Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy											Date: February 2018	
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 2017**	**FY 2018**	**FY 2019 Base**	**FY 2019 OCO**	**FY 2019 Total**	**FY 2020**	**FY 2021**	**FY 2022**	**FY 2023**	**Cost To Complete**	**Total Cost**
Total Program Element	253.416	8.436	7.770	8.529	-	8.529	9.471	9.512	9.685	9.467	Continuing	Continuing
2478: *Tactical Control System*	253.416	8.436	7.770	8.529	-	8.529	9.471	9.512	9.685	9.467	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program element provides for development and capability requirements for Tactical Unmanned Aerial Vehicles. Project is a Joint Military Intelligence Program.

The Tactical Control System (TCS), a component of the MQ-8 System, provides for the joint tactical MQ-8 Fire Scout System. TCS, integrated into the MQ-8 Mission Control System, provides the warfighters with the capability for day/night aerial Intelligence, Surveillance and Reconnaissance, 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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	8.436	7.770	10.070	-	10.070
Current President's Budget	8.436	7.770	8.529	-	8.529
Total Adjustments	0.000	0.000	-1.541	-	-1.541
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Rate/Misc Adjustments	0.000	0.000	-1.541	-	-1.541

Change Summary Explanation

The FY 2019 funding request was reduced by $1.400 million to account for the availability of prior year execution balances.

Schedule: TCS schedule and software improvements coincide with MQ-8 Fire Scout schedule milestones.

Technical: None

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy			Date: February 2018
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
2478: *Tactical Control System*	253.416	8.436	7.770	8.529	-	8.529	9.471	9.512	9.685	9.467	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The 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 (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, incorporate new payloads and payload capabilities (such as advanced sensors and weapons), 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. The FY19 funding increase supports final development of the MCS integration with the MQ-8C radar program.

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 migration.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: TCS Development and Integration	7.752	7.038	7.742	0.000	7.742
Articles:	-	-	-	-	-
FY 2018 Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Continue TCS integration and test with MQ-8 development. Continue new TCS capabilities to support requirements for LCS efforts. 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 payload integration and test, MQ-8C integration, and continue preparations for Common Control System (CCS) integration and demonstrations. Continue TCS Version 8 Common GCS transition. ***FY 2019 Base Plans:*** Continue TCS integration and test with MQ-8 development. Continue new TCS capabilities to support requirements for LCS efforts. 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 payload integration and test, MQ-8C integration, and continue preparations for CCS integration and demonstrations. Continue TCS Version 8 Common GCS transition and initiate TCS Version 9 CCS preparations. ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** There is no significant difference between FY 2018 and FY 2019.					
Title: Technical and Engineering Services	0.684	0.732	0.787	0.000	0.787
Articles:	-	-	-	-	-
FY 2018 Plans: Continue government engineering support, contractor support, program support, and travel for the TCS program. ***FY 2019 Base Plans:*** Continue government engineering support, contractor support, program support, and travel for the TCS program. ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** There is no significant difference between FY 2018 and FY 2019.					
Accomplishments/Planned Programs Subtotals	8.436	7.770	8.529	0.000	8.529

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
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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. TCS provides software modules to the Navy CCS and the TCS tech refresh hardware supports migration to CCS software.

