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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2025 Defense Advanced Research Projects Agency **Date:** March 2024

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide / BA 2: Applied Research</i>	<b>R-1 Program Element (Number/Name)</b> PE 0602702E / <i>TACTICAL TECHNOLOGY</i>
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COST (\$ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
Total Program Element	-	203.644	234.549	117.935	-	117.935	134.691	151.579	160.262	165.967	-	-
TT-03: <i>NAVAL WARFARE TECHNOLOGY</i>	-	31.957	7.759	0.000	-	0.000	0.000	0.000	0.000	0.000	-	-
TT-04: <i>ADVANCED LAND SYSTEMS TECHNOLOGY</i>	-	36.666	60.481	3.251	-	3.251	3.713	4.178	4.418	4.575	-	-
TT-07: <i>AERONAUTICS AND SPACE TECHNOLOGY</i>	-	57.602	74.675	71.996	-	71.996	82.225	92.535	97.835	101.318	-	-
TT-13: <i>INFORMATION ANALYTICS TECHNOLOGY</i>	-	77.419	91.634	42.688	-	42.688	48.753	54.866	58.009	60.074	-	-

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

The efforts described in this Program Element (PE) address the Applied Research associated with the Tactical Technology Program that supports the advancement of concepts and technologies to enhance the next generation of tactical systems. This PE funds a number of projects in the areas of Naval Warfare, Advanced Land Systems, Aeronautics and Space Technology and Information Analytics Technology. This PE also supports innovation and robust transition planning in the technology cycle by working with entrepreneurs to increase the likelihood that DARPA-funded technologies take root in the U.S. and provide new capabilities for national defense.

The Naval Warfare Technology project develops advanced technologies for application to a broad range of naval requirements. Enabling and novel technologies include concepts for expanding the envelope of operational naval capabilities to include the entire sea column such as improved situational awareness over large maritime environments, ship self-defense techniques, novel underwater propulsion modalities, high speed underwater vessels, improved techniques for underwater object detection and discrimination, long endurance unmanned surface vehicles, methods and techniques for servicing assets throughout the sea column, and high bandwidth communications. This project will also examine methods and architectures for distributing maritime operations to enable a more agile, survivable, and cost-effective fleet.

The Advanced Land Systems Technology project is developing technologies for enhancing U.S. military effectiveness and survivability in operations ranging from traditional threats to military operations against irregular forces that can employ disruptive or catastrophic capabilities, or disrupt stabilization operations, including competing in underground spaces. Programs in this project will break the relative symmetry of land combat to give U.S. forces a decided advantage in the current and future ground battlefield. The emphasis is on developing affordable technologies that reduce reliance on consolidated forward-operating bases and required lines of communication, and provide small units and individual warfighters with hyper-mobility and hyper-lethality. This project will develop methods and technologies to expand the maneuver trade space to include the vertical dimension, including subterranean environments, as well as underground spaces. It will leverage advances in artificial intelligence to enable integrated manned-unmanned operations and decrease warfighter exposure through the use of autonomous agents.

Aeronautics and Space Technology efforts will address high payoff opportunities that dramatically reduce costs associated with advanced aeronautical and space systems and/or provide revolutionary new system capabilities for satisfying current and projected military mission requirements. This includes advanced technology

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studies of revolutionary propulsion, vehicle, and launch concepts, sophisticated fabrication methods, and examination of novel materials and enabling technologies for aeronautics and space system applications. Studies that also fundamentally change the calculus of battle including consideration of a mix of assets, platforms that are potentially disposable or with limited lifespans, and autonomous integration of space and air platforms in the tactical battlespace are included.

The Information Analytics Technology project develops technology for analyzing data and information arising from: 1) intelligence networks; 2) open sources, social and broadcast media, and other external sources; 3) sensors and signal/image processors; and 4) collection platforms and weapon systems. Technical challenges include processing huge volumes of diverse, incomplete, and uncertain data in tactically-relevant timeframes, and countering the information operations of sophisticated adversaries who seek to deceive, degrade, deny, and disrupt the U.S. information enterprise. Benefits sought include a deeper understanding of the evolving operational environment tailored to the needs of commanders at every echelon; an enhanced capability to plan, monitor, and control diverse military operations ranging from stabilization and information operations to combat engagements; and increased efficiency of core military functions such as national and homeland security, warfighter health and readiness, and defense support of law enforcement and civil authorities.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025 Base</b>	<b>FY 2025 OCO</b>	<b>FY 2025 Total</b>
Previous President's Budget	206.883	234.549	181.779	-	181.779
Current President's Budget	203.644	234.549	117.935	-	117.935
Total Adjustments	-3.239	0.000	-63.844	-	-63.844
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	3.681	0.000			
• SBIR/STTR Transfer	-6.920	0.000			
• TotalOtherAdjustments	-	-	-63.844	-	-63.844

**Change Summary Explanation**

FY 2023: Decrease reflects SBIR/STTR transfer offset by reprogrammings.

