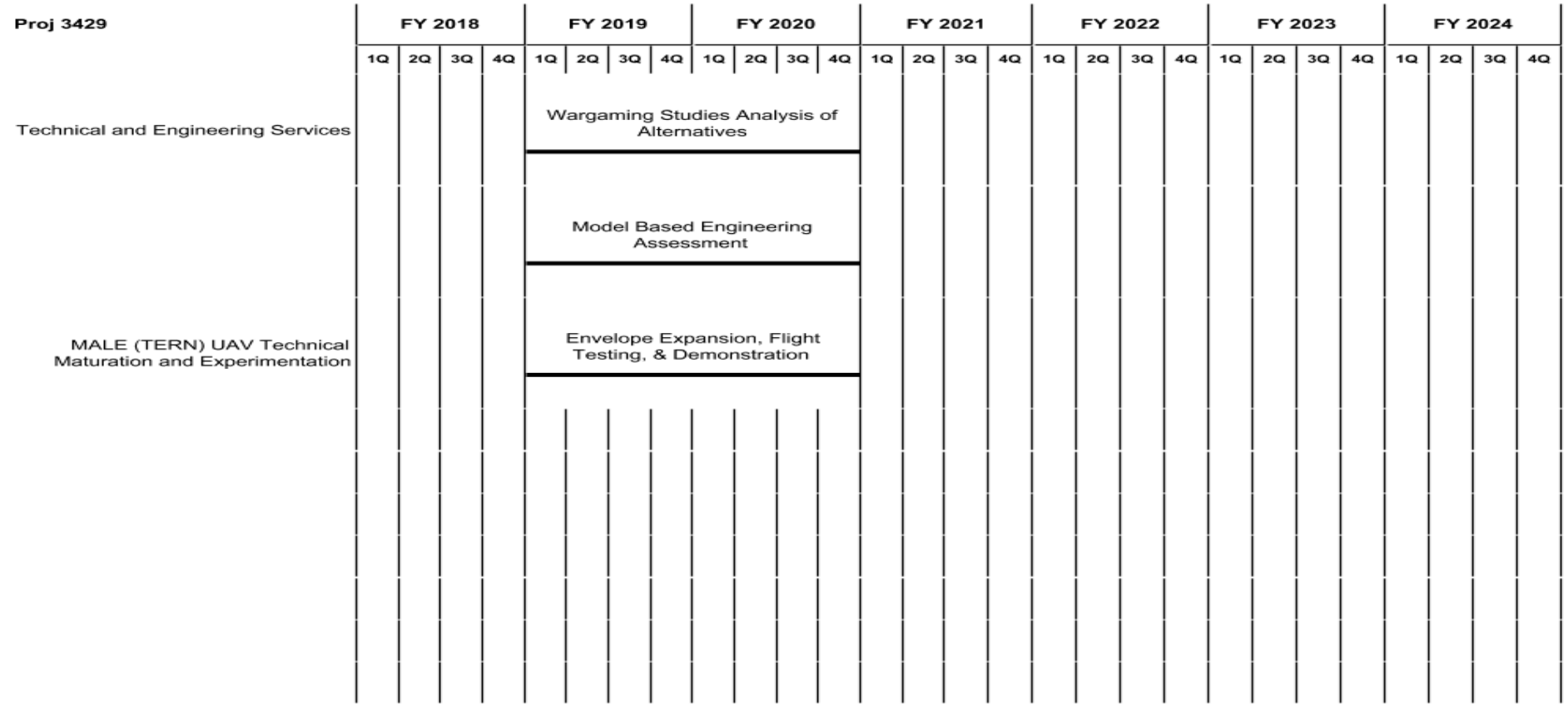

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0304240N / *(U)Advanced Tactical Unmanned Aircraft System*	**Project (Number/Name)** 3429 / *TERN UAS*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3429				
Technical and Engineering Services: Wargaming, Studies, Analysis of Alternatives	1	2019	4	2020
Technical and Engineering Services: Model Base Engineering Assessments	1	2019	4	2020
MALE (TERN) UAV Technical Maturation and Experimentation: Envelope Expansion, Flight Testing, & Demonstration	1	2019	4	2020