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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Air Force **Date:** March 2023

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 2: Applied Research</i>					R-1 Program Element (Number/Name) PE 0602788F / <i>Dominant Information Sciences and Methods</i>							
COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	209.892	271.005	182.076	0.000	182.076	175.548	179.617	182.347	199.453	Continuing	Continuing
625315: <i>C4I Dominance Technology</i>	-	154.343	187.246	89.429	0.000	89.429	88.040	90.106	91.983	99.726	Continuing	Continuing
625319: <i>Cyberspace Dominance Technology</i>	-	31.177	59.282	65.335	0.000	65.335	61.615	63.033	64.342	70.691	Continuing	Continuing
62OMMS: <i>Research Site Support</i>	-	24.372	24.477	27.312	0.000	27.312	25.893	26.478	26.022	29.036	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program develops enterprise-centric information technology for the Department of the Air Force. Advances in enterprise-centric information technologies are required to increase warfighter readiness and effectiveness by providing the right information, at the right time, in the right format, anytime, anywhere in the world. The C4I Dominance Technology project provides the technologies for (a) secure, self-configuring, self-healing, seamless networks; (b) timely delivery of information to tactical assets; (c) scaling, robustness, and collaboration features required of the Department of the Air Force net-centric information management environment; and (d) real-time effective portrayal of complex data sets. This project also provides a network-centric, collaborative intelligence analysis capability that enables the fusion of multi-intelligence and sensor sources to provide timely situational awareness, understanding, and anticipation of the threats in the battlespace; and the advanced, novel exploitation technologies needed to intercept, collect, locate, and process both covert and overt raw data from intelligence and sensor sources. The Cyberspace Dominance Technology project provides technologies to deliver a full range of options in cyberspace on par with air and space dominance in each of the areas of cyber-attack, cyber defense, and cyber support to achieve the strategic capability of cyber dominance. This project also provides technology that ensures Department of Air Force ability to (a) access, maintain presence on, and deliver effects to adversary systems; (b) detect, defend, and respond to attacks on friendly computer systems and provide forensic analysis concerning those attack attempts; (c) bring game-changing computing power to the warfighter and disruptive computing power at the tactical edge and for federated grid services; and (d) provide cyber situational awareness to Department of the Air Force Commanders. The Research Site Support project provides the Rome Research Site infrastructure at Rome, New York and provides for the continued operations of all Rome Research Site properties, buildings, and services necessary for the research mission. Efforts in this program have been coordinated through the Department of Defense (DoD) Science and Technology (S&T) Executive Committee process to harmonize efforts and eliminate duplication.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver science and technology capabilities. The use of program funds in this PE would be in addition to the civilian pay expenses budgeted in program elements 0601102F, 0602102F, 0602201F, 0602202F, 0602203F, 0602204F, 0602602F, 0602605F, 0603788F, and 0602298F.

Funds in this program element may be used to investigate specified technology advancements in air, space and/or cyber domains.

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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 2: Applied Research</i>	R-1 Program Element (Number/Name) PE 0602788F / <i>Dominant Information Sciences and Methods</i>
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This program is in Budget Activity 2, Applied Research because this budget activity includes studies, investigations, and non-system specific technology efforts directed toward general military needs with a view toward developing and evaluating the feasibility and practicality of proposed solutions and determining their parameters.

B. Program Change Summary (\$ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	221.110	166.041	170.096	0.000	170.096
Current President's Budget	209.892	271.005	182.076	0.000	182.076
Total Adjustments	-11.218	104.964	11.980	0.000	11.980
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	105.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-11.218	-0.036			
• Other Adjustments	0.000	0.000	11.980	0.000	11.980

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

Project: 625315: *C4I Dominance Technology*

	FY 2022	FY 2023
Congressional Add: <i>Program Increase - Quantum Network Testbed</i>	9.798	10.000
Congressional Add: <i>Program Increase - Photonic Quantum Computing</i>	24.496	-
Congressional Add: <i>Program Increase - Quantum Internet Battlefield</i>	6.859	-
Congressional Add: <i>Program Increase - Ion Trap Quantum Computing</i>	9.798	-
Congressional Add: <i>Internet of Things Innovation Ecosystem</i>	-	5.000
Congressional Add: <i>University-based Quantum Materials Applied Research</i>	-	30.000
Congressional Add: <i>Program Increase - Secure Quantum Computing Facility</i>	-	20.000
Congressional Add: <i>Program Increase - Trapped Ion Quantum Computer</i>	-	30.000
Congressional Add: <i>Traffic management operational readiness</i>	-	10.000
Congressional Add Subtotals for Project: 625315	50.951	105.000
Congressional Add Totals for all Projects	50.951	105.000

