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

Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0305231N / MQ-8 UAV
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	556.132	23.144	29.618	28.968	-	28.968	19.968	13.673	8.951	9.120	34.742	724.316
2768: <i>MQ-8 Fire Scout</i>	556.132	8.844	29.618	28.968	-	28.968	19.968	13.673	8.951	9.120	34.742	710.016
9999: <i>Congressional Adds</i>	0.000	14.300	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	14.300

Program MDAP/MAIS Code:
Project MDAP/MAIS Code(s): 253

A. Mission Description and Budget Item Justification

The MQ-8 Unmanned Air System is a Joint Military Intelligence Program.

The MQ-8 Unmanned Air System (Fire Scout) program achieved MS C in June 2017. MQ-8C Unmanned Air System declared Initial Operational Capability in June 2019. The program includes MQ-8B air vehicles, MQ-8C air vehicles, and associated Mission Control Systems (MCS), Unmanned Aerial Vehicle Common Automatic Recovery Systems (UCARS) and support equipment. In addition to the air vehicles, Radar capabilities were developed under the Navy's Rapid Deployment Capability (RDC) authorities. All acquisition actions previously planned under the RDCs have transitioned into the Program of Record (POR).

The MQ-8 System provides real-time and non-real-time Intelligence, Surveillance and Reconnaissance (ISR) data to tactical users without the use of manned aircraft or reliance on limited joint theater or national assets. The baseline MQ-8 can accomplish missions including over-the-horizon tactical reconnaissance, classification, targeting and laser designation and battle damage assessment including voice communications relay. Development efforts respond to emerging fleet requirements through integration and improvements to Common Operational Picture (COP) capabilities, avionics, payloads, range, endurance, and targeting.

The MQ-8 launches and recovers vertically, and can operate from suitably-equipped air capable ships, as well as confined area land bases. Interoperability is achieved through the use of the Tactical Control System (TCS) software in the MCS, also referred to as a Ground Control Station (GCS), and through the use of the Tactical Common Data Link (TCDL). The data from the MQ-8 is provided through standard DoD Command, Control, Communications, Computers and ISR (C4ISR) system architectures and protocols.

A deployed MQ-8 system includes air vehicle(s), payloads (i.e. electro-optical/infrared/laser designator-range finder, Automated Identification System, voice communications relay, Radar, and other specialty payloads), MCS (with TCS and TC DL integrated for interoperability), a UCARS for automatic launch and recovery, and associated spares and support equipment. The schedules for MCS and UCARS components are based on host ship requirements, while schedules for air vehicle components, support equipment, and training equipment are based on operational deployment plans. A limited number of land-based mission control systems supplement the shipboard systems to support shore-based operations, such as pre-deployment or acceptance functional check flights. These land-based mission control stations will also support depot-level maintenance/post-maintenance activities. The MQ-8C provides additional mission endurance and payload-weight-power, increased reliability, and improved maintainability to the MQ-8 Fire Scout System. MQ-8 systems will support missions on Littoral Combat Ship (LCS), Expeditionary Mobile Base

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(T-ESB), FFG(X), and/or suitably-equipped air capable ships. Quantities of air vehicles are derived from LCS and/or suitably-equipped air capable ship deployment requirements for Surface Warfare and Mine Countermeasures mission sets.

The MQ-8 Radar capability is the initial effort as part of the Surface Warfare (SUW) Increment of the MQ-8C. A non-developmental maritime Radar has been competitively selected for integration into the MQ-8C Fire Scout System. This system will provide the MQ-8 operators and the supported LCS, T-ESB and FFG(X) crew enhanced situational awareness of the Recognized Maritime Picture (RMP) by providing multiple operational modes to include surface search, track, Inverse Synthetic Aperture Radar (ISAR) maritime target classification, and Synthetic Aperture Radar (SAR) target classification capabilities. The maritime Radar will be fully integrated with the Mission Control Systems (MCS) and ship's combat systems providing data in standardized format for ease of dissemination to other users. Integration of the Radar capability also includes integration of the Minotaur mission management software on both the Air Vehicle and MCS. Minotaur provides the Radar operator interface, command and control Electro-optical Infrared (EO/IR) payloads, map management, and sensor track correlation.

