

Department of Homeland Security

Science and Technology Directorate

Budget Overview



Fiscal Year 2025

Congressional Justification

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**Science and Technology Directorate
Appropriation Organization Structure**

	Level	Fund Type (* Includes Defense Funding)
Science and Technology Directorate	Component	
Operations and Support	Appropriation	
Mission Support	PPA	Discretionary - Appropriation
Laboratory Facilities	PPA	Discretionary - Appropriation
Acquisition and Operations Analysis	PPA	Discretionary - Appropriation
Procurement, Construction, and Improvements	Appropriation	
Construction and Facility Improvements	PPA	
Critical Repair/Replacement Requirement	Investment,PPA Level II	Discretionary - Appropriation
Plum Island Closure and Support	Investment,PPA Level II	Discretionary - Appropriation
Detection Sciences Testing and Applied Research Center	Investment,PPA Level II	Discretionary - Appropriation
Research and Development	Appropriation	
Research, Development and Innovation	PPA	
Border Security Thrust Area	R&D Project,PPA Level II	Discretionary - Appropriation
Chemical, Biological, and Explosive Defense Thrust Area	R&D Project,PPA Level II	Discretionary - Appropriation
Counter Terrorist Thrust Area	R&D Project,PPA Level II	Discretionary - Appropriation
Cyber Security / Information Analysis Thrust Area	R&D Project,PPA Level II	Discretionary - Appropriation
First Responder / Disaster Resilience Thrust Area	R&D Project,PPA Level II	Discretionary - Appropriation
Innovation Research and Foundational Tools Thrust Area	R&D Project,PPA Level II	Discretionary - Appropriation
Physical Security and Critical Infrastructure Resilience Thrust Area	R&D Project,PPA Level II	Discretionary - Appropriation
University Programs	PPA	
Centers of Excellence	R&D Project,PPA Level II	Discretionary - Appropriation
Minority Serving Institutions (MSI)	R&D Project,PPA Level II	Discretionary - Appropriation

**Science and Technology Directorate
Budget Comparison and Adjustments**

Appropriation and PPA Summary

(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget
Operations and Support	\$384,107	\$384,107	\$383,485
Mission Support	\$164,210	\$164,210	\$175,140
Laboratory Facilities	\$127,522	\$127,522	\$130,590
Acquisition and Operations Analysis	\$92,375	\$92,375	\$77,755
Procurement, Construction, and Improvements	\$55,216	\$55,216	\$50,270
Construction and Facility Improvements	\$55,216	\$55,216	\$50,270
Critical Repair/Replacement Requirement	\$35,750	\$35,750	\$10,000
Plum Island Closure and Support	\$13,466	\$13,466	\$40,270
Detection Sciences Testing and Applied Research Center	\$6,000	\$6,000	-
Research and Development	\$461,218	\$461,218	\$402,353
Research, Development and Innovation	\$407,681	\$407,681	\$348,816
Border Security Thrust Area	\$83,007	\$83,007	\$100,500
Chemical, Biological, and Explosive Defense Thrust Area	\$21,510	\$21,510	\$17,046
Counter Terrorist Thrust Area	\$60,983	\$60,983	\$55,114
Cyber Security / Information Analysis Thrust Area	\$48,567	\$48,567	\$33,550
First Responder / Disaster Resilience Thrust Area	\$55,950	\$55,950	\$24,950
Innovation Research and Foundational Tools Thrust Area	\$95,106	\$95,106	\$84,106
Physical Security and Critical Infrastructure Resilience Thrust Area	\$42,558	\$42,558	\$33,550
University Programs	\$53,537	\$53,537	\$53,537
Centers of Excellence	\$45,880	\$45,880	\$45,880
Minority Serving Institutions (MSI)	\$7,657	\$7,657	\$7,657
Total	\$900,541	\$900,541	\$836,108

Science and Technology Directorate
Comparison of Budget Authority and Request
(Dollars in Thousands)

	FY 2023 Enacted			FY 2024 Annualized CR			FY 2025 President's Budget			FY 2024 to FY 2025 Total Changes		
	Pos.	FTE	Amount	Pos.	FTE	Amount	Pos.	FTE	Amount	Pos.	FTE	Amount
Operations and Support	572	544	\$384,107	572	544	\$384,107	571	563	\$383,485	(1)	19	(\$622)
Procurement, Construction, and Improvements	-	-	\$55,216	-	-	\$55,216	-	-	\$50,270	-	-	(\$4,946)
Research and Development	-	-	\$461,218	-	-	\$461,218	-	-	\$402,353	-	-	(\$58,865)
Total	572	544	\$900,541	572	544	\$900,541	571	563	\$836,108	(1)	19	(\$64,433)
Subtotal Discretionary - Appropriation	572	544	\$900,541	572	544	\$900,541	571	563	\$836,108	(1)	19	(\$64,433)

Component Budget Overview

The FY 2025 Budget includes \$836.1M; 571 positions; and 563 FTE for the Science and Technology Directorate (S&T). This funding level represents a decrease of \$64.4M from the FY 2023 Enacted Budget.