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Appropriation/Budget Activity
3600: *Research, Development, Test & Evaluation, Air Force I BA 2: Applied Research*

R-1 Program Element (Number/Name)
PE 0602788F / *Dominant Information Sciences and Methods*

Change Summary Explanation

In 2024, funding for Dominant Information Sciences & Methods (PE 0602788F) increased to emphasize science and technology investments necessary to maintain superiority over potential near-peer adversaries in key technology areas including multi-source data fusion, collaborative intelligence analysis, cyber offense and defense, and game-changing computing power.

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Air Force **Date:** March 2023

Appropriation/Budget Activity 3600 / 2	R-1 Program Element (Number/Name) PE 0602788F / <i>Dominant Information Sciences and Methods</i>	Project (Number/Name) 625315 / <i>C4I Dominance Technology</i>
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COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
625315: <i>C4I Dominance Technology</i>	-	154.343	187.246	89.429	0.000	89.429	88.040	90.106	91.983	99.726	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Department of the Air Force requires advanced technologies which support the Department of the Air Force core missions and enable the Department of the Air Force to achieve Global Vigilance, Global Reach, and Global Power in support of national security objectives. The technologies developed under this project enable the National Defense Strategy and Department of the Air Force future operating concepts which require operational agility (the ability to rapidly generate—and shift among—multiple solutions for a given challenge), creating combinations of air, space, and cyberspace capabilities to achieve desired effects in the battlespace.

This project provides the technologies for secure, self-configuring, self-healing, seamless networks; advanced communications processors; anti-jam and low probability of intercept communications techniques; agile and dynamic policy-based network management capabilities; and modular, programmable, low-cost software radios. In addition, it develops both the technology base for ultra-wide bandwidth and multi-channeled communications networks (both air and space based) on and between platforms.

This project provides the technologies which enable the ability to globally share, discover, and access information across organizational, functional, and coalition boundaries and between and among domains, the timely delivery of information to tactical assets, the tailoring and prioritization of information based on mission needs and importance, and the scaling, robustness, and collaboration features required of the Department of the Air Force net-centric information management environment.

This project advances technologies enabling the effective execution of military objectives that will vastly improve the ability to support the commander and staff's ability to command all viable options to achieve desired effects across the full spectrum of operations (air, space, and cyberspace) at all levels of war (strategic, operational, and tactical) and during all phases of conflict. This project provides technologies for anticipatory decision support; course of action development, planning, scheduling, and assessment; and the real-time effective portrayal of complex data sets.

This project improves and automates the capability to generate, process, manage, fuse, exploit, interpret, and disseminate timely and accurate information. This project provides not only a network-centric, collaborative intelligence analysis capability that enables the fusion of multi-intelligence and sensor sources to provide timely situational awareness, understanding, and anticipation of the threats in the battlespace, but also the advanced, novel exploitation technologies needed to intercept, collect, locate, and process both covert and overt raw data from intelligence and sensor sources.

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

	FY 2022	FY 2023	FY 2024
Title: Assured Communications & Networks	28.298	18.917	17.355
Description: Develop communications, networking, and signal processing technologies with improved survivability and capacity to provide secure, adaptive, covert, anti-jam, and assured global battlespace connectivity tailored to anti-access and area-denial			