FY 2024: N/A

FY 2025: Decrease reflects completion of the Semantic Forensics (SemaFor) and Computational Cultural Understanding (CCU) programs, and a shift from field experimentation to final documentation in the Robotic Autonomy in Complex Environments with Resiliency (RACER) program.

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**Exhibit R-2A, RDT&E Project Justification:** PB 2025 Defense Advanced Research Projects Agency **Date:** March 2024

<b>Appropriation/Budget Activity</b> 0400 / 2					<b>R-1 Program Element (Number/Name)</b> PE 0602702E / TACTICAL TECHNOLOGY				<b>Project (Number/Name)</b> TT-03 / NAVAL WARFARE TECHNOLOGY			
COST (\$ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
TT-03: NAVAL WARFARE TECHNOLOGY	-	31.957	7.759	0.000	-	0.000	0.000	0.000	0.000	0.000	-	-

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

The Naval Warfare Technology project develops advanced technologies for application to a broad range of naval requirements. Enabling and novel technologies include concepts for expanding the envelope of operational naval capabilities to include the entire sea column such as improved situational awareness over large maritime environments, ship self-defense techniques, novel underwater propulsion modalities, high speed underwater vessels, improved techniques for underwater object detection and discrimination, long endurance unmanned surface vehicles, methods and techniques for servicing assets throughout the sea column, and high bandwidth communications. This project will also examine methods and architectures for distributing maritime operations to enable a more agile, survivable, and cost-effective fleet.

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

	FY 2023	FY 2024	FY 2025
<p><b>Title:</b> Advanced Maritime Defense Technologies Concepts</p> <p><b>Description:</b> The Advanced Maritime Defense Technologies Concepts program will explore novel technologies and concepts of operations to mature capabilities that extend freedom of access, operations, and homeland defense in all parts of the maritime domain, including waterways, arctic areas, and the seabed. The program will investigate and mature technologies necessary for unmanned underwater vehicle (UUV) and unmanned surface vessel (USV) concepts for autonomous operation and domain specific warfare. Enabling technologies for advanced undersea systems, including a revolutionary propulsion concept, and novel approaches for maritime platform and fixed location self-defense will be investigated. Novel technologies and concepts required for arctic and seabed operations, such as distributed sensing, navigation, and communications architectures, as well as including new technologies to enable long duration maritime platforms will also be investigated. Finally, future concepts, approaches, and techniques will be identified to enable contested environment operations utilizing unmanned maritime platforms.</p> <p><b>FY 2024 Plans:</b></p> <ul style="list-style-type: none"> <li>- Finalize conceptual evaluation of APEX for underwater vehicles.</li> <li>- Complete a conceptual study in cross-domain transitions for vehicles and weapon systems.</li> <li>- Complete development of an architecture to inform conceptual evaluation of defensive systems and sensors for fixed locations.</li> <li>- Conduct a conceptual study on USV autonomy evaluation planned to enable long duration emission-controlled operations.</li> </ul> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> The FY 2025 decrease reflects program completion.</p>	24.437	7.759	-
<p><b>Title:</b> Multi-Azimuth Defense Fast Intercept Round Engagement System (MAD-FIRES)</p> <p><b>Description:</b> The Multi-Azimuth Defense Fast Intercept Round Engagement System (MAD-FIRES) program developed technologies for a point defense system against today's most stressing threats by developing a highly maneuverable, medium</p>	7.520	-	-

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
caliber, guided projectile, and fire sequencing and control system capable of neutralizing large threat raids of high speed, highly maneuverable targets. Leveraging recent advancements in gun hardening, miniaturization of guided munition components, and long-range sensors, MAD-FIRES advanced fire control technologies, medium caliber gun technologies, and guided projectile technologies enabling the multiple, simultaneous target, kinetic engagement mission at greatly reduced costs. MAD-FIRES achieved lethality overmatch through accuracy rather than size, thus expanding the role of smaller combat platforms into missions where they have been traditionally outgunned. MAD-FIRES, sized as a medium caliber system, enhanced flexibility for installment as a new ship self-defense system. This program is also funded in PE 0603766E, Project NET-02.			
<b>Accomplishments/Planned Programs Subtotals</b>	31.957	7.759	-

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

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

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<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025 Base</b>	<b>FY 2025 OCO</b>	<b>FY 2025 Total</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>FY 2028</b>	<b>FY 2029</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
TT-04: ADVANCED LAND SYSTEMS TECHNOLOGY	-	36.666	60.481	3.251	-	3.251	3.713	4.178	4.418	4.575	-	-

