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 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0305204N *I Tactical Unmanned Aer Vehicles*

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	287.602	7.108	9.837	10.576	-	10.576	11.185	10.109	10.289	10.453	Continuing	Continuing
2478: *Tactical Control System*	287.602	7.108	9.837	10.576	-	10.576	11.185	10.109	10.289	10.453	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program element provides funding for the software development capabilities associated with Mission modules of the Tactical Unmanned Aerial Vehicle. This project is a Joint Military Intelligence Program.

The Tactical Control System (TCS), a component of the MQ-8 System, provides software for the joint tactical MQ-8 Fire Scout System. TCS integrated into the MQ-8 Mission Control System (MCS) provides the warfighters with the capability for day/night aerial Intelligence, Surveillance and Reconnaissance (ISR), target acquisition, voice, data and command and control communications/relay, and mine detection and localization. Additionally, TCS provides a multi-level, scalable, and flexible operator control of the air vehicles and payloads as well as direct receipt and dissemination of unmanned aerial vehicle sensor data.

B. Program Change Summary ($ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	7.108	9.837	0.000	-	0.000
Current President's Budget	7.108	9.837	10.576	-	10.576
Total Adjustments	0.000	0.000	10.576	-	10.576
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Program Adjustments	0.000	0.000	0.000	-	0.000
• Rate/Misc Adjustments	0.000	0.000	0.000	-	0.000
• Adjustments to Budget Year	-	-	10.576	-	10.576

Change Summary Explanation

Schedule: TCS schedule deliveries updated to reflect changes in MQ-8 Fire Scout schedule milestones. Version 10 is scheduled to complete in the third quarter of FY 2022. This aligns with MQ-8 Radar integration efforts and supports subsequent TCS deliveries.

The FY 2023 funding request was decreased by $0.839M to account for the availability of prior year execution balances.

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 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0305204N *I Tactical Unmanned Aer Vehicles*

Technical: N/A

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 / 7	R-1 Program Element (Number/Name) PE 0305204N / *Tactical Unmanned Aer Vehicles*	Project (Number/Name) 2478 / *Tactical Control System*	

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
2478: *Tactical Control System*	287.602	7.108	9.837	10.576	-	10.576	11.185	10.109	10.289	10.453	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Tactical Control System (TCS) program supports the MQ-8 Fire Scout System and is a standards-based system, which provides interoperability and commonality for Command and Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) interfaces of Unmanned Aircraft Systems (UAS). TCS software, operating on Mission Control System (MCS) (also referred to as a Ground Control Station) hardware, utilizes North Atlantic Treaty Organization (NATO) Standardization Agreements (STANAG)-4586 architecture to communicate across a Tactical Common Data Link.

TCS provides a full range of scalable UAS capabilities from passive receipt of air vehicle and payload data to full air vehicle and payload command and control. TCS offers the warfighter a common core operating environment to simultaneously receive, process, and disseminate data from different UAS types for intelligence, reconnaissance, surveillance, and combat assessment.

This program supports enhancements and updates to TCS in order to continue to meet supported air vehicle enhancements, incorporation of new technologies that will be used to enhance overall system performance, includes software updates to support Mission System Trainers (MST), incorporate new payloads and payload capabilities(such as Link-16), incorporate multi-vehicle control, incorporate NATO STANAG-4586 and Command, Control, Communications, Computers and Intelligence enhancements, and alignment with OSD direction for UAS control segments.

TCS software is incorporated into the MQ-8 Fire Scout System and fields in conjunction with MQ-8. TCS software addresses MQ-8 requirements validated by the Joint Requirements Oversight Council in the MQ-8 Capability Production Document (Nov 2016) and multiple Joint Emergent Operational Need/Urgent Operational Needs statements. TCS is supported by an Operational Requirements Document (Feb 2000).