The MQ-8C Link-16 capability will disseminate sensor tack data to other Link-16 participants contributing to the Common Operational Picture (COP). Line-of-Sight (LOS) capability will connect Fleet users and disadvantaged users increasing situational awareness. Additionally, the Link-16 In-Flight Target Update (IFTU) capability will allow for Network Enabled Weapon Targeting (NEW-T) for Over-the-Horizon Targeting (OTH-T). Minotaur software will be used to correlate sensor data and manage the Link-16 network.

This budget prioritizes system wholeness to ensure program of record capabilities are fully integrated and support fleet requirements. System wholeness supports completion of MQ-8C operational test requirements, development of radar, and component redesign required to maintain system hardware.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	24.143	29.618	29.763	-	29.763
Current President's Budget	23.144	29.618	28.968	-	28.968
Total Adjustments	-0.999	0.000	-0.795	-	-0.795
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.999	0.000			
• SBIR/STTR Transfer	-	-			
• Program Adjustments	0.000	0.000	-0.866	-	-0.866
• Rate/Misc Adjustments	0.000	0.000	0.071	-	0.071

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 9999: *Congressional Adds*

	FY 2019	FY 2020

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Congressional Add Details (\$ in Millions, and Includes General Reductions)

Congressional Add: *Radar Integration*

Congressional Add: *Weapons Capability Integration*

Congressional Add Subtotals for Project: 9999

Congressional Add Totals for all Projects

	FY 2019	FY 2020
Congressional Add: <i>Radar Integration</i>	5.500	0.000
Congressional Add: <i>Weapons Capability Integration</i>	8.800	0.000
Congressional Add Subtotals for Project: 9999	14.300	0.000
Congressional Add Totals for all Projects	14.300	0.000

Change Summary Explanation

The FY 2021 funding request was reduced by \$0.271 million to account for the availability of prior year execution balances.

Schedule:

Updated production and delivery schedules for the current production plan.

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

Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0305231N / MQ-8 UAV				Project (Number/Name) 2768 / MQ-8 Fire Scout			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
2768: MQ-8 Fire Scout	556.132	8.844	29.618	28.968	-	28.968	19.968	13.673	8.951	9.120	34.742	710.016
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 253

A. Mission Description and Budget Item Justification

This budget prioritizes system wholeness to ensure program of record capabilities are fully integrated and support fleet requirements. System wholeness supports completion of MQ-8C operational test requirements, development of radar, development of Link-16, component redesign required to maintain system hardware and trade studies for the MQ-8C weaponization requirements.

The MQ-8 Unmanned Air System (Fire Scout) program achieved MS C in June 2017. MQ-8C Unmanned Air System declared Initial Operational Capability in June 2019. The program includes MQ-8B air vehicles, MQ-8C air vehicles, and associated Mission Control Systems (MCS), Unmanned Aerial Vehicle Common Automatic Recovery Systems (UCARS) and support equipment. In addition to the air vehicles, Radar and Weapons capabilities were developed under the Navy's Rapid Deployment Capability (RDC) authorities. All acquisition actions previously planned under the RDCs have transitioned into the Program of Record (POR).

The MQ-8 System provides real-time and non-real-time Intelligence, Surveillance and Reconnaissance (ISR) data to tactical users without the use of manned aircraft or reliance on limited joint theater or national assets. The baseline MQ-8 can accomplish missions including over-the-horizon tactical reconnaissance, classification, targeting and laser designation and battle damage assessment including voice communications relay. Development efforts respond to emerging fleet requirements through integration and improvements to Common Operational Picture (COP) capabilities, avionics, payloads, range, endurance, and targeting.

The MQ-8 launches and recovers vertically, and can operate from suitably-equipped air capable ships, as well as confined area land bases. Interoperability is achieved through the use of the Tactical Control System (TCS) software in the MCS, also referred to as a Ground Control Station (GCS), and through the use of the Tactical Common Data Link (TCDL). The data from the MQ-8 is provided through standard DoD Command, Control, Communications, Computers and ISR (C4ISR) system architectures and protocols.