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

The Advanced Land Systems Technology project is developing technologies for enhancing U.S. military effectiveness and survivability in operations ranging from traditional threats to military operations against irregular forces that can employ disruptive or catastrophic capabilities, or disrupt stabilization operations, including competing in underground spaces. Programs in this project will break the relative symmetry of land combat to give U.S. forces a decided advantage in the current and future ground battlefield. The emphasis is on developing affordable technologies that reduce reliance on consolidated forward-operating bases and required lines of communication, and provide small units and individual warfighters with hyper-mobility and hyper-lethality. This project will develop methods and technologies to expand the maneuver trade space to include the vertical dimension, including subterranean environments, as well as underground spaces. It will leverage advances in artificial intelligence to enable integrated manned-unmanned operations and decrease warfighter exposure through the use of autonomous agents.

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

	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<b>Title:</b> Robotic Autonomy in Complex Environments with Resiliency (RACER)	24.843	55.000	3.251
<p><b>Description:</b> Multi-domain operations (MDO) present complex and challenging environments to ground combat platforms. Ground combat platforms must operate in a more distributed manner in these environments to gain a sustained tactical advantage and enhance warfighter survivability. The Army intends to deploy autonomous robotic combat vehicles and optionally manned fighting vehicles to accomplish this objective. In order to meet the demands of an MDO environment, significant advances in perception, planning, and control algorithms are required to autonomously maneuver faster and more resiliently in complex and novel off-road situations. Maneuver environments are characterized by three-dimensional surfaces of highly compliant soils and vegetation, hundreds of positive and negative obstacle classes, no defined road networks or driving rules, and where use of terrain for survivability is critical. In order to achieve operationally relevant speeds and resilience to novel situations on the battlefield, while simultaneously reducing the soldier's cognitive and communications burden and increasing battle space awareness, Robotic Autonomy in Complex Environments with Resiliency (RACER) will develop and demonstrate game-changing autonomous ground combat vehicle mobility using a combination of simulation and advanced platforms. RACER will deliver autonomy algorithms using the latest in Artificial Intelligence (AI) and machine-learning techniques, a code repository, an off-road simulation environment tailored for military off-road autonomy development, tactical route planning methods, and field-demonstrated off-road autonomous capabilities. The culmination of the RACER program will demonstrate fully autonomous maneuver on a military Unmanned Ground Vehicle (UGV) in a variety of militarily relevant environments.</p> <p><b>FY 2024 Plans:</b></p> <ul style="list-style-type: none"> <li>- Continue Government-hosted field experiments in increasingly complex terrain and obstacle classes with combat vehicle scale autonomous system.</li> </ul>			

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	
<ul style="list-style-type: none"> <li>- Conduct alternative simulation environments resiliency testing of autonomy development.</li> <li>- Test tactically relevant route planner against simulated adversary force.</li> <li>- Curate autonomy data sets for use by service stakeholders.</li> <li>- Complete build of a large-scale demonstration platform fleet for demonstration with multiple teams.</li> </ul> <p><b>FY 2025 Plans:</b></p> <ul style="list-style-type: none"> <li>- Conduct final capstone Government-hosted field experiments with large-scale platform (combat vehicle scale) in environments that contain relevant complexity and obstacle classes.</li> </ul> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> The FY 2025 decrease reflects the completion of experimentation and final documentation.</p>					
<p><b>Title:</b> Advanced Ground Technologies Concepts</p> <p><b>Description:</b> The Advanced Ground Technologies Concepts program aims to surmount key challenges associated with redefining access and timely delivery of effects to the ground domain by using targeted investments that explore the feasibility of novel technical solutions, force capabilities, innovations in logistics and manufacturing. In particular, program investments encompass technologies that promise breakthroughs in enabling actionable situational awareness across diverse environments, missionized autonomy for integration of manned-unmanned ground and air vehicle force; intelligent ground mobility systems; advanced military robotic systems; technologies expanding the effective ranges of surface-to-surface precision fires and in situ manufacturing of tactical munitions in mass to enable rapid response to quick developing conflicts while avoiding limitations of extended logistics chains.</p> <p><b>FY 2024 Plans:</b></p> <ul style="list-style-type: none"> <li>- Identify concepts and technologies to enable in situ digital manufacturing of tactical grade munitions.</li> <li>- Identify concepts and technologies that enable contested environments operations utilizing advanced ground autonomy, perception and decision making to enable single operators to command multiple platforms.</li> <li>- Mature framework for human-machine embodied decision making for enhanced situational awareness across environments.</li> </ul> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> The FY 2025 decrease reflects program completion.</p>		10.790	5.481	-	
<p><b>Title:</b> Urban Reconnaissance through Supervised Autonomy (URSA)</p> <p><b>Description:</b> The Urban Reconnaissance through Supervised Autonomy (URSA) program developed and demonstrated new autonomous agents and techniques that support a Blue Force Commander in managing the complexity and ambiguity of urban spaces by rapidly identifying and discriminating among potential threats during missions ranging from minutes to hours. The program used perception-enabled autonomous vehicles to manage complexity and interactions with populations to drive down</p>		1.033	-	-	