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2022	FY 2023	FY 2024
environments and contested operations. Includes the research and development to advance existing nuclear capable forces to ensure command, control, and connectivity for the President without constraints.				
<p>FY 2023 Plans: Continue the research and development of technologies for robust, adaptive, and mission aware airborne networks. Continue the research and development of large-scale hardware-in-the-loop verification of developed directional networking protocols. Continue the research and development of propagation models. Decrease the development of a network stack suitable for high-bandwidth terahertz links. Continue the development, verification, and validation of advanced, airborne high-frequency antenna/ionospheric structure. Continue the development of an airborne mesh networking capability that utilizes adaptive and responsive antennas for a dynamic and reliable high capacity mesh network suitable for communications in contested environments. Continue the development, verification, and test of advanced waveforms. Continue the development, verification, and test of software-defined radio prototypes. Continue development of enhanced assurance and filtration offloading. Continue to develop, verify, and validate software-defined radio prototypes. Initiate development of capabilities that incorporate communications network connectivity into information extraction tools.</p> <p>FY 2024 Plans: Continue the research and development of technologies for robust, adaptive, and mission aware airborne networks. Continue the research and development of large-scale hardware-in-the-loop verification of developed directional networking protocols. Continue the research and development of propagation models. Decrease the development of a network stack suitable for high-bandwidth terahertz links. Continue the development, verification, and validation of advanced, airborne high-frequency antenna/ionospheric structure. Continue the development of an airborne mesh networking capability that utilizes adaptive and responsive antennas for a dynamic and reliable high capacity mesh network suitable for communications in contested environments. Continue the development, verification, and test of advanced waveforms. Continue the development, verification, and test of software-defined radio prototypes. Continue development of enhanced assurance and filtration offloading. Continue to develop, verify, and validate software-defined radio prototypes. Continue to develop capabilities that incorporate communications network connectivity into information extraction tools. Initiate implementation and simulation against several adversarial interference conditions, and initiate developing and testing the operationally-relevant scenario.</p> <p>FY 2023 to FY 2024 Increase/Decrease Statement: FY 2024 decreased compared to FY 2023 by 1.562 million due to decreased emphasis in high-bandwidth terahertz technology and advanced directional propagation models.</p>				
Title: Data to Decisions		16.892	14.180	16.512
Description: Investigate and develop technologies for decision quality information dissemination services via publish, subscribe, and query across the Global Information Grid to enterprise and tactical assets and coalition partners.				

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2022	FY 2023	FY 2024
<p><i>FY 2023 Plans:</i> Continue the research and development of data analytics and strategic indications and warnings technologies (including large data alignment, indexing and search on textual data, large-scale and disparate data sources, both structured and unstructured data, and employment of various ontologies and machine learning techniques). Continue the development of Conversational Artificial Intelligence capabilities to deliver conversational agents capable of answering complex analytical questions. Continue the development of a user customizable entity, event, and relation text extraction capability with automatic performance estimates of the user-customized extractors on new documents and mission areas. Continue research and development of a Request for Information dialog system that can help answer Requests for Information for single service applications across 10 essential Intelligence enterprise identified Requests for Information. Continue the development of a Multi-Source Intelligence, Surveillance, and Reconnaissance ontology connecting Air Force analytics, Application Programming Interfaces, and services. Continue research and development of an integrated threat detection system based on vetted events from Publicly Available Information fused and corroborated with Intelligence, Surveillance, and Reconnaissance sources. Continue the research and development of autonomous, heterogeneous, distributed multi-sensor management and upstream data fusion for improved target detection, tracking and classification. Continue the development of Counter Small Unmanned Air Systems detection and identification, via acoustics, and algorithm work. Initiate the development of new methods that exploit traditional and non-traditional data to categorize and predict engagement scenarios of coordinated, non-cooperative targets, and that assess the threats based on situation-driven adversary capabilities. Continue to develop capabilities to automate emitter corridor extraction and mode tagging to deploy capabilities onboard the collection platform. Initiate research to add new data sources to identify signatures corresponding to different categories of multi-satellite actions. Initiate research methods to allow for change detection and pattern recognition. Initiate research to seek correlations between non-traditional data source signatures and multi-satellite actions.</p> <p><i>FY 2024 Plans:</i> Continue the research and development of data analytics and strategic indications and warnings technologies (including large data alignment, indexing and search on textual data, large-scale and disparate data sources, both structured and unstructured data, and employment of various ontologies and machine learning techniques). Continue the development of Conversational Artificial Intelligence (CAI) capabilities to deliver conversational agents capable of answering complex analytical questions. Continue the development of a user customizable entity, event, and relation text extraction capability with automatic performance estimates of the user-customized extractors on new documents and mission areas. Continue research and development of a Request for Information dialog system that can help answer RFIs for single service applications across 10 essential Intelligence enterprise identified RFIs. Continue the development of a Multi-Source Intelligence, Surveillance, and Reconnaissance ontology connecting Air Force analytics, Application Programming Interfaces, and services. Continue research and development of an integrated threat detection system based on vetted events from Publicly Available Information fused and corroborated with ISR sources. Continue the research and development of autonomous, heterogeneous, distributed multi-sensor management and upstream data fusion for improved target detection, tracking, and classification. Continue the development of new methods that</p>			

