Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Office of the Secretary Of Defense	Date: May 2021
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604331D8Z / *Rapid Prototyping Program*

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	243.180	70.227	92.023	103.575	-	103.575	-	-	-	-	-	-
638: *Rapid Prototyping Program*	243.180	70.227	92.023	103.575	-	103.575	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

In partnership with the Services and Defense Agencies, the Rapid Prototyping Program (RPP) encourages joint Service development through prototyping efforts that reduce risk, establish affordable and realistic requirements, and support timely development of fieldable capabilities. RPP addresses priorities identified by the National Defense Strategy, the Department of Defense (DoD) modernization priorities, the emerging Joint Warfighting Concept (JWC) needs, and Service or Agency identified capability gaps. New projects are selected with inputs from the Services and Agencies, the Joint Staff, the Combatant Commands, the Strategic Capabilities Office, the Defense Innovation Unit, and other organizations in order to minimize duplication, synchronize prototyping efforts, and target projects with the widest benefit to the joint warfighter. Overarching program goals include DoD and international (as applicable) modernization of cross-cutting technology areas; enhanced warfighter lethality; providing fieldable end-to-end mission capabilities for Services and Joint application; leveraging international technologies for prototyping and informing programs of record; and delivering capabilities more quickly than traditional acquisition.

RPP develops prototypes that reduce technical and integration risk to define and improve requirements for programs of record. RPP project selection aligns to DoD modernization priorities including artificial intelligence / machine learning; autonomous systems; hypersonics; electronic warfare; sensors for intelligence, surveillance, and reconnaissance (ISR); and fire control. RPP rapidly develops and fields cross-cutting, prototype capabilities that demonstrate in an operational environment to inform DoD and Service leadership.

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	72.351	102.023	104.452	-	104.452
Current President's Budget	70.227	92.023	103.575	-	103.575
Total Adjustments	-2.124	-10.000	-0.877	-	-0.877
• Congressional General Reductions	-	-10.000			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-2.112	-			
• Program Adjustments	-0.012	-	-0.877	-	-0.877