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<p>the ambiguity between peaceful civilians and threats. The program created a system of autonomous ground and air platforms operating in conjunction with U.S. ground forces that monitor an area overtly to detect hostile forces and establish Positive Identification (PID) before any U.S. troops come into contact. Military units follow strict rules of engagement (ROEs) that prescribe an escalation of force appropriate with the level of hostilities and confidence that an individual is engaged in nefarious behavior. This program established a Legal, Moral, Ethical (LME) working group comprising multiple experts (technologists, military, university professors, ethicists, legal experts) to engage in development of an ethical operations process (DevEthOps) to engineer Responsible Artificial Intelligence (RAI) principles into this supervised autonomous system. URSA explored scenarios and probed behaviors to enable identifying innocent civilians and individuals who pose a threat to U.S. Forces, allies, or non-combat civilians. This mission requires the integration and maturation of novel sensors, and unmanned ground and air vehicles which leverage current techniques in perspective and reactive autonomy to navigate cluttered urban environments. URSA developed new search and engagement behaviors to disambiguate human actions and serve as evidence that a potential target is a threat. It implemented new dimensions of evidence such as the human reactions to these engagements to improve confidence of operators in determining with high precision and low false positives who may pose a threat and who does not. While developed for Urban environments, other applications may include managing large populations of any kind to include supporting Military Police and detainee operations.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	36.666	60.481	3.251

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

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

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COST (\$ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
TT-07: AERONAUTICS AND SPACE TECHNOLOGY	-	57.602	74.675	71.996	-	71.996	82.225	92.535	97.835	101.318	-	-

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

Aeronautics and Space Technology efforts will address high payoff opportunities that dramatically reduce costs associated with advanced aeronautical and space systems and/or provide revolutionary new system capabilities for satisfying current and projected military mission requirements. This includes advanced technology studies of revolutionary propulsion, vehicle, and launch concepts, sophisticated fabrication methods, and examination of novel materials and enabling technologies for aeronautics and space system applications. Studies that also fundamentally change the calculus of battle including consideration of a mix of assets, platforms that are potentially disposable or with limited lifespans, and autonomous integration of space and air platforms in the tactical battlespace are included.

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

	FY 2023	FY 2024	FY 2025
<p><b>Title:</b> Oversight</p> <p><b>Description:</b> Oversight will develop and demonstrate a suite of autonomy technologies to provide constant custody of targets as a service for tactical operations in contested environments. Existing and emerging space systems will be evaluated. Proliferated Low Earth Orbit (p-LEO) satellite constellations and payloads will be leveraged due to their high-bandwidth, processing-on-the-edge capabilities in support of tactical, efficient, integrated missions at scale. Oversight will develop autonomous technology to enable advanced collaboration among constellations of satellites for target custody in contested environments where the numbers of targets is far greater than the number of satellites and sensors over the operating area. The Oversight program will culminate with a demonstration using existing on-orbit p-LEO assets combined with live, virtual and constructive terrestrial assets.</p> <p><b>FY 2024 Plans:</b></p> <ul style="list-style-type: none"> <li>- Continue development of necessary constant custody algorithms for software applications and services.</li> <li>- Incorporate target scenarios, satellite constellation resources and ground resources into the government-owned modeling and simulation framework.</li> <li>- Demonstrate capability of applications and services in a performer-provided laboratory environment.</li> <li>- Evolve the applications from the modeling and simulation framework to incorporate target scenarios, satellite constellations resources and ground resources.</li> <li>- Conduct demonstration of performer-developed suite of software applications and services running in the loop on representative space hardware in the government modeling and simulation environment to assess performance of constant custody of 100 targets.</li> </ul> <p><b>FY 2025 Plans:</b></p>	23.800	30.500	28.618