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2022	FY 2023	FY 2024
<p>exploit traditional and non-traditional data to categorize and predict engagement scenarios of coordinated, non-cooperative targets, and that assess the threats based on situation-driven adversary capabilities. Continue to develop capabilities to automate emitter corridor extraction and mode tagging to deploy capabilities onboard the collection platform. Continue research to add new data sources to identify signatures corresponding to different categories of multi-satellite actions. Continue researching methods that allow for change detection and pattern recognition. Continue research to seek correlations between non-traditional data source signatures and multi-satellite actions. Initiate development of a machine-learning environment to autonomously govern the execution of composite tasks. Initiate development of an analyst recognition engine for application programming interfaces, data, and services. Complete development of Counter Small Unmanned Air Systems detection and identification technology. Complete a proof-of-concept assistant to perform composite tasks over multiple turns. Initiate development of an advanced multimodal threat forecasting system with advanced veracity and fusion components. Initiate and complete analyst dialog interface and threat detection system.</p> <p>FY 2023 to FY 2024 Increase/Decrease Statement: FY 2024 increased compared to FY 2023 by \$2.332 million due to an increased emphasis in research creating a machine-learning environment to autonomously govern the execution of composite tasks and the development of an analyst recognition engine for application programming interfaces, data, and services.</p>				
<p>Title: Processing Technologies</p> <p>Description: Develop automatic and dynamically reconfigurable, scalable, affordable distributed peta-flop processing technologies for real-time global information systems.</p> <p>Starting in FY 2021, the remaining non-cyber work that was performed under Project 625319, Cyberspace Dominance Technology, in the Processing Technologies effort within this PE will now be performed within this effort.</p> <p>FY 2023 Plans: Continue advancing the application of novel neuromorphic systems for robust machine learning. Continue advancing research and development of the neuromorphic processor and validate capabilities for dynamic learning on mobile and power-constrained platforms. Continue the development of integrating embedded high performance computing systems. Continue the development and delivery of a Neuromorphic High-Performance-Computing (Brain-in-the-Box).</p> <p>FY 2024 Plans: Continue advancing the application of novel neuromorphic systems for robust machine learning. Continue advancing research and development of the neuromorphic processor and validate capabilities for dynamic learning on mobile and power-constrained platforms. Complete the development of a model integrated with existing embedded high performance computing systems.</p>		8.294	7.258	6.616

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2022	FY 2023	FY 2024
Complete the development and delivery of a Neuromorphic High-Performance-Computing (Brain-in-the-Box). Initiate research to advance the Strategic Sensing Grid orchestration and data exploitation. FY 2023 to FY 2024 Increase/Decrease Statement: FY 2024 decreased compared to FY 2023 by \$0.642 million. Justification for the decrease is described in the plans above.				
Title: Multi-Domain Command & Control (MDC2) Description: Develop advanced monitoring, planning, and assessment technologies enabling aerospace commanders to develop effects-based campaigns. Investigate, analyze, and develop technologies for planning, execution, and automatic rapid reconfiguration of distributed intelligent and integrated command and control information systems to achieve the commander's intent throughout varying crisis levels. FY 2023 Plans: Continue research applying machine learning techniques to enhance and optimize multi domain operations (including space). Continue research and development to refine the mathematical framework and provide a method for evaluating and presenting multi-domain courses of action to maximize operational effects for decisive advantage. Continue the development of tools, technology, and a framework for execution management of operational center process workflows and applications. Continue the research and development of a novel composable planning paradigm to overcome the serial and time-intensive nature of existing planning techniques. FY 2024 Plans: Continue research for applying machine learning techniques to enhance and optimize multi domain operations (including space). Complete research into a mathematical framework and provide a method for evaluating and presenting multi-domain courses of action to maximize operational effects for decisive advantage. Continue the development of tools, technology, and a framework for execution management of operational center process workflows and applications. Continue the research and development of a novel composable planning paradigm to overcome the serial and time-intensive nature of existing planning techniques. FY 2023 to FY 2024 Increase/Decrease Statement: FY 2024 increased compared to FY 2023 by \$1.551 million due to increased emphasis in mathematical frameworks for providing a method of evaluation to maximize operational effects for decisive advantage.		21.929	17.884	19.435
Title: Artificial Intelligence/Autonomy/Machine Learning Description: Perform research and development (R&D) to harness the speed and scale of computers and machines to address problems of complexity. FY 2023 Plans:		18.559	15.573	15.596