A deployed MQ-8 system includes air vehicle(s), payloads (i.e. electro-optical/infrared/laser designator-range finder, Automated Identification System, voice communications relay, Radar, and other specialty payloads), MCS (with TCS and TC DL integrated for interoperability), a UCARS for automatic launch and recovery, and associated spares and support equipment. The schedules for MCS and UCARS components are based on host ship requirements, while schedules for air vehicle components, support equipment, and training equipment are based on operational deployment plans. A limited number of land-based mission control systems supplement the shipboard systems to support shore-based operations, such as pre-deployment or acceptance functional check flights. These land-based mission control stations will also support depot-level maintenance/post-maintenance activities. The MQ-8C provides additional mission endurance and payload-weight-power, increased reliability, and improved maintainability to the MQ-8 Fire Scout System. MQ-8 systems will support missions on Littoral Combat Ship (LCS), Expeditionary Mobile Base (T-ESB), FFG(X), and/or suitably-equipped air capable ships. Quantities of air vehicles are derived from LCS and/or suitably-equipped air capable ship deployment requirements for Surface Warfare and Mine Countermeasures mission sets.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305231N / MQ-8 UAV	Project (Number/Name) 2768 / MQ-8 Fire Scout

The MQ-8 Radar capability is the initial effort as part of the Surface Warfare (SUW) Increment of the MQ-8C. A non-developmental maritime Radar has been competitively selected for integration into the MQ-8C Fire Scout System. This system will provide the MQ-8 operators and the supported Littoral Combat Ship (LCS) crew enhanced situational awareness of the Recognized Maritime Picture (RMP) by providing multiple operational modes to include surface search, track, Inverse Synthetic Aperture Radar (ISAR) maritime target classification, and Synthetic Aperture Radar (SAR) target classification capabilities. The maritime Radar will be fully integrated with the Mission Control Systems (MCS) and ship's combat systems providing data in standardized format for ease of dissemination to other users.

The MQ-8C Link-16 capability will disseminate sensor tack data to other Link-16 participants contributing to the Common Operational Picture. This capability will connect Fleet users and disadvantaged users increasing situational awareness. Additionally, the Link-16 In-Flight Target Update (IFTU) capability will allow for Network Enabled Weapon Targeting (NEW-T) for Over-the-Horizon Targeting (OTH-T). Minotaur will be used to correlate sensor data and manage the Link-16 network.

The MQ-8C Weapons capability integration study will evaluate weapons requirements outlined in the MQ-8C Capabilities Production Document (CPD). Weapons trade study will be conducted to assess the mission effectiveness and potential impacts of adding candidate weapons systems to the MQ-8C Fire Scout in a Surface Warfare (SUW) scenario. Additional trade studies will be conducted to analyze weapons platform integration, software architecture, stores management, and air vehicle structural requirements for addition of the MQ-8C Weapons capability.

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Hardware and System Development	1.193	13.716	10.654	0.000	10.654
Articles:	-	-	-	-	-
FY 2020 Plans: Continue MQ-8C hardware, software modifications, other payload integration, cyber vulnerability closure and safety capability improvements such a backup landing system and collision avoidance systems. Continue MQ-8 integration and testing on LCS. Continue integration of the selected Radar with the MQ-8C Air Vehicle and MCS. Award contracts and hold System Requirements Review (SRR) for Link-16. Complete System Integration Lab (SIL) testing associated with Correction of Deficiencies(COD)software build for the maritime Radar integration. Continue MQ-8 FOT&E.					
FY 2021 Base Plans: Continue MQ-8C hardware, software modifications, other payload integration, cyber vulnerability closure and safety capability improvements such a backup landing system and collision avoidance systems. Continue MQ-8 integration and testing on LCS. Continue integration and test of the selected Radar with the MQ8-C Air Vehicles and MCS. Conduct MQ-8C Link-16 Preliminary Design Review (PDR)/Critical Design Review (CDR). Develop software build for Link-16 integration.					
FY 2021 OCO Plans:					