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<ul style="list-style-type: none"> <li>- Deliver performer-developed suite of applications and services that will run in the government-owned modeling and simulation environment.</li> <li>- Demonstrate performer-developed software in the modeling and simulation environment.</li> </ul> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> The FY 2025 decrease reflects the shift from software development to delivery and demonstrations in the modeling and simulation environment.</p>				
<p><b>Title:</b> Advanced Aeronautics and Space Technologies</p> <p><b>Description:</b> The Advanced Aeronautics and Space Technologies program examines and evaluates aeronautical and space technologies and concepts through applied research. These may include feasibility studies of novel or emergent materials, sensors and tactics for air and space platforms, launch vehicles, satellites, manufacturing and implementation approaches, and hardware demonstrations of key enabling technologies. The areas of interest range from propulsion and power, guidance and control, concepts to enable novel air platforms, to innovative technologies and platform concepts to enable new missions and resilient operations for space systems, from low earth orbit to cislunar space. Aeronautics interest areas include hybrid electric/combustion propulsion concepts, small-scale air mobility solutions, and networking of both piloted and unpiloted air vehicles. Space interest areas include advanced or novel power and propulsion systems, novel sensors, advanced lightweight structures, advanced miniature radio frequency (RF) technology, precision navigation and timing technologies, ground and space-based space domain awareness, avionics, structures, and novel approaches to support terrestrial operations. These studies may lead to the development of new programs, components or subsystems to enhance future aerospace platforms, or improvement of existing systems.</p> <p><b>FY 2024 Plans:</b></p> <ul style="list-style-type: none"> <li>- Identify concepts and technologies to provide improved resilience, survivability, and lethality in contested environments.</li> <li>- Perform laboratory demonstrations of novel technologies for early risk reduction and concept validation.</li> </ul> <p><b>FY 2025 Plans:</b></p> <ul style="list-style-type: none"> <li>- Explore updated and new architectures for aerospace vehicle concepts.</li> <li>- Improve ability of piloted and unpiloted vehicles to cooperate to enhance mission effectiveness.</li> </ul>		33.802	10.000	10.000
<p><b>Title:</b> Persistent Optical Wireless Energy Relay (POWER)</p> <p><b>Description:</b> The Persistent Optical Wireless Energy Relay (POWER) program will design, build, and demonstrate effective optical energy relays. These relays will enable a ground-based laser to efficiently transmit energy over 100s of kilometers leveraging a high-altitude transmission layer which minimizes atmospheric absorption and scattering. The high-altitude energy relay nodes will redirect, correct, and selectively harvest energy from the optical energy source and then beam that energy</p>		-	29.175	33.378

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<p>back down to the surface for conversion to electricity. These relays are the core building blocks to construct a flexible, resilient, reconfigurable, persistent, and distributed energy network. POWER will also produce conceptual designs for new platform capabilities realized by offboarding power storage and generation. These platforms will have range, endurance, and payload power performance that is no longer tied to platform size enabling a new class of small but high-performance platforms.</p> <p><b>FY 2024 Plans:</b></p> <ul style="list-style-type: none"> <li>- Complete airborne relay Conceptual Design Review (CoDR).</li> <li>- Initiate design and development of low power relays able to demonstrate beam redirect, wavefront correction, and energy harvesting to support risk reduction of high-power relay.</li> <li>- Validate propagation modeling based on low power relay testing.</li> </ul> <p><b>FY 2025 Plans:</b></p> <ul style="list-style-type: none"> <li>- Conduct Laboratory Demonstrations of key risk technologies.</li> <li>- Initiate manufacturing of relay system components.</li> <li>- Initiate detailed design of hardware and software systems, including both relay and aircraft interfaces.</li> </ul> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> The FY 2025 increase reflects a shift from design, development and modeling activities to hardware procurement and component manufacturing.</p>			
<p><b>Title:</b> Gambit</p> <p><b>Description:</b> The Gambit program will study a Rotating Detonation Engine (RDE) propulsion system design that enables standoff strike of time-critical targets from 4th generation fighters at campaign scale. This will help pave a path to a flight test of a prototype system in a future program.</p> <p><b>FY 2024 Plans:</b></p> <ul style="list-style-type: none"> <li>- Conduct a study that explores the technology that may lead to the development of a design of an operational system.</li> </ul> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> The FY 2025 decrease reflects program completion.</p>	-	5.000	-
<b>Accomplishments/Planned Programs Subtotals</b>	57.602	74.675	71.996

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

N/A

**Remarks**

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**D. Acquisition Strategy**

N/A

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Defense Advanced Research Projects Agency										<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 0400 / 2					<b>R-1 Program Element (Number/Name)</b> PE 0602702E / TACTICAL TECHNOLOGY				<b>Project (Number/Name)</b> TT-13 / INFORMATION ANALYTICS TECHNOLOGY			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025 Base</b>	<b>FY 2025 OCO</b>	<b>FY 2025 Total</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>FY 2028</b>	<b>FY 2029</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
TT-13: INFORMATION ANALYTICS TECHNOLOGY	-	77.419	91.634	42.688	-	42.688	48.753	54.866	58.009	60.074	-	-