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2022	FY 2023	FY 2024
<p>Continue the research and development of machine learning approaches for supporting and performing operations in complex adversarial environments. Continue the research to understand operational needs of machine learning algorithms and systems with the multi-domain command and control connect. Continue research into the application of Interactive Learning techniques to the auto-planning problem and development of an IL based planning capability to augment existing auto-planning tools. Continue the research and development of machine learning approaches for supporting and performing operations in complex adversarial environments.</p> <p>FY 2024 Plans: Continue advancing the research and development of machine learning approaches for supporting and performing operations in complex adversarial environments. Continue the research to understand operational needs of machine learning algorithms and systems with the multi-domain command and control connect. Continue research into the application of Interactive Learning techniques to the auto-planning problem and development of an IL based planning capability to augment existing auto-planning tools. Continue the research and development of machine learning approaches for supporting and performing operations in complex adversarial environments.</p> <p>FY 2023 to FY 2024 Increase/Decrease Statement: FY 2024 increased compared to FY 2023 by \$0.023 million. Justification for the decrease is described in the plans above.</p>				
<p>Title: Quantum Information Science</p> <p>Description: Perform research and development (R&D) that will utilize quantum physics for the storage, transmission, manipulation, computing, or measurement of information in ways that offer advantages to classical capabilities.</p> <p>FY 2023 Plans: Continue research and development in the area of supreme and quantum computing information sciences through algorithm development and characterization of commercial device capability. Continue development of further reducing SWaP of network node demonstrations. Continue demonstration of quantum information processing on a single chip by using developed quantum photonics processor with photon sources.</p> <p>FY 2024 Plans: Continue research and development in the area of supreme and quantum computing information sciences. Continue to advance development of further reducing SWaP of network node demonstrations. Continue demonstration of quantum information processing on a single chip by using developed quantum photonics processor with photon sources. Initiate research and development of quantum photonic integrated circuits for transmission/node operations. Initiate research into designs for network architecture and connectivity.</p> <p>FY 2023 to FY 2024 Increase/Decrease Statement:</p>		9.420	8.434	13.915

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2022	FY 2023	FY 2024
FY 2024 increased compared to FY 2023 by \$5.481 million due to increase in research and development in the area of supreme and quantum computing information sciences, research and development of quantum photonic integrated circuits for transmission/node operations, and research of designs for network architecture and connectivity.			
Accomplishments/Planned Programs Subtotals	103.392	82.246	89.429

	FY 2022	FY 2023
Congressional Add: Program Increase - Quantum Network Testbed <i>FY 2022 Accomplishments:</i> Conduct congressionally directed efforts. <i>FY 2023 Plans:</i> Conduct Congressionally directed efforts.	9.798	10.000
Congressional Add: Program Increase - Photonic Quantum Computing <i>FY 2022 Accomplishments:</i> Conduct congressionally directed efforts.	24.496	-
Congressional Add: Program Increase - Quantum Internet Battlefield <i>FY 2022 Accomplishments:</i> Conduct congressionally directed efforts.	6.859	-
Congressional Add: Program Increase - Ion Trap Quantum Computing <i>FY 2022 Accomplishments:</i> Conduct congressionally directed efforts.	9.798	-
Congressional Add: Internet of Things Innovation Ecosystem <i>FY 2023 Plans:</i> Conduct Congressionally directed efforts.	-	5.000
Congressional Add: University-based Quantum Materials Applied Research <i>FY 2023 Plans:</i> Conduct Congressionally directed efforts.	-	30.000
Congressional Add: Program Increase - Secure Quantum Computing Facility <i>FY 2023 Plans:</i> Conduct Congressionally directed efforts.	-	20.000
Congressional Add: Program Increase - Trapped Ion Quantum Computer <i>FY 2023 Plans:</i> Conduct Congressionally directed efforts.	-	30.000
Congressional Add: Traffic management operational readiness <i>FY 2023 Plans:</i> Conduct Congressionally directed efforts.	-	10.000
Congressional Adds Subtotals	50.951	105.000