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
N/A					
<p><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Decrease due to completion of SIL testing associated with correction of deficiencies software build for the maritime Radar integration. The FY 2021 funding request was reduced by 271K to account for the availability of prior year execution balances.</p> <p><i>Title:</i> Development/Operational Testing</p> <p align="right"><i>Articles:</i></p> <p><i>FY 2020 Plans:</i> Continue MQ-8C developmental testing of hardware and software modifications and planning for other payload integration. Continue developmental testing of maritime Radar on the MQ-8C Air Vehicle. Continue MQ-8 Follow-on Operational Test and Evaluation (FOT&E). Support Link-16 integration efforts on the MQ-8C to include System Requirements Review (SRR).</p> <p><i>FY 2021 Base Plans:</i> Continue MQ-8C developmental testing of hardware and software modifications and planning for other payload integration. Complete MQ-8C Radar DT. Conduct MQ-8C Radar FOT&E.</p> <p><i>FY 2021 OCO Plans:</i> N/A</p> <p><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Increase due to the delay of Radar Developmental Test initiating from 3QFY19 to 4QFY19, specialty payloads testing and preparation efforts to support Link-16 System Requirement Review.</p>	4.269	7.103	8.901	0.000	8.901
	-	-	-	-	-
<p><i>Title:</i> Engineering and Technical Services</p> <p align="right"><i>Articles:</i></p> <p><i>FY 2020 Plans:</i> Continue engineering, program technical management, logistics support of the MQ-8C. Continue acquisition planning and execution to transition the Radar and Weapons capabilities. Continue Radar, Weapons, other payloads, LCS integration, and system studies and design. Continue MQ-8 FOT&E. Initiate Link-16 System integration studies and procurement development. Award contracts and hold System Requirements Review (SRR) for the Link-16 Program of Record.</p> <p><i>FY 2021 Base Plans:</i></p>	3.382	8.799	9.413	0.000	9.413
	-	-	-	-	-

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Continue engineering, program technical management, logistics support of the MQ-8C. Continue acquisition planning and execution to transition the Radar capabilities. Continue Radar, Weapons, other payloads, LCS integration, and system studies and design. Continue MQ-8 FOT&E. Award contracts for L-16 integration and test. Conduct Link-16 integration PDR/CDR. FY 2021 OCO Plans: N/A FY 2020 to FY 2021 Increase/Decrease Statement: Increase of funding to support Link-16 and Radar with additional engineering and technical requirements associated with design reviews.					
Accomplishments/Planned Programs Subtotals	8.844	29.618	28.968	0.000	28.968

C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• APN/0443: MQ-8 UAV	89.061	44.957	40.431	-	40.431	59.273	40.539	41.344	42.171	67.114	1,634.127
• APN/0605: MQ-8 UAV Spares	4.710	0.099	1.597	-	1.597	0.000	0.000	0.000	0.000	15.939	22.345
• APN/0588: MQ-8 Series	37.907	34.686	28.508	-	28.508	33.901	19.258	16.084	19.716	25.096	280.142

Remarks

D. Acquisition Strategy

The Navy's acquisition strategy capitalizes on prior Rapid Deployment Capability efforts, while leveraging existing program investments. The acquisition strategy maintains commonality of MQ-8B and MQ-8C systems, payloads, avionics, software, and ancillary equipment where possible. The acquisition strategy supports the revised Capability Production Document. Initial Operational Capability (IOC) of an MQ-8B-based system was achieved in 2QFY14. IOC of an MQ-8C-based system onboard Littoral Combat Ship (LCS) was achieved in 3QFY19. The maritime Radar has been competitively selected. The integration effort will require sole source contracts to the current prime Original Equipment Manufacturers (OEM) for the Tactical Control System (TCS) and the MQ-8 Fire Scout air vehicle. The Link-16 effort will require sole source contracts to the current OEM for the TCS, Link-16 J-series Message Implementation Plan, and the MQ-8 Fire Scout air vehicle. Existing Department of Defense contracts will be leveraged for Link-16 Terminal, Minotaur, and peripheral procurements.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy **Date:** February 2020

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305231N / MQ-8 UAV	Project (Number/Name) 2768 / MQ-8 Fire Scout
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Primary Hardware Development (MQ-8)	C/CPIF	Northrop Grumman Corp : San Diego, CA	372.042	0.392	Nov 2018	5.566	Jan 2020	0.000		-		0.000	0.000	378.000	378.000
Primary Hardware Development (MQ-8)	C/CPIF	Raytheon Corp : Falls Church, VA	26.788	0.801	Nov 2018	0.650	Jan 2020	0.000		-		0.000	0.000	28.239	28.239
Primary Hardware Development (RADAR OEM)	C/CPIF	Leonardo MW : Edinburgh, United Kingdom	10.821	0.000		0.000		0.000		-		0.000	0.000	10.821	10.821
Primary Hardware Development (Minotaur)	C/BA	John Hopkins University : Laurel, MD	7.293	0.000		0.000		0.000		-		0.000	0.000	7.293	7.293
Primary Hardware Development(Link-16)	C/CPIF	Northrop Grumman : San Diego, CA	0.000	0.000		4.500	Jun 2020	2.274	Jun 2021	-		2.274	4.100	10.874	10.874
Primary Hardware Development(Link-16)	C/CPIF	Raytheon Corp : Falls Church, VA	0.000	0.000		1.000	Jun 2020	1.780	Jun 2021	-		1.780	1.000	3.780	3.780
Primary Hardware Development(Link-16)	C/BA	John Hopkins University : Laurel, MD	0.000	0.000		1.000	Mar 2020	4.500	Mar 2021	-		4.500	2.300	7.800	7.800
Primary Hardware Development(Link-16)	TBD	TBD : TBD	0.000	0.000		1.000	Mar 2020	2.100	Mar 2021	-		2.100	1.000	4.100	4.100
Subtotal			416.944	1.193		13.716		10.654		-		10.654	8.400	450.907	N/A