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

The Information Analytics Technology project develops technology for analyzing data and information arising from: 1) intelligence networks; 2) open sources, social and broadcast media, and other external sources; 3) sensors and signal/image processors; and 4) collection platforms and weapon systems. Technical challenges include processing huge volumes of diverse, incomplete, and uncertain data in tactically-relevant timeframes, and countering the information operations of sophisticated adversaries who seek to deceive, degrade, deny, and disrupt the U.S. information enterprise. Benefits sought include a deeper understanding of the evolving operational environment tailored to the needs of commanders at every echelon; an enhanced capability to plan, monitor, and control diverse military operations ranging from stabilization and information operations to combat engagements; and increased efficiency of core military functions such as national and homeland security, warfighter health and readiness, and defense support of law enforcement and civil authorities.

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

	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<b>Title:</b> Influence Campaign Awareness and Sensemaking (INCAS)	15.000	20.600	11.688
<p><b>Description:</b> The Influence Campaign Awareness and Sensemaking (INCAS) program is developing analyst-guided techniques, tools, and platforms for the DoD to detect and understand geopolitical influence campaigns in a rigorous, quantitative manner. Increasingly, competitors and adversaries are using influence operations to project soft power. Competitor and adversary influence campaigns can be overt in the form of anti-U.S. messaging, or they can be disguised in the form of complex narratives that seek to advance agendas harmful to U.S. interests. The U.S. Government and DoD need the capability to rapidly detect and understand competitor and adversary messaging campaigns and narratives within the context of the populations and groups for whom they are intended. To accomplish this, the program will develop and operationalize natural language processing, social network analysis, psychographics, and behavioral science-based technologies, and integrate these into a unified influence campaign modeling framework and sensemaking platform. INCAS aims to produce a suite of automated digital tools to enable analysts to better understand how information is being used by competitors and adversaries, and to quantitatively assess in real time and at scale the effects of influence campaigns across time and over multiple platforms.</p> <p><b>FY 2024 Plans:</b></p> <ul style="list-style-type: none"> <li>- Extend multimedia analytics to discover influence indicators in video and other media and associate these indicators with population attributes.</li> <li>- Develop analytics for assessing the threat, similarity, and confidence level of adversary influence campaigns based on multiple social media platforms.</li> <li>- Extend datasets, human-machine interfaces, and workflows to quantify the effectiveness of influence campaign sensemaking and potential response strategies.</li> </ul>			

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<p>- Provide technology to potential transition partners to enable military users to assess utility against adversary influence campaigns.</p> <p><b>FY 2025 Plans:</b></p> <ul style="list-style-type: none"> <li>- Refine multimedia analytics for influence indicator discovery and quantify the association with population attributes.</li> <li>- Expand variety and scope of influence indicators to include detection of coordinated messaging across platforms.</li> <li>- Refine system utility by increasing the accuracy of influence messaging detection and improving the interactive capabilities of the user interface.</li> <li>- Enhance technology in response to transition partner feedback and facilitate evaluation by military users against adversary influence campaigns.</li> </ul> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b></p> <p>The FY 2025 decrease reflects ramping down development of techniques to detect and characterize influence campaigns and focus shifting to evaluation and transition the techniques.</p>				
<p><b>Title:</b> Beyond Linear Signal Processing (BLiP)</p> <p><b>Description:</b> The Beyond Linear Signal Processing (BLiP) program is performing a fundamental redevelopment of the radar signal processing chain with the intent that smaller radar apertures will operate with the performance of much larger, more expensive radar systems. Building upon earlier technology efforts, including the Arrays at Commercial Timescales (ACT) program (previously budgeted in PE 0602716E/Project ELT-01), which focused on hardware-based limitations such as bandwidth and dynamic range, BLiP is focusing on the software and signal processing to fundamentally enhance all radars. Multiple recent developments show that non-linear and iterative estimation algorithms can out-perform our current linear radar signal processing algorithms. BLiP is developing and maturing the algorithms for specific radar mission areas through rapid development, integration, real-time processing, and field testing.</p> <p><b>FY 2024 Plans:</b></p> <ul style="list-style-type: none"> <li>- Conduct a series of field data collections with well-characterized radar targets.</li> <li>- Develop signal processing baseline and BLiP system performance models for a specific mission area.</li> <li>- Commence development of the end-to-end processing algorithms and techniques for real-time radar data acquisition and analysis.</li> <li>- Acquire and install radar processing with a high-performance graphical processing unit (GPU) into an existing radar facility.</li> </ul> <p><b>FY 2025 Plans:</b></p> <ul style="list-style-type: none"> <li>- Conduct independent verification and validation (IV&amp;V) and integrate the real-time developments into a testbed radar system.</li> </ul>		4.000	15.000	11.000

