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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Office of the Secretary Of Defense **Date:** May 2021

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603923D8Z I <i>Coalition Warfare Program (CWP)</i>
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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	81.129	11.159	10.123	5.103	-	5.103	-	-	-	-	-	-
923: <i>Coalition Warfare</i>	81.129	11.159	10.123	5.103	-	5.103	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

The Coalition Warfare Program (CWP) supports DoD organizations that: 1) work with foreign partners to collaboratively address strategic technology gaps for current and future missions; 2) develop interoperability solutions for coalition operations; and 3) develop and strengthen defense relationships. It comprehensively addresses all three National Defense Strategy lines of effort: to develop a more lethal joint force; strengthen alliances and attract new partners; and implement business practices for greater performance and affordability. Coalition warfare and multinational operations are fundamental features of the U.S. National Security Strategy. Coalitions provide a broad base of technological, operational, and logistical support for military operations and ease the U.S. financial and manpower burdens associated with meeting military goals and objectives. Coalitions and relationships with international partners are high priorities for the nation and the Department of Defense.

CWP supplements a U.S. Government proponent's funding for cooperative efforts, ensuring U.S. funds are sufficient to complete the engagement with the foreign partner(s). When CWP funds are used to help fund a cooperative project, that project leverages technical and financial contributions of the foreign partner(s) and accelerates the development and delivery of technical solutions to the warfighter. For every \$1 CWP has invested in cooperative projects with 76 partners since 2001, the program has leveraged \$3 in foreign partner resources and \$2 in other U.S. Government resources; providing an overall 5:1 return on investment. CWP funding enables DoD project teams to transition technology to operational use, further development, or integration into other systems. These projects may also form the basis for future cooperation with international partners.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	11.316	10.129	9.491	-	9.491
Current President's Budget	11.159	10.123	5.103	-	5.103
Total Adjustments	-0.157	-0.006	-4.388	-	-4.388
• Congressional General Reductions	-	-0.006			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.155	-			
• Program Adjustments	-0.002	-	-4.388	-	-4.388

**Change Summary Explanation**

The FY 2022 funding request was reduced by \$4.107 million to account for the availability of prior year execution balances.

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Office of the Secretary Of Defense **Date:** May 2021

<b>Appropriation/Budget Activity</b> 0400 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603923D8Z / <i>Coalition Warfare Program (CWP)</i>	<b>Project (Number/Name)</b> 923 / <i>Coalition Warfare</i>
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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
923: <i>Coalition Warfare</i>	81.129	11.159	10.123	5.103	-	5.103	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

The Coalition Warfare Program (CWP) supports DoD organizations that: 1) work with foreign partners to collaboratively address strategic technology gaps for current and future missions; 2) develop interoperability solutions for coalition operations; and 3) develop and strengthen defense relationships. It comprehensively addresses all three National Defense Strategy lines of effort: to develop a more lethal joint force; strengthen alliances and attract new partners; and implement business practices for greater performance and affordability. Coalition warfare and multi-national operations are fundamental features of the U.S. National Security Strategy. Coalitions provide a broad base of technological, operational, and logistical support for military operations and ease the U.S. financial and manpower burdens associated with meeting military goals and objectives. Coalitions and relationships with international partners are high priorities for the nation and the Department of Defense.