TCS maximizes the use of contractor and government off-the-shelf hardware and software whenever possible and incorporates software/hardware enhancements where appropriate to maintain growth potential and minimize hardware and operating system dependence. TCS software is interoperable and is compliant with the OSD Command and Control, Communications, Intelligence Joint Technical Architecture, Distributed Common Ground System standards, Global Command and Control System, and NATO standards. TCS hardware and software upgrades support the Navy's Common Control System (CCS) migration and as such can be used to support future UAS MCS requirements.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: TCS Development and Integration	6.127	8.748	9.070	0.000	9.070
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305204N / *Tactical Unmanned Aer Vehicles*	**Project (Number/Name)** 2478 / *Tactical Control System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
FY 2022 Plans: Continue TCS integration and test with MQ-8 development. Continue new TCS capabilities to support requirements for MQ-8 land-based efforts plus support for air capable ships (to include Littoral Combat Ship (LCS), Frigates (FFG(X)), and Expeditionary Support Bases (ESB). Continue TCS STANAG 4586 compliance. Continue TCS C4ISR interface integration and testing for MQ-8 systems. Continue hardware and operating system independence initiatives. Continue radar, Minotaur, and Common Control System (CCS) Vehicle Management (VM) integration and test leading to the first Fire Scout MQ-8C radar deployment. Continue TCS version 10 planning for the potential integration of Link-16. The Passive Targeting capability will not be included in the current MQ-8 and TCS requirements beyond FY21, based on the partial divestment of MQ-8. Capability enhancements planned for Passive Targeting in FY22 and beyond have been deferred. ***FY 2023 Base Plans:*** Continue TCS integration and test with MQ-8 development. Continue new TCS capabilities to support requirements for MQ-8 land-based efforts plus support for air capable ships (to include Littoral Combat Ship (LCS), Frigates (FFG(X)), and Expeditionary Support Bases (ESB). Continue TCS STANAG 4586 compliance. Continue TCS C4ISR interface integration and testing for MQ-8 systems. Continue hardware and operating system independence initiatives. Continue radar and Minotaur updates. Start TCS version 11 integration and test including Link-16 capabilities as applicable. ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Increase due to TCS version 11 and correction of software deficiencies, training, resiliency and reliability upgrades.					
Title: Technical and Engineering Services	0.981	1.089	1.506	0.000	1.506
Articles:	-	-	-	-	-
FY 2022 Plans: Continue government engineering support, contractor support, program support, and travel as well as training, resiliency and reliability support. ***FY 2023 Base Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305204N / *Tactical Unmanned Aer Vehicles*	**Project (Number/Name)** 2478 / *Tactical Control System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Increase in Government Engineering support related to TCS rel 10.X correction of deficiencies (COD) build and capability enhancements for rel 11.0. ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Increase in Government Engineering support related to TCS rel 10.X COD build and capability enhancements for rel 11.0.					
Accomplishments/Planned Programs Subtotals	7.108	9.837	10.576	0.000	10.576

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

The TCS program is government owned, non-proprietary software that currently supports the MQ-8 Fire Scout System. The TCS program continues to focus on Navy requirements and standards-based architecture/software to support interoperability. The government-owned TCS software development toolkit is available to all UAS developers and manufacturers that allows a low-cost integration into the open architecture non-proprietary TCS system.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305204N / *Tactical Unmanned Aer Vehicles*	**Project (Number/Name)** 2478 / *Tactical Control System*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2021 Cost	FY 2021 Award Date	FY 2022 Cost	FY 2022 Award Date	FY 2023 Base Cost	FY 2023 Base Award Date	FY 2023 OCO Cost	FY 2023 OCO Award Date	FY 2023 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary Software Development	SS/CPIF	Raytheon : Falls Church,VA	68.708	5.198	Dec 2020	7.935	Dec 2021	8.241	Dec 2022	-		8.241	40.244	130.326	122.874
Prior Year Cost no longer Funded in the FYDP	Various	Various : Various	195.505	0.000		0.000		0.000		-		0.000	0.000	195.505	195.505
Software Development	TBD	Various : Various	0.000	0.934	Nov 2020	0.813	Nov 2021	0.829	Nov 2022	-		0.829	9.376	11.952	11.418
		Subtotal	264.213	6.132		8.748		9.070		-		9.070	49.620	337.783	N/A