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

N/A

Remarks

D. Acquisition Strategy

Not applicable

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COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
625319: <i>Cyberspace Dominance Technology</i>	-	31.177	59.282	65.335	0.000	65.335	61.615	63.033	64.342	70.691	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Department of the Air Force requires technologies to deliver a full range of options in cyberspace on par with air and space dominance in each of the areas of cyber-attack, cyber defense, and cyber support to achieve the strategic capability of cyber dominance. The Department of the Air Force requires the development of superior, intelligent, on-demand computing to enable information superiority to include advances in secure information sharing across domains and boundaries as well as technologies that successfully deter any adversary from attacking computer systems anytime, anywhere by ensuring the Department of the Air Force's ability to: access, maintain presence on, and deliver effects to adversary systems; detect, defend, and respond to attacks on friendly computer systems and provide forensic analysis concerning those attack attempts; and provide cyber situational awareness to Department of the Air Force Commanders. In addition, the Department of the Air Force requires technology development that produces computing architectures with greater capacity and sophistication for addressing constrained, dynamic mission objectives; game-changing computing power to the warfighter, disruptive computing power at the tactical edge and for federated grid services; and interactive and real-time computing improving the usability of high-performance computing to the Department of the Air Force. It includes technologies in computational sciences and engineering, computer architectures and software intensive systems.

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

	FY 2022	FY 2023	FY 2024
Title: Cyber Defense Technologies	19.234	29.279	32.035
Description: Develop cyber defense and supporting technologies to detect, defend, and respond to attacks on computer systems as well as provide forensic concerning attacks.			
FY 2023 Plans:			
Continue research in the area of autonomous integrated cyber operations. Continue applied research in the area of biologically resilient cyber technologies. Continue research into mission-specific block-chain capabilities, and the alignment of cyber resilient services and dynamic management tailored towards unmanned aerial systems. Continue the development of radical architectural and infrastructural changes from computational diversity, to deliver a quantifiable improvement to cybersecurity. Continue research and validation of a cyber-hardened (robust, secure) processor for embedded weapon systems. Continue applied research to create trusted and resilient embedded systems that are capable of identifying, localizing, and automatically repairing previously unknown and/or unintended vulnerabilities. Continue development of software using evolutionary approaches to make embedded systems tolerant to unexpected and unforeseen situations. Continue research effort to discover concepts and capabilities for cyber survivability techniques and algorithms for counter-unmanned aerial systems. Continue development of a counter-unmanned aerial systems open architecture to enable interoperability. Continue evolution of autonomous machine learning functions. Decrease the validation and demonstration of automated workflows into defensive cyber operations systems. Continue development of a model-assisted concolic firmware exploration and threat models based on device behavior. Continue			