E. Performance Metrics

Successfully complete Navy payloads integration, to include Coastal Battlefield Reconnaissance and Analysis (COBRA). Support MQ-8C Endurance Upgrade, Radar, and future capabilities. Successfully complete Littoral Combat Ship Integration. Complete Developmental and Operational Test.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy			Date: February 2018
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary Software Development 2	SS/CPIF	Raytheon : Falls Church,VA	37.533	7.739	Dec 2016	7.032	Dec 2017	7.742	Dec 2018	-		7.742	57.947	117.993	117.993
Prior Year Cost no longer Funded in the FYDP	C/CPAF	Raytheon : Falls Church,VA	195.332	0.000		0.000		0.000		-		0.000	0.000	195.332	195.332
Primary Software Development 2	SS/CPIF	NGC : San Diego, CA	0.173	0.000		0.000		0.000		-		0.000	0.000	0.173	0.173
		Subtotal	233.038	7.739		7.032		7.742		-		7.742	57.947	313.498	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Test and Evaluation	WR	Various : Various	1.321	0.025	Nov 2016	0.026	Nov 2017	0.027	Nov 2018	-		0.027	Continuing	Continuing	Continuing
		Subtotal	1.321	0.025		0.026		0.027		-		0.027	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Engineering Support	Various	Various : Various	3.736	0.247	Nov 2016	0.260	Nov 2017	0.268	Nov 2018	-		0.268	Continuing	Continuing	Continuing
Government Engineering Support	WR	Various : Various	10.161	0.246	Nov 2016	0.264	Nov 2017	0.268	Nov 2018	-		0.268	Continuing	Continuing	Continuing
Program Management Support	Various	Various : Various	4.791	0.156	Nov 2016	0.164	Nov 2017	0.199	Nov 2018	-		0.199	Continuing	Continuing	Continuing
Travel	WR	NAVAIR : Patuxent River, MD	0.369	0.023	Nov 2016	0.024	Nov 2017	0.025	Nov 2018	-		0.025	Continuing	Continuing	Continuing
		Subtotal	19.057	0.672		0.712		0.760		-		0.760	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy			Date: February 2018
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Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Remarks															
Travel Contract Type is TO.															

	Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	253.416	8.436		7.770		8.529		-		8.529	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305204N / *Tactical Unmanned Aer Vehicles*	**Project (Number/Name)** 2478 / *Tactical Control System*