Remarks

1. Decrease from FY20 to FY21 for Prim Hw Dev NGC was due to Radar integration being completed in FY20.
2. Decrease from FY20 to FY21 for Prim Hw Dev (Link-16) NGC supported the completion of Link-16 System Requirements Review and System Functional Review. FY21 efforts will focus on Link-16 hardware integration.
3. Increase from FY20 to FY21 for Prim Hw Dev (Link-16) JHU effort supports finalization of software requirements and the required updates to the Minotaur software to integrate with the Link-16 terminal hardware.
4. Increase from FY20 to FY21 for Prim Hw Dev (Link-16) TBD will support finalization of the Link-16 system design and will deliver Link-16 hardware terminals for test.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy **Date:** February 2020

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305231N / MQ-8 UAV	Project (Number/Name) 2768 / MQ-8 Fire Scout
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Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Integrated Logistics Support	Various	Various : Various	4.870	0.385	Nov 2018	0.250	Dec 2019	0.712	Dec 2020	-		0.712	9.719	15.936	-
Subtotal			4.870	0.385		0.250		0.712		-		0.712	9.719	15.936	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Developmental Test & Evaluation	WR	NAWCAD : PAXRV, MD	28.844	3.485	Nov 2018	3.500	Dec 2019	3.601	Dec 2020	-		3.601	21.414	60.844	-
Operational Test & Evaluation/QRA	WR	NAWC : Various	17.481	0.784	Nov 2018	3.603	Nov 2019	5.300	Nov 2020	-		5.300	15.019	42.187	-
Prior Years T&E no longer funded in the FYDP	Various	Various : Various	1.646	0.000		0.000		0.000		-		0.000	0.000	1.646	-
Subtotal			47.971	4.269		7.103		8.901		-		8.901	36.433	104.677	N/A

Remarks

- FY20-21 increase of funding required to support Radar DT/OT efforts.

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Government Engineering Support	WR	NAWCAD : PAXRV, MD	62.053	2.000	Nov 2018	5.146	Dec 2019	5.930	Dec 2020	-		5.930	21.968	97.097	-
Program Management Support	Various	Various : Various	19.825	0.712	Nov 2018	3.153	Dec 2019	2.521	Dec 2020	-		2.521	7.813	34.024	-
Travel	WR	NAVAIR : PAXRV, MD	2.012	0.285	Nov 2018	0.250	Dec 2019	0.250	Dec 2020	-		0.250	2.121	4.918	-
Prior years Mgmt Svcs no longer funded in the FYDP	Various	Various : Various	2.457	0.000		0.000		0.000		-		0.000	0.000	2.457	-
Subtotal			86.347	2.997		8.549		8.701		-		8.701	31.902	138.496	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy **Date:** February 2020

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305231N / MQ-8 UAV	Project (Number/Name) 2768 / MQ-8 Fire Scout
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			

Remarks
 1. FY20 government engineering supports both Radar and Link-16 development and integration events.
 2. Increase from FY20 to FY21 due to inflation and Navy Working Capital Fund rate model adjustments.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	556.132	8.844	29.618	28.968	-	28.968	86.454	710.016	N/A