Remarks

FY 2023 increase in Product Development supports interim software release to address corrections of defects (COD) requirements identified during version 11 integration testing.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2021 Cost	FY 2021 Award Date	FY 2022 Cost	FY 2022 Award Date	FY 2023 Base Cost	FY 2023 Base Award Date	FY 2023 OCO Cost	FY 2023 OCO Award Date	FY 2023 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Test and Evaluation	WR	Various : Various	1.427	0.028	Nov 2020	0.032	Nov 2021	0.158	Nov 2022	-		0.158	Continuing	Continuing	Continuing
		Subtotal	1.427	0.028		0.032		0.158		-		0.158	Continuing	Continuing	N/A

Remarks

FY 2023 increase in Test and Evaluation to support integration of additional capability, correction of deficiencies and training systems testing requirements.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2021 Cost	FY 2021 Award Date	FY 2022 Cost	FY 2022 Award Date	FY 2023 Base Cost	FY 2023 Base Award Date	FY 2023 OCO Cost	FY 2023 OCO Award Date	FY 2023 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Engineering Support	Various	Various : Various	4.754	0.258	Nov 2020	0.236	Nov 2021	0.329	Nov 2022	-		0.329	Continuing	Continuing	Continuing
Government Engineering Support	WR	Various : Various	11.232	0.457	Nov 2020	0.583	Nov 2021	0.687	Nov 2022	-		0.687	Continuing	Continuing	Continuing
Program Management Support	Various	Various : Various	5.509	0.208	Nov 2020	0.212	Nov 2021	0.298	Nov 2022	-		0.298	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305204N / *Tactical Unmanned Aer Vehicles*	**Project (Number/Name)** 2478 / *Tactical Control System*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2021 Cost	FY 2021 Award Date	FY 2022 Cost	FY 2022 Award Date	FY 2023 Base Cost	FY 2023 Base Award Date	FY 2023 OCO Cost	FY 2023 OCO Award Date	FY 2023 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Travel	WR	NAVAIR : Patuxent River, MD	0.467	0.025	Nov 2020	0.026	Nov 2021	0.034	Nov 2022	-		0.034	Continuing	Continuing	Continuing
		Subtotal	21.962	0.948		1.057		1.348		-		1.348	Continuing	Continuing	N/A