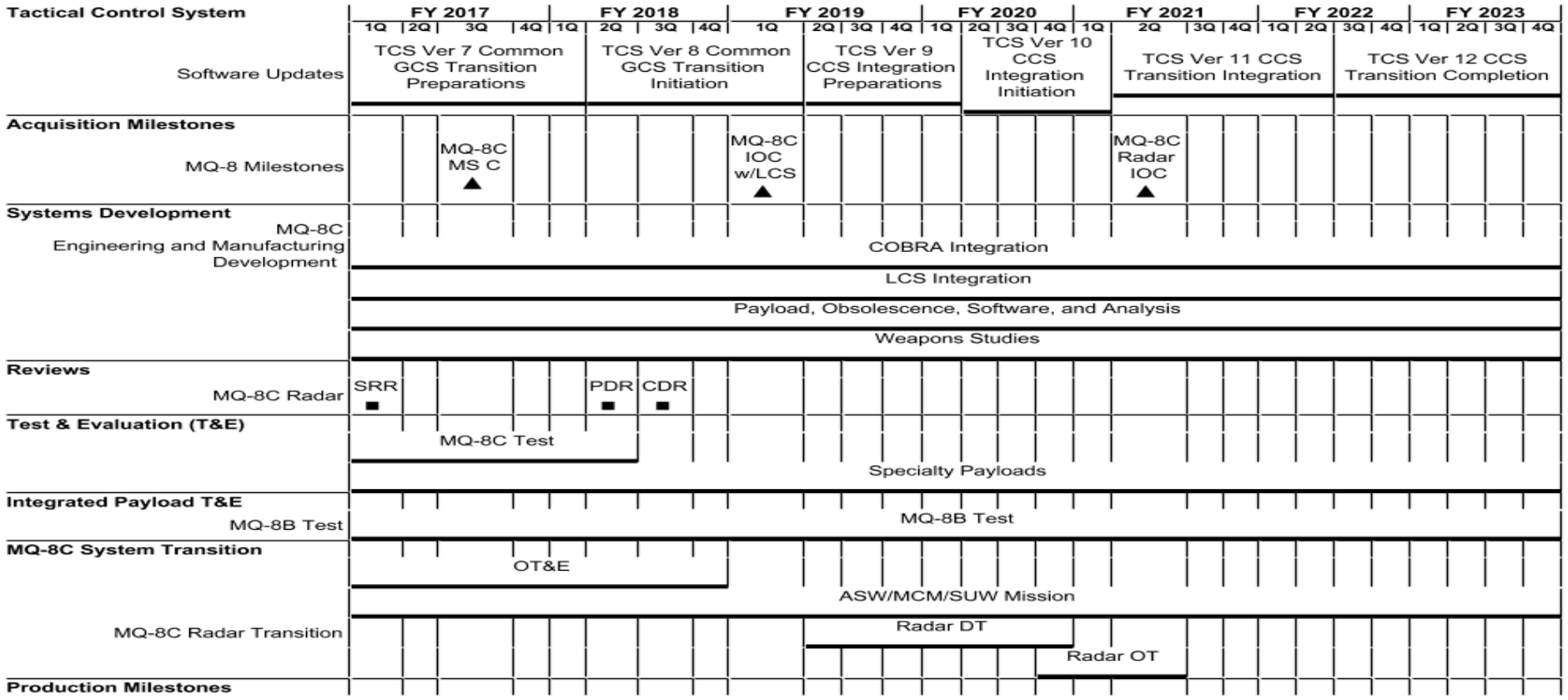

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305204N / *Tactical Unmanned Aer Vehicles*	**Project (Number/Name)** 2478 / *Tactical Control System*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Tactical Control System				
Software Updates: TCS Ver 7 Common GCS Transition Preparations	1	2017	1	2018
Software Updates: TCS Ver 8 Common GCS Transition Initiation	2	2018	1	2019
Software Updates: TCS Ver 9 CCS Integration Preparations	2	2019	1	2020
Software Updates: TCS Ver 10 CCS Integration Initiation	2	2020	1	2021
Software Updates: TCS Ver 11 CCS Transition Integration	2	2021	2	2022
Software Updates: TCS Ver 12 CCS Transition Completion	3	2022	4	2023
Acquisition Milestones: MQ-8 Milestones: MQ-8 Initial Operational Capability (IOC) MQ-8C Littoral Combat Ship (LCS)	1	2019	1	2019
Acquisition Milestones: MQ-8 Milestones: MQ-8C Milestone C	3	2017	3	2017
Acquisition Milestones: MQ-8 Milestones: MQ-8C Radar IOC	2	2021	2	2021
Systems Development: Engineering and Manufacturing Development: Coastal Battlefield Reconnaissance and Analysis Integration (COBRA), BLK 1/2/3	1	2017	4	2023
Systems Development: Engineering and Manufacturing Development: Littoral Combat Ship (LCS) Integration	1	2017	4	2023
Systems Development: Engineering and Manufacturing Development: Payload, Obsolescence, Software, and Analysis	1	2017	4	2023
Systems Development: Engineering and Manufacturing Development: Weapons Studies	1	2017	4	2023
Reviews: MQ-8C Radar: System Requirements Review (SRR)	1	2017	1	2017
Reviews: MQ-8C Radar: Preliminary Design Review (PDR)	2	2018	2	2018
Reviews: MQ-8C Radar: Critical Design Review (CDR)	3	2018	3	2018
Test & Evaluation (T&E): MQ-8C Development Test	1	2017	2	2018

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305204N / *Tactical Unmanned Aer Vehicles*	**Project (Number/Name)** 2478 / *Tactical Control System*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Test & Evaluation (T&E): Specialty Payloads	1	2017	4	2023
Integrated Payload T&E: MQ-8B Test: MQ-8B/C Test: Littoral Combat Ship (LCS) Integration	1	2017	4	2023
MQ-8C System Transition: Operational Test and Evaluation (OT&E)	1	2017	4	2018
MQ-8C System Transition: ASW/MCM/SUW Mission	1	2017	4	2023
MQ-8C System Transition: MQ-8C Radar Transition: Radar Developmental Test (DT)	2	2019	4	2020
MQ-8C System Transition: MQ-8C Radar Transition: Radar Operational Test (OT)	4	2020	2	2021