Change Summary Explanation

Fiscal Year 2021 net reduction of $10.000 million is directed by Congress. Fiscal Year 2022 net reduction of $0.877 million to support economic assumption.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Office of the Secretary Of Defense			Date: May 2021
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604331D8Z / *Rapid Prototyping Program*	Project (Number/Name) 638 / *Rapid Prototyping Program*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
638: *Rapid Prototyping Program*	243.180	70.227	92.023	103.575	-	103.575	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Rapid Prototyping Program (RPP) develops prototypes to deliver capabilities, reduce risk, and inform requirements. RPP facilitates and accelerates joint, cross-cutting prototyping efforts within the Services and Defense Agencies. This program has the agility to select, fund, and implement projects in the year of execution as new opportunities or threats emerge. In consultation with the Service Science and Technology (S&T) executives, selected projects generally receive a single year of funding to accelerate capability transition to Services' and Agencies' programs of record. Projects deemed to be critical to Modernization by the Under Secretary of Defense for Research and Engineering (USD(R&E)) receive higher amounts of funding across multiple years. Planned funding supports the National Defense Strategy, the DoD modernization priorities, and Service and Agency needs, enabling rapid response to emergent and time-sensitive threats.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: High Altitude Long Endurance (HALE) Architecture Technical Demonstration ***Description:*** HALE provided a modular space, stratospheric, air-breathing, and surface based system designed to meet specific mission needs. This system serves as a special communications, full motion video, and tactical system provider out of range of most enemy detection and/or interdiction systems with a large operating envelope. Depending on warfighter requirements, the HALE platform can be modified to fly payloads ranging from Synthetic Aperture Radar (SAR), Electro-optical (EO)/Infra-red (IR) systems, tactical Unmanned Aerial Systems (UAS), communications systems, and tracking systems. The capability was demonstrated at Valiant Shield 20.	4.300	-	-
Title: Stratospheric Intelligence, Reconnaissance, and Surveillance (ISR) Technical Demonstration ***Description:*** The Stratospheric ISR project supported technology development of stratospheric capabilities in order to enable, expedite maturation, and inform transition of U.S. government high-altitude initiatives. This demonstration effort is a leading Department of Defense (DoD) effort to operationalize the stratosphere by offering increased demonstration of high-altitude intelligence, surveillance, and reconnaissance (ISR) and communication systems. The project is focused on the National Defense Strategy principle of "moving at the speed of relevance" for prototyping and experimentation. The project employed small, tactical zero-pressure balloons as well as larger super-pressure balloons while leveraging recent advances made in the commercial sector including sensors and communications links to enable military applications. The effort successfully demonstrated multiple capabilities at Valiant Shield 20.	4.400	-	-
Title: Maritime Prepositioning Squadron (MPSRON) Support to Valiant Shield 20	3.000	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Office of the Secretary Of Defense		Date: May 2021
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604331D8Z / *Rapid Prototyping Program*	**Project (Number/Name)** 638 / *Rapid Prototyping Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Description: This project provided MPSRON support to the Valiant Shield 20 joint exercise to demonstrate the ability to perform intelligence, surveillance, and reconnaissance (ISR) collection against maritime vessels in a contested and degraded environment. MPSRON vessels served as stationary targets in port and moving targets at sea utilizing resilient communications and ISR sensors to impose time constraints on a targeting cycle. MPSRON support to Valiant Shield 20 facilitated demonstration of enhanced lethality prototypes and directly aligns with the National Defense Strategy elements focused on developing creative operational concepts and accelerating the cycle of innovation.			
Title: Naval Surface Warfare Center Port Hueneme Detachment (NSWC PHD) Demonstration Support ***Description:*** This effort provided NSWC PHD - White Sands Missile Range (WSMR) support to Valiant Shield 20. NSWC PHD - WSMR provided support for test events including emitter placement, route planning, and mission execution. This support included the locating and use of a 16-vehicle convoy to include realistic target and support vehicles; location and shipping of threat emitters; global positioning system support from Fort Bliss with towers and drivers; and post-mission data reduction and defined level of situational display during conduct of tests. This funding provided support throughout FY 2020.	5.700	-	-
Title: Distributed Network Resiliency Technical Demonstration ***Description:*** The Distributed Network Resiliency effort demonstrated and provided a resilient aerial network to connect forward based agencies and sensors to ground and maritime command and weapons providing assured command and control in a contested spectrum environment. This effort demonstrated the ability to pass advanced sensor data back to a processing system to be used to provide updates to loitering strike assets. This effort provided data transport over the horizon for platforms across multiple domains and transitioned to the U.S. Navy.	5.672	-	-
Title: Unmanned Systems Technical Demonstration ***Description:*** Unmanned Systems is a Joint Capability Technology Demonstration (PE 0603648D8Z) project that developed autonomous unmanned air systems to accomplish intelligence, surveillance, and reconnaissance (ISR) and electronic warfare (EW) operations n areas inaccessible to manned platforms to find, fix, track, and target mobile targets. In FY 2020, funding from RPP was used to demonstrate the effort in an operational environment, showing EW effects in support of autonomous ISR operations. This effort offers the Combatant Commanders increased operational capacity and resilience by enabling the Joint Force Commander to deliver and adapt effects in dynamic, highly contested areas and support dynamic over-the-horizon targeting concepts. This capability transitioned to a U.S. Marine Corps Program of Record.	4.726	-	-
Title: SCIFIRE ***Description:*** The Southern Cross Integrated Flight Research Experiment (SCIFIRE) is a joint U.S.- Australia (AUS) partnership to develop and demonstrate an air-launched air-breathing hypersonic weapon prototype leveraging previous science and technology	29.200	37.900	45.400