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Appropriation/Budget Activity 3600 / 2	R-1 Program Element (Number/Name) PE 0602788F / <i>Dominant Information Sciences and Methods</i>	Project (Number/Name) 625319 / <i>Cyberspace Dominance Technology</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2022	FY 2023	FY 2024
<p>large scale device analysis and demonstration on AF-relevant system. Initiate a capability to model, intercept, and synchronize the state of all embedded devices connected on a single bus. Initiate development of a physics-based and topologically-based model of an intra-connected and inter-connected electric power grid and communications network. Initiate research and development of the design, implementation, and evaluation of a proof-of-concept system to enable secure and efficient outsourcing of relational queries and Machine Learning training. Initiate research into the inference to untrusted clouds with cost-based optimization options, under Multiparty Computation protocols with different threat models, guarantees, and physical deployments (i.e., Local Area Network, Wide Area Networks, Blockchain, or mixed) settings.</p> <p>FY 2024 Plans: Continue research in the area of autonomous integrated cyber operations. Continue research into mission-specific block-chain capabilities and the alignment of cyber resilient services. Continue research and validation of a cyber-hardened (robust, secure) processor for embedded weapon systems. Continue applied research to create trusted and resilient embedded systems that are capable of identifying, localizing, and automatically repairing previously unknown and/or unintended vulnerabilities. Continue development of software using evolutionary approaches to make embedded systems tolerant to unexpected and unforeseen situations. Continue research effort to discover concepts and capabilities for cyber survivability techniques and algorithms for counter-unmanned aerial systems. Continue development of a counter-unmanned aerial systems open architecture to enable interoperability. Continue evolution of autonomous machine learning functions, including the validation and demonstration of automated workflows into defensive cyber operations systems. Continue development of a model-assisted concolic firmware exploration and threat models based on device behavior. Continue conducting large scale device analysis and demonstration on AF-relevant system. Continue to create a capability to model, intercept, and synchronize the state of all embedded devices connected on a single bus. Continue development of a physics-based and topologically-based model of an intra-connected and inter-connected electric power grid and communications network. Continue research and develop the design, implementation, and evaluation of a proof-of-concept model to enable secure and efficient outsourcing of relational queries and Machine Learning training. Initiate research on the inference to untrusted clouds with cost-based optimization options, under Multiparty Computation (MPC) protocols with different threat models, guarantees, and physical deployments (i.e., Local Area Network, Wide Area Networks, Blockchain, or mixed) settings. Initiate research to implement a binary injection suite on software binaries. Initiate research on expansion of software introspection techniques to exploit introspection accelerator capabilities. Complete the implementation of multiparty computation and zero knowledge proof schemes over multiple content service providers.</p> <p>FY 2023 to FY 2024 Increase/Decrease Statement: FY 2024 increased compared to FY 2023 by \$2.756 million. Justification for the increase is added emphasis in defensive technologies, including adversary behavior predictions, operational use of commercial cloud-computing platforms, and cyber situational awareness of friendly and adversarial systems.</p>				
Title: Cyber Offense Technologies		11.943	30.003	33.300

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Air Force		Date: March 2023		
Appropriation/Budget Activity 3600 / 2	R-1 Program Element (Number/Name) PE 0602788F / <i>Dominant Information Sciences and Methods</i>	Project (Number/Name) 625319 / <i>Cyberspace Dominance Technology</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2022	FY 2023	FY 2024
<p>Description: Develop offensive cyber operations technologies to access, maintain presence on, and deliver effects to adversary systems.</p> <p>FY 2023 Plans: Continue research and development of game changing technologies which employ dominant power for cyber offensive operations and information warfare to change the future fight. Continue research and development in capabilities for multi-function, non-kinetic cyber effects against adversarial systems. Continue demonstrating ground-based and airborne delivery of disrupt, deny, degrade, destroy, or deceive effects that are both cyber and physical/kinetic. Continue the advancement of research in systems performing blind data discovery associated with the Internet of Things. Continue research and development for the identification of items of interest associated with the Internet of Things. Continue research for specific items of interest within the Internet of Things.</p> <p>FY 2024 Plans: Continue research and development of game changing technologies which employ dominant power for cyber offensive operations and information warfare to change the future fight. Continue research and development in capabilities for multi-function, non-kinetic cyber effects against adversarial systems. Continue to demonstrate ground-based and airborne delivery of disrupt, deny, degrade, destroy, or deceive effects that are both cyber and physical/kinetic. Continue the advancement of research in systems to perform blind data discovery associated with the Internet of Things. Continue research and development for the identification of items of interest associated with the Internet of Things. Continue research for specific items of interest within the Internet of Things. Initiate development of a model of an Electrical Power and interconnected communication network. Initiate and complete the design, implementation, and test of user equipment positioning and geofencing methods.</p> <p>FY 2023 to FY 2024 Increase/Decrease Statement: FY 2024 increased compared to FY 2023 by \$3.297 million. Justification for the increase is added emphasis in multi-function cyber effects, complexity capabilities against adversarial systems, and technology advancements to ensure cyberspace dominance.</p>				
Accomplishments/Planned Programs Subtotals		31.177	59.282	65.335
C. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
D. Acquisition Strategy				
Not applicable				