CWP supplements a U.S. Government proponent’s funding for cooperative efforts, ensuring U.S. funds are sufficient to complete the engagement with the foreign partner(s). When CWP funds are used to help fund a cooperative project, that project leverages technical and financial contributions of the foreign partner(s) and accelerates the development and delivery of technical solutions to the warfighter. For every \$1 CWP has invested in cooperative projects with 76 partners since 2001, the program has leveraged \$3 in foreign partner resources and \$2 in other U.S. Government resources; providing an overall 5:1 return on investment. CWP funding enables DoD project teams to transition technology to operational use, further development, or integration into other systems. These projects may also form the basis for future cooperation with international partners.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<b>Title:</b> Coalition Warfare Program (Continuing Projects)	11.159	10.123	5.103
<p><b>Description:</b> CWP provides funding on a competitive basis to DoD organizations to conduct cooperative research, development, test, and evaluation projects with foreign partners. The goals of the CWP program are to: collaboratively address strategic technology gaps for current and future missions, develop interoperability solutions for coalition operations, and strengthen current and future defense partnerships. CWP selects projects for funding through an annual competitive selection process in accordance with Department of Defense and Combatant Command needs.</p> <p>In addition to funding newly selected projects, the program also provides funding to projects that began in earlier selection cycles (for a total of up to three years of funding for each project).</p> <p>Currently, the funded portfolio includes projects governed by negotiated/signed international agreements with 19 different foreign partners. Including prior year project selections, the following FY 2021 projects encompass CWP funding in FY 2021 and FY 2022:</p>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Office of the Secretary Of Defense	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 0400 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603923D8Z / <i>Coalition Warfare Program (CWP)</i>	<b>Project (Number/Name)</b> 923 / <i>Coalition Warfare</i>
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**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<ul style="list-style-type: none"> <li>• Collaborative Artificial Intelligence (AI) at the Tactical Edge (CATE) (US Army)</li> <li>• Air-launched Unmanned Aerial System (UAS) for Extended-range Communications (AL AUS) (US Air Force)</li> <li>• Diagnostic Applied to Heterogeneous Multi-phase Reactive Blast (HMRB) (DTRA)</li> <li>• High Speed Sensors, Materials, Airframes, and Controls (HSMAC) (US Air Force)</li> <li>• Integrated Threat Awareness - Coalition (ITAC) (US Army)</li> <li>• Low-Light Automated Identification System for Maritime Domain Awareness (LLAMDA) (US Navy)</li> <li>• Stealth Ultra Low-Power Underwater Sensors (LPS) (US Navy)</li> <li>• Lightweight Transparent Armor (LWTA) (US Navy)</li> <li>• A Review of Surface Analysis Technologies for Increasing Robustness of Composite Bonding in the Fleet (SAT-IRCB) (US Navy)</li> <li>• Manufacturing Alloys for Near-Net Turbine Applications to Supersonic (MANTAS) (US Air Force)</li> <li>• Synthetic Environment Enhanced Artificial Intelligence (AI) for Wargaming, Course of Action Analysis, Decision Making, and Training (WARGAMING) (US Army)</li> </ul> <p>Interoperability and Collaboration Initiatives: Program provides funds in support of new or planned acquisition programs with the aim of 1) promoting coalition interoperability early in the requirements or technical development phases, 2) harmonizing common goals between U.S. and foreign partners, 3) improving management of collaborative efforts. Funds support workshops, risk reduction efforts, standards development, architecture analysis, and information management initiatives.</p> <p><b>FY 2021 Plans:</b> Completion of efforts that will develop coalition interoperable, undersea power and data stations (uPODS) that can autonomously transfer wireless energy/data to undersea vehicles (UUV's) (uPODS); develop and demonstrate radar, munition, and launcher technologies with the ability to detect, track, and defeat of Low, Slow, Small (LSS) Unmanned Aerial Systems (UASs)(AERIAL THREAT DEFEAT); advance methods for space object understanding of Resident Space Objects (RSOs) better enabling collaborative coalition Space Situational Awareness (SSA) and Command and Control (C2) (ALLIANCE); improve the non-lethal weapon effective range of high-powered radio frequency vessel/vehicle stopping systems, using recent developments in vacuum electronics designs (RF tubes) and solid state power modulators (HIPOM); measure signatures of non-cooperative maritime traffic and perform automated detection at range using hyperspectral imagery, yielding 2.5X-10X better performance than traditional visible cameras (SHIP DETECTION); provide autonomous ground refueling capability for rotary-wing aircraft in remote and rugged terrain using fast fuel transfer and self- surveillance capability (AR3P); develop a revolutionary micro-layer transparent armor that uses the new, emerging Naval Research Laboratory ballistic shockwave re-direction and attenuation concept, recently demonstrated, to obtain a 2x reduction in transparent armor weight (Micro Layered Transparent Armor - MLTA); develop and test compact wide-band IR imaging lens systems with bonded glass elements to reduce SWaP-C (size, weight, power and cost) of imaging sensors on weight-sensitive platforms for all services (CIRIS); develop and validate a new class of</p>			