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
- Conduct test exercise for controlled target flight tests.				
<b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> The FY 2025 decrease reflects a shift from performer processing and testing to the transition of BLiP software.				
<b>Title:</b> Resilient Supply-and-Demand Networks (RSDN)		9.400	15.000	10.000
<b>Description:</b> The Resilient Supply-and-Demand Networks (RSDN) program is developing supply-chain risk management analytics to detect systemic vulnerabilities and improve resilience in supply and demand networks. At present, the separation of supply-chain information into confidential silos obscures a system-wide view, inhibiting comprehensive risk-focused analysis of supply and demand networks. RSDN is developing techniques for modeling both the broad level of the supply-chain network and the detailed level of individual procurement agreements. Network analytics and visualizations will reveal emerging fragilities and enable deep situational awareness of systemic vulnerabilities and potential disruptions. Blind spots due to hidden interdependencies can lead to fragility in supply chains. An RSDN stress-testing framework will enable repeatable scenario analysis of strategic vulnerabilities in supply and demand networks, automated analysis and discovery of risk patterns, and evaluation of alternative risk mitigation strategies.				
<b>FY 2024 Plans:</b>				
- Augment the initial datasets with supplemental information about the participants and their relationships to provide a granular view of each supply and demand network.				
- Expand the initial library of vulnerability analytics and visualizations with new methods and algorithms to illuminate supply and demand network blind spots and identify data gaps.				
- Demonstrate a stress-testing capability to assess the propagation of shock scenarios through a supply and demand network and to motivate suitable mitigation strategies.				
- Demonstrate an initial end-to-end system for mapping supply and demand networks, analyzing systemic fragilities, and conducting stress-testing evaluations.				
<b>FY 2025 Plans:</b>				
- Develop privacy-preserving functionality to permit analysis of sensitive data to inform supply and demand network representations, analytics, and stress tests.				
- Develop techniques to identify contingency features in contracts to support machine learning that highlights patterns of fragility.				
- Demonstrate a stress-testing capability to model dynamic shock scenarios that incorporate nonlinear behavior of supply and demand networks.				
- Demonstrate generalizability of the end-to-end system to additional use cases.				
<b>FY 2024 to FY 2025 Increase/Decrease Statement:</b>				

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
The FY 2025 decrease reflects ramping down of development of techniques for analyzing and stress-testing supply and demand networks and focus shifting to demonstration and assessment of the stress-testing capability.				
<p><b>Title:</b> Defense Applications of Innovative Remote Sensing (DAIRS)</p> <p><b>Description:</b> The Defense Applications of Innovative Remote Sensing (DAIRS) program seeks to enable new approaches for the persistent long-range tracking of maritime and air targets. Specifically, DAIRS will focus on the use of surface wave over-the-horizon radar (SWOTHR) with operation in low latitudes, where spread-Doppler clutter currently limits reliable target track to ranges less than 100km, and the low bandwidth precludes the use of microwave target classification approaches. The program will explore passive remote sensing using endemic noise sources as a highly disruptive method for environmental and target sensing. Space time adaptive processing and polarimetric sensing provide the baseline technologies for clutter rejection and this program will combine those techniques with technologies developed in the Shosty program (budgeted in PE 0603767E, Project SEN-01), which uncovered spatial-temporal correlation that potentially provides suppression of spread-Doppler clutter. The program will develop these methods for various conditions that affect SWOTHR, including the day/night cycle, sea state, forward scatter and backscatter, and bistatic range. Additionally, the program will take a first-principles approach for conducting classification at high frequency wavelengths for total disruption of the field. Technology developed under this program will be transitioned to the Services and the U.S. Coast Guard.</p> <p><b>FY 2024 Plans:</b></p> <ul style="list-style-type: none"> <li>- Perform data collection to support passive noise radar and classification approach investigations.</li> <li>- Develop and deploy SWOTHR receiver and transmit sites in the relevant low-latitude environment.</li> </ul> <p><b>FY 2025 Plans:</b></p> <ul style="list-style-type: none"> <li>- Collect, characterize, and deliver in-situ data from the relevant low-latitude environment.</li> <li>- Begin algorithmic development on passive noise radar, target classification and spread-Doppler clutter reduction techniques.</li> <li>- Apply techniques and lessons learned to follow-on collection campaigns.</li> </ul> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b></p> <p>The FY 2025 increase reflects a shift from initial data collection to algorithm development.</p>		-	8.000	10.000
<p><b>Title:</b> Computational Cultural Understanding (CCU)</p> <p><b>Description:</b> The Computational Cultural Understanding (CCU) program is creating cross-cultural language understanding technologies to improve a DoD operator's situational awareness and interactional effectiveness. CCU natural language processing technologies will recognize, adapt to, and recommend how to operate within emotional, social, and cultural norms that differ across societies, languages, and group affinities. To support diverse and emergent use cases, CCU technologies will be engineered to require minimal to no training data in a local culture, while maximizing operator success during negotiations and</p>		18.000	17.000	-