Exhibit R-2A, RDT&E Project Justification: PB 2022 Office of the Secretary Of Defense		Date: May 2021
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604331D8Z / *Rapid Prototyping Program*	**Project (Number/Name)** 638 / *Rapid Prototyping Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
investments in hypersonics. SCIFIRE will further mature hypersonic cruise missile technologies to engage time-critical, heavily defended, and high-value targets in a contested environment. The SCIFiRE form factor provides enhanced capability by allowing for integration on fighter aircraft. In FY 2020, funding established the Air Force Hypersonic Prototyping Program Office and supported initial prototyping risk reduction activities. ***FY 2021 Plans:*** Continue risk reduction activities, finalize system requirements, and establish Weapons Open System Architecture (WOSA) evaluation criteria. Begin system design efforts and digital system modeling. ***FY 2022 Plans:*** Continue Weapons Open System Architecture (WOSA) implementation, system design efforts for the potential OS alternatives, and digital system modeling. Begin Operational Flight Program (OFP) development, building aircraft integration assets, and wind tunnel testing. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** FY 2022 funding increases as to support prototyping and demonstration prior to transition into Air Force.			
Title: Joint Affordable Kill-Chain Closure (JAKCC)	13.229	30.000	50.000
Description: JAKCC supports the National Defense Strategy's priorities to modernize key capabilities and evolve innovative operational concepts. This effort integrates the fully networked command, control, and communications (FNC3); autonomy; electronic warfare (EW); and intelligence, surveillance, and reconnaissance (ISR) prototypes developed on an autonomous platform. A series of incremental demonstration and experimentation activities are executed in coordination with the Services and Combatant Commands to validate the platform integrated prototype capability to accelerate development and adoption of cost effective and interoperable solutions for defense challenges. The JAKCC project leverages a government reference architecture developed in coordination with the Services and Combatant Commands to enable a Service agnostic prototype acquisition strategy. In coordination with the Services and Combatant Commands, in FY 2020, the JAKCC project developed a Service agnostic prototype acquisition strategy and created a government reference architecture. Additional details are classified. ***FY 2021 Plans:*** In FY 2021, the JAKCC project initiates system engineering and platform system design changes to enable integration of prototype FNC3, EW, and ISR payloads. JAKCC completes system design for FNC3, EW, and ISR payloads and initiates			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Office of the Secretary Of Defense		Date: May 2021
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604331D8Z / *Rapid Prototyping Program*	**Project (Number/Name)** 638 / *Rapid Prototyping Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
prototype development. Additionally, the project completes preliminary planning in coordination with the Services and Combatant Commands and schedules initial technology demonstration for late-FY 2022. ***FY 2022 Plans:*** In FY 2022, the JAKCC project completes prototype payload development. Prototypes undergo testing in laboratory and operationally-relevant conditions prior to integration onto prototype autonomous platforms and the execution of the initial technology demonstration in late-FY 2022. The project begins preliminary planning for a FY 2023 operational demonstration in coordination with the Services and Combatant Commands. JAKCC culminates in a FY 2023 operational demonstration prior to transitioning to multiple Service programs of record for integration. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** In FY 2022, funding increases to complete payload development, platform integration, and demonstration activities.			
Title: Advanced Prototyping to Support DoD Modernization Priorities ***Description:*** This effort prototypes cutting-edge land, sea, undersea, air, and space capabilities critical to the National Defense Strategy and Modernization priorities and objectives of the Department of Defense (DoD). This effort matures and experiments with operationally representative prototypes of fully networked command, control, and communications; 5G; space; autonomy; hypersonics; cyber; directed energy; bio-technology, and machine learning systems to accelerate development and adoption of cost effective and interoperable solutions for defense challenges. Selected projects demonstrate and deliver mature prototypes to Service programs of record; mitigate risk in DoD programs; and help characterize potential concepts of operations. Advanced prototyping activities seek to rapidly demonstrate capabilities that can help maintain the U.S. technological edge. Demonstration of advanced prototypes will involve partnerships with the Services, industry, academia, and non-traditional DoD partners. ***FY 2021 Plans:*** Projects will be selected in the year of execution to support National Defense Strategy priorities, DoD Modernization priorities, and gaps in the joint Services' investments. Projects will focus on cost-effective, mission-focused efforts to design, mature, and deliver new concepts and technology prototypes aimed at supporting the Joint Force. One to two prototype efforts are anticipated in FY 2021, leveraging Joint, Service, and interagency partnerships. ***FY 2022 Plans:*** Projects will be selected in the year of execution to support National Defense Strategy priorities, DoD Modernization priorities, and gaps in the joint Services' investments. Projects focus on cost-effective, mission-focused efforts to design, mature, and deliver new concepts and technology prototypes aimed at supporting the Joint Force. One to two prototype efforts are anticipated in FY 2021, leveraging Joint, Service, and interagency partnerships. ***FY 2021 to FY 2022 Increase/Decrease Statement:***	-	24.123	8.175

Exhibit R-2A, RDT&E Project Justification: PB 2022 Office of the Secretary Of Defense		Date: May 2021
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
RPP anticipates decreasing funding in this focus area to align funding to high priority USD(R&E) mission prototyping efforts.			
Accomplishments/Planned Programs Subtotals	70.227	92.023	103.575