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**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<p>multirole 5000 series aluminum-magnesium alloys for improved welded strength, ballistics, and marine corrosion resistance to replace current alloy 5083 in ground, amphibious, and sea systems (AL MGS ALLOYS); develop and test antireflective (AR) moth eye surfaces fabricated on optics and detectors to enable low reflections and resistance to laser damage without use of traditional AR coatings (MOTH EYE); develop surface and subsurface sediment/beach characterization tools using hyperspectral and multi-band synthetic aperture radar in maritime environments (Remote Multi-sensor Multi-angular Terrain Characterization - MSTC); develop a methodology and the software tools necessary to rapidly integrate Information, Surveillance, Target Acquisition, and Reconnaissance (ISTAR) sensors and validate interoperability of these sensors with US and partner sensor architectures (RAPID INTEGRATION); develop Arctic high frequency (HF) surveillance capabilities with supporting long-haul HF communications (ARCTIC HF SURVEILLANCE); and develop and deliver new bomb crater repair solutions for rapidly repairing craters for roads and airfields in extreme cold weather conditions (CRADR).</p> <p><b>FY 2022 Plans:</b> Completion of efforts that will Improve Coalition exploitation of WMD Underground facilities with robotics collaboration and progressive demonstrations (ATE); develop and assess a low light level, digital fused goggle with augmented reality for enhanced Soldier mobility (DELTA-I); develop and demonstrate prototype of terrestrial free-space laser communication network system for critical military uninterrupted communication and information links (LASERCOMMNET); build, fly, and demonstrate micro-satellites with onboard Automated Identification System (AIS) and imagery-based ship detection fused to provide maritime domain awareness (MICROSAT MDA); establish the capability for space solar cell calibration to enable accurate calculation on orbit power for all military and commercial spacecraft (SOLARCELLCAL); develop and demonstrate a Solid Propellant Rotating Detonation Engine (SPEAR); develop and test revolutionary infrared (IR) refractive non-mechanical beam steering (NMBS) devices using operationally-relevant laser sources for low size, weight, and power (SWAP) and high speed applications (ALIS); and develop a shared, persistent, affordable and accessible distributed collaborative development and simulation test bed capability, with a repository of released data and models for reuse, connected to partner nation defense labs to facilitate rapid prototype testing and experimentation to address warfighter challenges (VIPRE).</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> The FY 2022 funding request was reduced by \$4.107 million to account for the availability of prior year execution balances and to support the department's other priorities, which focused on the Secretary's guidance to streamline operations, increase efficiency, and promote greater affordability within the OSD and Defense Agencies and Field Activities in order to ensure the Department's optimum alignment to the National Defense Strategy and DoD strategic guidance, with particular focus on building a more lethal, resilient, agile, and ready force while strengthening alliances, prioritizing cyber and space capabilities, and focusing on innovation to maintain the technological advantage.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	11.159	10.123	5.103

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Office of the Secretary Of Defense		<b>Date:</b> May 2021
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**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The Combatant Commands, Services, Defense Agencies, and the Office of the Secretary of Defense nominate candidate projects on an annual basis. CWP provides selected projects up to three years of funding. The Program selects projects that address DoD priorities and meet the needs and requirements specified by the Joint Staff and the Combatant Commanders. Projects have equitable contributions from international partners, strong potential for transition, Combatant Command endorsement, and contribute to allied interoperability and/or meet a user need.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Office of the Secretary Of Defense** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 0400 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603923D8Z / <i>Coalition Warfare Program (CWP)</i>	<b>Project (Number/Name)</b> 923 / <i>Coalition Warfare</i>
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<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Coalition Warfare Program Project Product Development Costs	Various	Various : Various	58.692	9.389		8.382		3.867		-		3.867	-	-	-
<b>Subtotal</b>			58.692	9.389		8.382		3.867		-		3.867	-	-	N/A

<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Coalition Warfare Program Project Test and Evaluation Costs	Various	Various : Various	12.885	0.940		0.896		0.386		-		0.386	-	-	-
<b>Subtotal</b>			12.885	0.940		0.896		0.386		-		0.386	-	-	N/A

<b>Management Services (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Coalition Warfare Program Project Management Services Costs	Option/ FFP	Analygence, INC. : Fulton, MD	9.552	0.830		0.845		0.850		0.000		0.850	-	-	-
<b>Subtotal</b>			9.552	0.830		0.845		0.850		0.000		0.850	-	-	N/A

<b>Prior Years</b>	<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Project Cost Totals</b>			81.129	11.159	10.123	5.103	0.000	5.103	-	-	N/A	

**Remarks**



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Office of the Secretary Of Defense		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 0400 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603923D8Z / <i>Coalition Warfare Program (CWP)</i>	<b>Project (Number/Name)</b> 923 / <i>Coalition Warfare</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
FY 2020 CWP Project Execution	1	2020	4	2021
FY 2021 CWP Project Selection	3	2020	3	2020
FY 2021 CWP Project Execution	1	2021	4	2022
FY 2022 CWP Project Selection	3	2021	3	2021
FY 2022 CWP Project Execution	1	2022	4	2023
FY 2023 CWP Project Selection	2	2022	2	2022
FY 2023 CWP Project Execution	1	2023	4	2024
FY 2024 CWP Project Selection	2	2023	2	2023
FY 2024 CWP Project Execution	1	2024	4	2025
FY 2025 CWP Project Selection	2	2024	2	2024
FY 2025 CWP Project Execution	1	2025	4	2026
FY 2026 CWP project Selection	2	2025	2	2025
FY 2026 CWP Project Execution	1	2026	4	2026