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<p>other interactions in the field. CCU will create new component technologies for sociocultural norm discovery, cross-cultural emotion recognition, and communicative change detection. The program will incorporate these component technologies into a prototype platform to assist military users with cross-cultural dialogue.</p> <p><b>FY 2024 Plans:</b></p> <ul style="list-style-type: none"> <li>- Generalize sociocultural analysis and dialogue assistance techniques to encompass multiple language-culture pairs.</li> <li>- Utilize the integration testbed to evaluate and optimize cross-cultural language understanding and situational awareness technologies.</li> <li>- Implement sociocultural analysis and dialogue assistance capabilities in wearable hardware to facilitate assessment in real-world scenarios.</li> <li>- Demonstrate effectiveness of sociocultural analysis and cross-cultural dialogue assistance within additional negotiation scenarios in collaboration with military stakeholders.</li> </ul> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> The FY 2025 decrease reflects program completion.</p>			
<p><b>Title:</b> Semantic Forensics (SemaFor)</p> <p><b>Description:</b> The Semantic Forensics (SemaFor) program is developing technologies to defend against multimedia falsification and disinformation campaigns. Statistical detection techniques have been successful, but media generation and manipulation technologies applicable to imagery, voice, video, text, and other modalities are advancing rapidly. Purely statistical detection methods are now insufficient to detect these manipulations, especially when multiple modalities are involved. Existing media generation and manipulation algorithms are data driven and are prone to making semantic errors that provide defenders an opportunity for asymmetric advantage. SemaFor is developing semantic and statistical analysis algorithms that determine if media is generated or manipulated, attribution algorithms that infer if media originates from a particular organization or individual, and characterization algorithms that reason about whether media was falsified (generated or manipulated) for malicious purposes. SemaFor aims to create technologies to identify, deter, and understand adversary media falsification.</p> <p><b>FY 2024 Plans:</b></p> <ul style="list-style-type: none"> <li>- Refine and demonstrate approaches for reasoning about manipulated media across multimodal types (images, video, audio, or text) of information.</li> <li>- Finalize application programming interfaces including multimodal (images, video, audio, or text) system enhancements based on input from transition partners and other stakeholders.</li> </ul>	21.015	16.034	-

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
- Demonstrate media falsification detection, attribution, and characterization capabilities on use cases of interest to transition partners.				
<b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> The FY 2025 decrease reflects program completion.				
<b>Title:</b> Adapting Cross-domain Kill-Webs (ACK)		6.000	-	-
<b>Description:</b> The Adapting Cross-domain Kill-Webs (ACK) program assisted military decision makers with rapidly identifying and selecting options for tasking and re-tasking assets within and across organizational boundaries. ACK assisted users with selecting sensors, effectors, and support elements across military domains (space, air, land, surface, subsurface, and cyber) to form and adapt kill chains to deliver desired effects on targets. Today's Command and Control (C2) organizations and processes cannot support multi-domain warfighting concepts, especially during joint operations. ACK addressed this challenge by utilizing a decentralized approach to allocating resources to tasks and assigning mission orders to assets, motivated by ideas developed in online commerce, sourcing, and supply chain management, such as bid requests and offers. The impact of ACK was to accelerate asset re-allocation and assignment decision timelines to be on the order of minutes, and the output of ACK was automated tools and decision aids to support the selection of the elements of a kill-chain and assignment of roles and responsibilities to each of the elements. Technology developed under this program transitioned to the Services.				
<b>Title:</b> Data-Driven Discovery of Models (D3M)		4.004	-	-
<b>Description:</b> The Data-Driven Discovery of Models (D3M) program developed automated model discovery techniques and tools that enable non-expert users to create empirical models of real, complex processes and phenomena. The ability to understand the battlespace is driven increasingly by expert analysis of sensor and open-source data. The DoD and IC communities are fundamentally limited by a shortage of domain-focused subject matter expert data scientists to construct empirical models that predict behaviors and anticipate contingencies during tactical and strategic planning. D3M addressed this need by creating technologies that automate the construction of complex empirical models. D3M technologies include a library of data modeling primitives that are automatically selectable, automated approaches for composition of complex models from modeling primitives, and intuitive mechanisms for human-model interaction that enable curation of models by non-experts. D3M focused on the types of empirical modeling problems commonly encountered by the DoD and IC.				
<b>Accomplishments/Planned Programs Subtotals</b>		77.419	91.634	42.688
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				

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**D. Acquisition Strategy**

N/A