Remarks
 OT&E includes MQ-8C FOT&E

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy **Date:** February 2020

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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Proj 2768				
Milestones: MQ-8 Initial Operational Capability (IOC) - MQ-8C Littoral Combat Ship (LCS)	3	2019	3	2019
Milestones: MQ-8C Radar IOC	3	2021	3	2021
Milestones: MQ-8C Initial Operational Capability (IOC) Link-16	4	2023	4	2023
Systems Development: Engineering and Manufacturing Development: Coastal Battlefield Reconnaissance and Analysis Integration (COBRA), BLK 1/2/3	1	2019	4	2025
Systems Development: Engineering and Manufacturing Development: Littoral Combat Ship (LCS) Integration	1	2019	4	2023
Systems Development: Engineering and Manufacturing Development: Payload, Obsolescence, Software, and Analysis	1	2019	4	2025
Systems Development: Engineering and Manufacturing Development: Software Increment 12.0	4	2019	4	2019
Systems Development: Engineering and Manufacturing Development: Software Increment 12.1	4	2019	4	2020
Systems Development: Engineering and Manufacturing Development: Software Increment 12.2	3	2022	3	2023
Systems Development: Engineering and Manufacturing Development: Software Increment 13.0	3	2022	3	2023
Systems Development: Engineering and Manufacturing Development: Software Increment 14.0	4	2023	4	2024
Systems Development: Engineering and Manufacturing Development: Software Increment 15.0	2	2025	2	2025
Reviews: MQ-8C Link-16: System Requirement Review (SRR)	4	2020	4	2020
Reviews: MQ-8C Link-16: MQ-8C Link 16 Preliminary Design Review (PDR) / Critical Design Review	3	2021	3	2021

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy **Date:** February 2020

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305231N / MQ-8 UAV	Project (Number/Name) 2768 / MQ-8 Fire Scout
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Test & Evaluation (T&E): Specialty Payloads	1	2019	4	2025
Test & Evaluation (T&E): MQ-8C Dynamic Interface (DI) Testing LCS Odd Class	1	2019	4	2019
MQ-8C System Transition: Operational Test and Evaluation (OT&E)	1	2019	4	2020
MQ-8C System Transition: MQ-8C Radar Transition: Radar Developmental Test (DT)	4	2019	1	2021
MQ-8C System Transition: MQ-8C Radar Transition: Radar Operational Test (OT)	1	2021	2	2021
MQ-8C System Transition: MQ-8C Link-16 Transition: Link-16 Development Test (DT)	3	2022	4	2022
MQ-8C System Transition: MQ-8C Link-16 Transition: Link-16 Operational Test (OT)	1	2023	2	2023
Production Milestones: Contract Awards: MQ-8C Link-16 Phase I	3	2020	3	2020
Production Milestones: Contract Awards: MQ-8C Link-16 Phase II	2	2021	2	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy										Date: February 2020		
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0305231N / MQ-8 UAV				Project (Number/Name) 9999 / Congressional Adds			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
9999: <i>Congressional Adds</i>	0.000	14.300	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	14.300
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The MQ-8 Unmanned Air System program (Fire Scout), includes MQ-8B air vehicles (AV), MQ-8C AV, associated Mission Control Systems (MCS), Unmanned Aerial Vehicle Common Automatic Recovery Systems (UCARS), and payloads, to include Radar and weapons capabilities.

The MQ-8 System provides real-time and non-real-time Intelligence, Surveillance and Reconnaissance (ISR) data to tactical users without the use of manned aircraft or reliance on limited joint theater or national assets. The baseline MQ-8 can accomplish missions including over-the-horizon tactical reconnaissance, classification, targeting and laser designation and battle damage assessment (including voice communications relay). Development efforts respond to emerging fleet requirements through integration and improvements to Common Operational Picture capabilities, avionics, payloads, range, endurance, and targeting.

The MQ-8 launches and recovers vertically, and can operate from suitably-equipped air capable ships, as well as confined area land bases. Interoperability is achieved through the use of the Tactical Control System (TCS) software in the MCS, also referred to as a Ground Control Station (GCS), and through the use of the Tactical Common Data Link (TCDL). The data from the MQ-8 is provided through standard DoD Command, Control, Communications, Computers and ISR (C4ISR) system architectures and protocols.

A deployed MQ-8 system includes air vehicle(s), payloads (i.e. electro-optical/infrared/laser designator-range finder, Automated Identification System, voice communications relay, Radar, Weapons, and other specialty payloads), MCS (with TCS and TC DL integrated for interoperability), a UCARS for automatic launch and recovery, and associated spares and support equipment.