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

N/A

D. Acquisition Strategy

RPP leverages the Services' and Defense Agencies' most efficient and effective acquisition approach for rapid prototyping. This includes using Other Transaction Authorities and new or existing contract vehicles.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Office of the Secretary Of Defense		Date: May 2021
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604331D8Z / *Rapid Prototyping Program*	**Project (Number/Name)** 638 / *Rapid Prototyping Program*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
High Altitude Long Endurance (HALE) Architecture Technical Demonstration	MIPR	U.S. Army : White Sands Missile Range, NM	-	1.699	Jun 2020	-		-		-		-	Continuing	Continuing	-
High Altitude Long Endurance (HALE) Architecture Technical Demonstration	MIPR	Technology Applications Office : Fort Detrick, MD	-	3.101	Jun 2020	-		-		-		-	Continuing	Continuing	-
Stratospheric Intelligence, Reconnaissance, and Surveillance Technical Demonstration	MIPR	U.S. Army CCDC Aviation & Missile Center : Redstone Arsenal	-	2.703	May 2020	-		-		-		-	Continuing	Continuing	-
Stratospheric Intelligence, Reconnaissance, and Surveillance Technical Demonstration	Option/ FFP	Defense Technical Information Center : Fort Belvoir, VA	-	2.197	May 2020	-		-		-		-	Continuing	Continuing	-
Maritime Prepositioning Squadron (MPSRON) Support to Valiant Shield 20	MIPR	Military Sea Lift Command : Norfolk, VA	-	3.500	Aug 2020	-		-		-		-	Continuing	Continuing	-
Naval Surface Warfare Center Port Hueneme Detachment (NSWC PHD) Demonstration Support	MIPR	Naval Surface Warfare Center PORT HUENEME : PORT HUENEME, CA	-	6.200	Aug 2020	-		-		-		-	Continuing	Continuing	-
Distributed Network Resiliency Technical Demonstration	MIPR	Naval Research Laboratory : Washington, DC	-	5.672	Nov 2020	-		-		-		-	Continuing	Continuing	-
Unmanned Systems Technical Demonstration	MIPR	Naval Research Laboratory : Washington, DC	-	4.850	Oct 2020	-		-		-		-	Continuing	Continuing	-
SCIFIRE	Option/ FFP	Defense Technical Information Center : Fort Belvoir, VA	-	0.247	Nov 2020	-		-		-		-	Continuing	Continuing	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Office of the Secretary Of Defense		Date: May 2021
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604331D8Z / *Rapid Prototyping Program*	**Project (Number/Name)** 638 / *Rapid Prototyping Program*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SCIFIRE	MIPR	Air Force Life Cycle Management Center : Wright-Patterson Air Force Base, OH	-	1.050	Nov 2020	-		-		-		-	Continuing	Continuing	-
SCIFIRE	C/FP	Johns Hopkins University, Applied Physics Laboratory : Laurel, MD	-	2.319	Nov 2020	-		-		-		-	Continuing	Continuing	-
VARIOUS	MIPR	MULTI : MULTI	243.180	36.689	Sep 2020	92.023	Sep 2021	103.575	Sep 2022	-		103.575	Continuing	Continuing	-
		Subtotal	243.180	70.227		92.023		103.575		-		103.575	Continuing	Continuing	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	243.180	70.227		92.023		103.575		-		103.575	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Office of the Secretary Of Defense		Date: May 2021
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604331D8Z / *Rapid Prototyping Program*	**Project (Number/Name)** 638 / *Rapid Prototyping Program*