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Air Force										Date: March 2023		
Appropriation/Budget Activity 3600 / 2					R-1 Program Element (Number/Name) PE 0602788F / <i>Dominant Information Sciences and Methods</i>				Project (Number/Name) 62OMMS / <i>Research Site Support</i>			
COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
62OMMS: <i>Research Site Support</i>	-	24.372	24.477	27.312	0.000	27.312	25.893	26.478	26.022	29.036	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Air Force Research Laboratory Information Directorate leads the discovery, development and implementation of information science and technology to drive transformation within the Department of the Air Force and across the Department of Defense. The focus of the work is to provide the warfighter with the required technology-based capabilities to defend the Nation by unleashing the power of innovative information science and technology to anticipate, find, fix, track, target, engage, and assess anything, anytime, anywhere. Since the site is a single-purpose location which is not located on a military installation, the Information Directorate has unique requirements for supporting its science and technology mission. As the host unit, the directorate is responsible to provide the Rome Research Site infrastructure at Rome, New York and provide for the continued operations of all Rome Research Site properties, buildings, and services necessary for the research mission. Operations include: logistics and communication services, utilities, maintenance of facilities and structures, safety and security of the workforce and visiting researchers, and ensures compliance with the laws, regulations, and directives that pertain to site operations. These services are host unit responsibilities and are necessary to provide a safe and effective environment for the Research Site's workforce and mission.

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

	FY 2022	FY 2023	FY 2024
Title: Rome Research Infrastructure	24.372	24.477	27.312
Description: Provide the necessary services and support including, but not limited to: fire inspections, refuse collection, water, electricity, steam, heat, custodial, and grounds maintenance services to the Research Site. Provide the necessary support for the maintenance and repair of Research Site facilities (buildings and other structures), vehicle and equipment lease and security/safety inspections and services as necessary for compliance and safety/security of personnel and research assets. Provide the Research Site with long haul communications (using the Government Services Administration set of Networx contracts for Continental United States), trunk connectivity and wireless communications.			
FY 2023 Plans: Continue providing civilian payroll and non-pay costs for installation operations in support of the Rome Research Site property and all onsite personnel. Continue providing facilities, facility operations, facility sustainment, support equipment, contracts, and associated costs to plan, manage and execute the following functions: fire prevention, disaster preparedness, plant operation and purchase of commodity, refuse collection, pavement clearance of snow and ice, grounds maintenance including landscaping, real property special inspections, pest control, and custodial services. Continue providing Real Property Management and Engineering Services, including: (1) Facility Management and Administration and (2) Installation Engineering Services. Facility Management includes public works management costs, contract management, material procurement, facility data management, furnishings management costs, and real estate management. Installation Engineering Services includes annual inspection of facilities, master planning, overhead of planning and design, overhead of construction management, and non Site Recovery Management service			

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Air Force		Date: March 2023		
Appropriation/Budget Activity 3600 / 2	R-1 Program Element (Number/Name) PE 0602788F / <i>Dominant Information Sciences and Methods</i>	Project (Number/Name) 62OMMS / <i>Research Site Support</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2022	FY 2023	FY 2024
<p>calls. Continue providing basic installation communication services, including long haul trunk and telecommunications services. Continue providing site vehicle lease for logistics, security, and mission support under the Government Services Administration.</p> <p>FY 2024 Plans: Continue providing civilian payroll and non-pay costs for installation operations in support of the Rome Research Site property and all onsite personnel. Continue providing facilities, facility operations, facility sustainment, support equipment, contracts, and associated costs to plan, manage and execute the following functions: fire prevention, disaster preparedness, plant operation and purchase of commodity, refuse collection, pavement clearance of snow and ice, grounds maintenance including landscaping, real property special inspections, pest control, and custodial services. Continue providing Real Property Management and Engineering Services, including: (1) Facility Management and Administration and (2) Installation Engineering Services. Facility Management includes public works management costs, contract management, material procurement, facility data management, furnishings management costs, and real estate management. Installation Engineering Services includes annual inspection of facilities, master planning, overhead of planning and design, overhead of construction management, and non Site Recovery Management service calls. Continue providing basic installation communication services, including long haul trunk and telecommunications services. Continue providing site vehicle lease for logistics, security, and mission support under the Government Services Administration.</p> <p>FY 2023 to FY 2024 Increase/Decrease Statement: FY 2024 increased compared to FY 2023 by \$2.835 million due to increased costs of materials and labor in virtually every sector such as construction, building repair, pavement, pest control, fire and police equipment maintenance, vehicle maintenance, network services, and security.</p>				
Accomplishments/Planned Programs Subtotals		24.372	24.477	27.312
C. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
D. Acquisition Strategy				
Not applicable				