The MQ-8 Radar capability is the initial effort of the Surface Warfare (SUW) Increment to the MQ-8C. A non-developmental maritime Radar has been competitively selected for integration into the MQ-8C Fire Scout System. This system will provide MQ-8 operators enhanced situational awareness of the Recognized Maritime Picture (RMP) by providing multiple operational modes to include surface search, track, Inverse Synthetic Aperture Radar (ISAR) maritime target classification, and Synthetic Aperture Radar (SAR) target classification capabilities. The maritime Radar will be fully integrated with the MCS and ship's combat systems, providing data in standardized format for ease of dissemination to other users.

The MQ-8C Weapons Capability Integration study will evaluate weapons requirements outlined in the MQ-8C Capabilities Production Document (CPD). Weapons trade study will be conducted to assess the mission effectiveness and potential impacts of adding candidate weapons systems to the MQ-8C Fire Scout in a Surface Warfare (SUW) scenario. Additional trade studies will be conducted to analyze weapons platform integration, software architecture, stores management, and air vehicle structural requirements for addition of the MQ-8C Weapons capability.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy	Date: February 2020
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Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305231N / MQ-8 UAV	Project (Number/Name) 9999 / Congressional Adds
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020
<p>Congressional Add: Radar Integration</p> <p>FY 2019 Accomplishments: Continued integration of the selected Radar with the MQ-8C AV and Mission Control Station (MCS) and completed qualification of the selected Radar for the MQ-8C operational environment. Provided engineering, program technical management, logistics and T&E support of the MQ-8C AV and Radar programs.</p> <p>FY 2020 Plans: N/A</p>	5.500	0.000
<p>Congressional Add: Weapons Capability Integration</p> <p>FY 2019 Accomplishments: Conducted and completed a weapons trade study to assess the mission effectiveness and potential impacts of adding a candidate weapons systems to the MQ-8C AV in a surface warfare scenario. Conducted and completed additional trade studies to analyze weapons platform integration, software architecture, stores management, and MQ-8C AV structural requirements for the addition of weapons capabilities. Developed program and technical plans to integrate selected weapon on the MQ-8C.</p> <p>FY 2020 Plans: N/A</p>	8.800	0.000
Congressional Adds Subtotals	14.300	0.000

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy **Date:** February 2020

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305231N / MQ-8 UAV	Project (Number/Name) 9999 / Congressional Adds
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Primary Hardware Development (Weapons)	C/CPIF	NGC : San Diego, CA	0.000	1.000	Jun 2019	0.000		0.000		-		0.000	0.000	1.000	-
Primary Hardware Development (Weapons)	C/CPIF	Raytheon Corp : Falls Church, VA	0.000	1.000	Jun 2019	0.000		0.000		-		0.000	0.000	1.000	-
Primary Hardware Development (Weapons)	TBD	Bell : Not Specified	0.000	0.500	Jun 2019	0.000		0.000		-		0.000	0.000	0.500	-
Primary Hardware Development (Weapons)	C/BA	John Hopkins University : Laurel, MD	0.000	0.500	Jun 2019	0.000		0.000		-		0.000	0.000	0.500	-
Primary Hardware Development (Weapons)	TBD	TBD : TBD	0.000	1.500	Jun 2019	0.000		0.000		-		0.000	0.000	1.500	-
Primary Hardware Development (Radar)	TBD	TBD : TBD	0.000	1.460	Jun 2019	0.000		0.000		-		0.000	0.000	1.460	-
Subtotal			0.000	5.960		0.000		0.000		-		0.000	0.000	5.960	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Integrated Logistics (Radar)	WR	Various : Various	0.000	0.240	Feb 2019	0.000		0.000		-		0.000	0.000	0.240	-
Subtotal			0.000	0.240		0.000		0.000		-		0.000	0.000	0.240	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Development & Test Eval (Radar)	WR	NAWCAD : Pax Rvr, MD	0.000	3.800	Feb 2019	0.000		0.000		-		0.000	0.000	3.800	-
Subtotal			0.000	3.800		0.000		0.000		-		0.000	0.000	3.800	N/A

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy **Date:** February 2020

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305231N / MQ-8 UAV	Project (Number/Name) 9999 / Congressional Adds
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Proj 9999				
Systems Development: Engineering and Manufacturing Development: Weapons Studies (Weapons)	2	2019	4	2020
Systems Development: Engineering and Manufacturing Development: Radar Payloads, Obsolescence, Software and Analysis	2	2019	4	2020
MQ-8C System Transition: MQ-8C Radar Transition: Radar Developmental Test (DT)	3	2019	4	2020