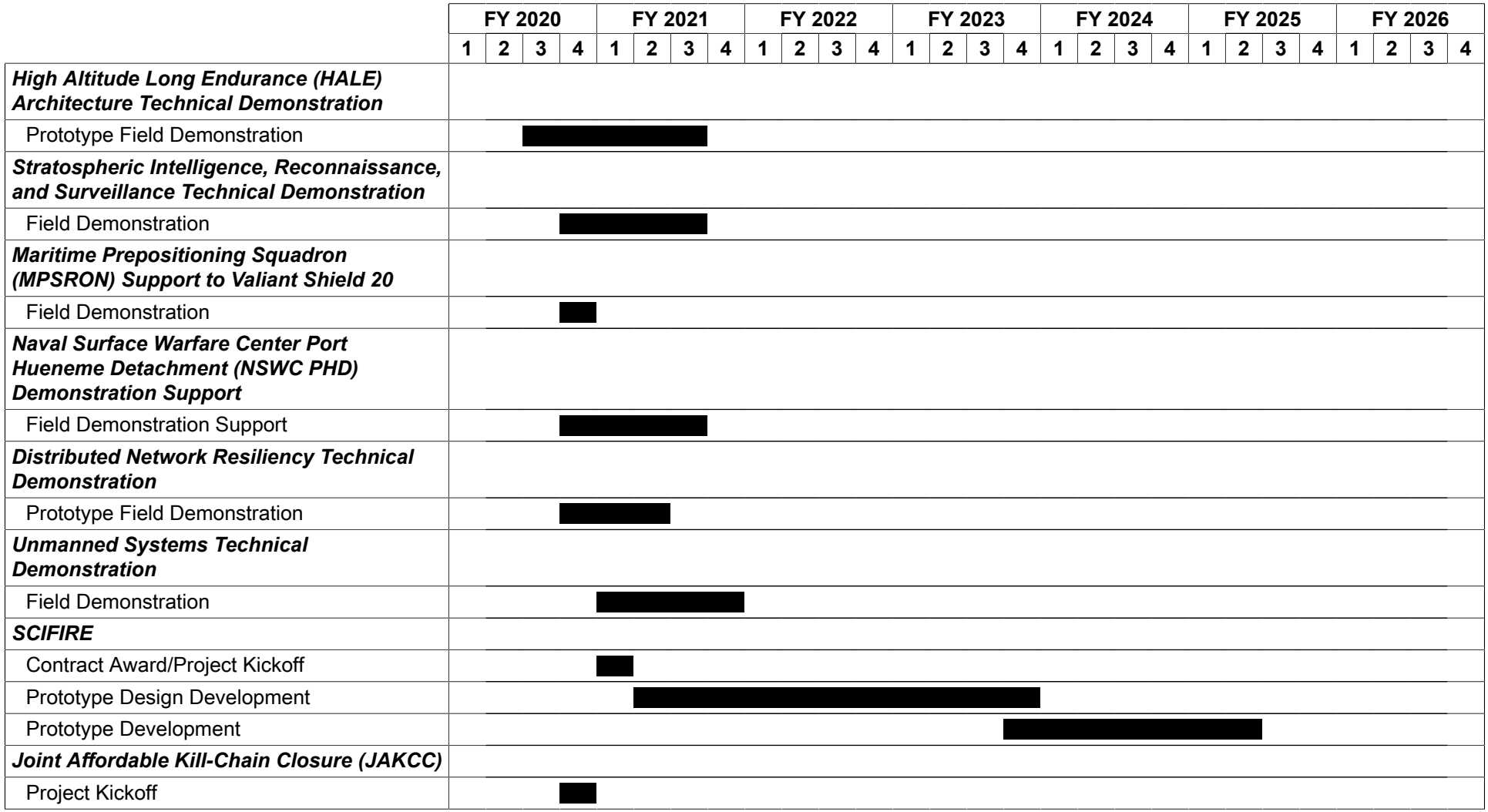

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Office of the Secretary Of Defense		Date: May 2021
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604331D8Z / *Rapid Prototyping Program*	**Project (Number/Name)** 638 / *Rapid Prototyping Program*

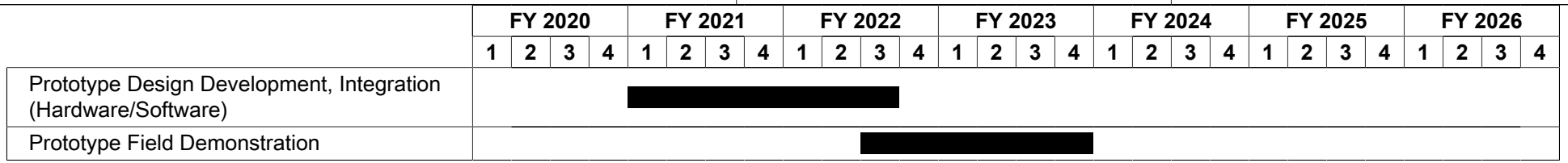

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Office of the Secretary Of Defense		Date: May 2021
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604331D8Z / *Rapid Prototyping Program*	**Project (Number/Name)** 638 / *Rapid Prototyping Program*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
High Altitude Long Endurance (HALE) Architecture Technical Demonstration				
Prototype Field Demonstration	3	2020	3	2021
Stratospheric Intelligence, Reconnaissance, and Surveillance Technical Demonstration				
Field Demonstration	4	2020	3	2021
Maritime Prepositioning Squadron (MPSRON) Support to Valiant Shield 20				
Field Demonstration	4	2020	4	2020
Naval Surface Warfare Center Port Hueneme Detachment (NSWC PHD) Demonstration Support				
Field Demonstration Support	4	2020	3	2021
Distributed Network Resiliency Technical Demonstration				
Prototype Field Demonstration	4	2020	2	2021
Unmanned Systems Technical Demonstration				
Field Demonstration	1	2021	4	2021
SCIFIRE				
Contract Award/Project Kickoff	1	2021	1	2021
Prototype Design Development	2	2021	4	2023
Prototype Development	4	2023	2	2025
Joint Affordable Kill-Chain Closure (JAKCC)				
Project Kickoff	4	2020	4	2020
Prototype Design Development, Integration (Hardware/Software)	1	2021	3	2022
Prototype Field Demonstration	3	2022	4	2023