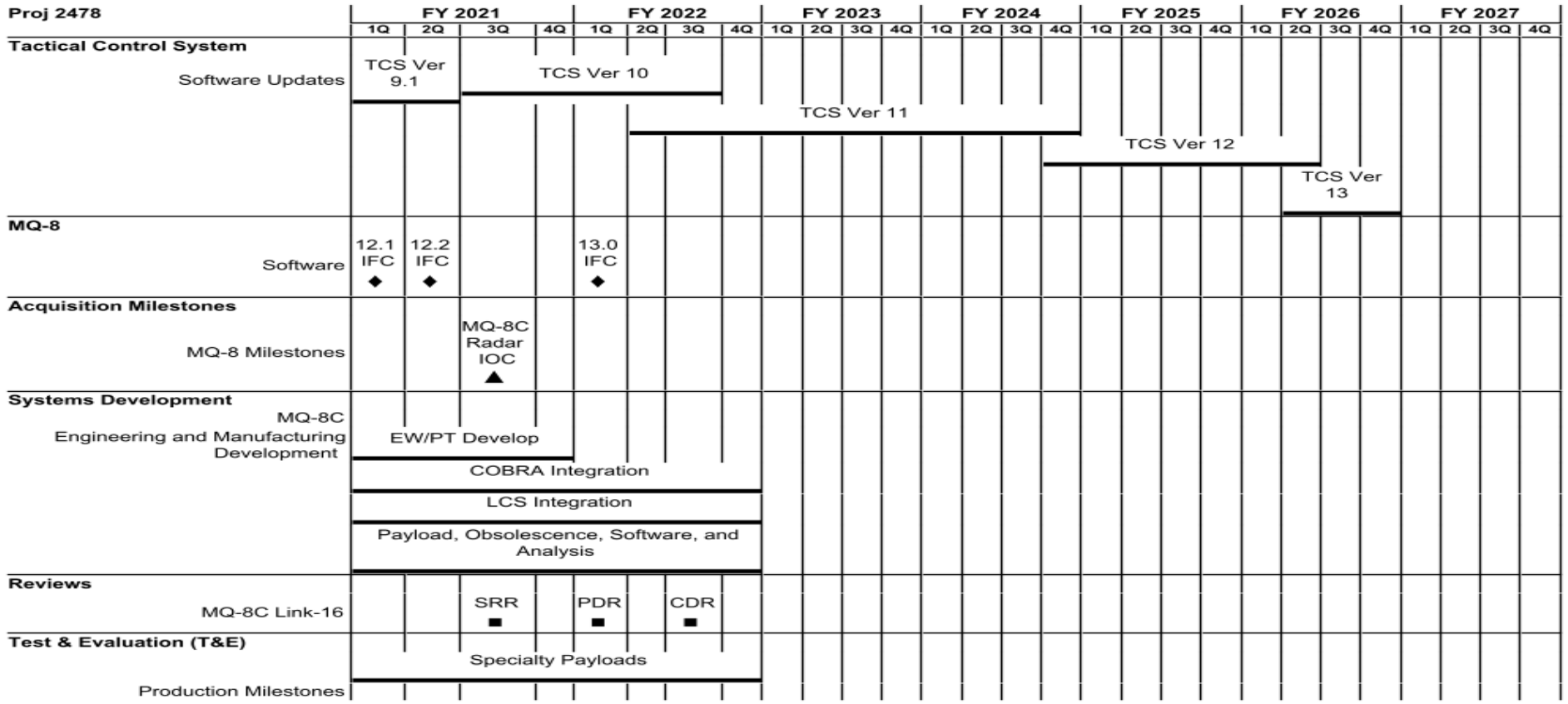
Remarks

FY 2023 increase in Management Services: Contractor Engineering support, Government Engineering support, Program Management support, and Travel relates to version 11 and correction of software deficiencies, training, resiliency and reliability upgrades.

	Prior Years	FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	287.602	7.108		9.837		10.576		-		10.576	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305204N / *Tactical Unmanned Aer Vehicles*	**Project (Number/Name)** 2478 / *Tactical Control System*



2023DON - 0305204N - 2478

Exhibit R-4A, RDT&E Schedule Details: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305204N / *Tactical Unmanned Aer Vehicles*	**Project (Number/Name)** 2478 / *Tactical Control System*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2478				
Tactical Control System: Software Updates: TCS Version 9.1	1	2021	2	2021
Tactical Control System: Software Updates: TCS Version 10	3	2021	3	2022
Tactical Control System: Software Updates: TCS Version 11	2	2022	4	2024
Tactical Control System: Software Updates: TCS Version 12	4	2024	2	2026
Tactical Control System: Software Updates: TCS Version 13	2	2026	4	2026
MQ-8: Software: 12.1 IFC	1	2021	1	2021
MQ-8: Software: 12.2 IFC	2	2021	2	2021
MQ-8: Software: 13.0 IFC	1	2022	1	2022
Acquisition Milestones: MQ-8 Milestones: MQ-8C Radar IOC	3	2021	3	2021
Systems Development: Engineering and Manufacturing Development: Electronic Warfare/Passive Targeting (EW/PT) Spec/SOW Development	1	2021	4	2021
Systems Development: Engineering and Manufacturing Development: Coastal Battlefield Reconnaissance and Analysis Intergration (COBRA), BLK 1/2/3	1	2021	4	2022
Systems Development: Engineering and Manufacturing Development: Littoral Combat Ship (LCS) Integration	1	2021	4	2022
Systems Development: Engineering and Manufacturing Development: Payload, Obsolescence, Software, and Analysis	1	2021	4	2022
Reviews: MQ-8C Link-16: Systems Readiness Review (SRR)	3	2021	3	2021
Reviews: MQ-8C Link-16: Program Design Review(PDR)	1	2022	1	2022
Reviews: MQ-8C Link-16: Critical Design Review (CDR)	3	2022	3	2022
Test & Evaluation (T&E): Specialty Payloads	1	2021	4	2022