S&T’s Research, Development, Test, and Evaluation (RDT&E) efforts are critical to maintaining threat awareness, delivering mitigation strategies, and creating novel technology and approaches for the Department of Homeland Security’s (DHS) Components and partners in the Homeland Security Enterprise (HSE). S&T’s enduring research provides the essential building blocks for incremental scientific advances in collaboration with public and private sector research partners. S&T conducts this vital work with public and private sector research partners in collaboration with our Office of National Laboratories, Office of University Program’s Centers of Excellence, Technology Centers, and Small Business Innovation Research program. S&T seeks to meet future needs by expanding capabilities in advanced computing, information security, and communications to better understand the next generation of computing capabilities and their impacts to the full spectrum of homeland security operations. S&T’s budget supports Component capability gap requirements and aligns with the Administration and DHS priorities.

S&T focuses its resources on rapidly transitioning existing and new technology capabilities to operations to help the HSE be more agile and responsive to emerging threats. S&T leverages existing technologies to expedite the development of vital capabilities critical to mission operations. Advanced technologies, knowledge products, technical analyses, laboratories, and university-based research contributes to the effectiveness and efficiency of DHS operations and the safety and interoperability of the first responder community.

**Science and Technology Directorate
Budget Authority and Obligations**
(Dollars in Thousands)

	FY 2023	FY 2024	FY 2025
Enacted/Request	\$900,541	\$900,541	\$836,108
Carryover - Start of Year	\$437,879	\$446,942	\$447,380
Recoveries	\$32,297	-	-
Rescissions to Current Year/Budget Year	(\$142)	-	-
Net Sequestered Resources	-	-	-
Reprogramming/Transfers	(\$7,644)	-	-
Supplementals	-	\$13,846	-
Total Budget Authority	\$1,362,931	\$1,361,329	\$1,283,488
Collections - Reimbursable Resources	\$96,525	\$96,525	\$120,667
Collections - Other Sources	-	-	-
Total Budget Resources	\$1,459,456	\$1,457,854	\$1,404,155
Obligations (Actual/Estimates/Projections)	\$1,012,052	\$1,010,012	\$980,550
Personnel: Positions and FTE			
Enacted/Request Positions	572	572	571
Enacted/Request FTE	544	544	563
Onboard and Actual FTE			
Onboard (Actual/Estimates/Projections)	509	547	571
FTE (Actual/Estimates/Projections)	507	536	563

**Science and Technology Directorate
Collections – Reimbursable Resources**
(Dollars in Thousands)

	FY 2023 Enacted			FY 2024 Annualized CR			FY 2025 President's Budget		
	Pos.	FTE	Amount	Pos.	FTE	Amount	Pos.	FTE	Amount
Canada	-	-	\$300	-	-	\$300	-	-	-
Department of Agriculture	-	-	\$3,600	-	-	\$3,600	-	-	\$1,485
Department of Defense	-	-	\$13,500	-	-	\$13,500	-	-	\$5,980
Department of Defense - Navy, Marine Corps	-	-	-	-	-	-	-	-	\$80
Department of Energy	-	-	\$700	-	-	\$700	-	-	\$700
Department of Health and Human Services - Department Wide	-	-	-	-	-	-	-	-	\$500
Department of Health and Human Services - Food and Drug Administration	-	-	\$2,650	-	-	\$2,650	-	-	-
Department of Homeland Security	-	-	\$500	-	-	\$500	-	-	\$15,500
Department of Homeland Security - Countering Weapons of Mass Destruction	-	-	\$3,500	-	-	\$3,500	-	-	\$17,250
Department of Homeland Security - Cybersecurity and Infrastructure Security Agency	-	-	\$13,300	-	-	\$13,300	-	-	\$14,500
Department of Homeland Security - Federal Emergency Management Agency	-	-	\$2,770	-	-	\$2,770	-	-	\$50
Department of Homeland Security - Federal Law Enforcement Training Centers	-	-	\$10	-	-	\$10	-	-	-
Department of Homeland Security - Intelligence and Analysis	-	-	-	-	-	-	-	-	\$8,000
Department of Homeland Security - Management Directorate	-	-	\$2,100	-	-	\$2,100	-	-	\$8,500
Department of Homeland Security - Office of Biometric Identity Mangement (OBIM)	-	-	\$2,000	-	-	\$2,000	-	-	\$1,925
Department of Homeland Security - Transportation Security Administration	-	-	\$13,345	-	-	\$13,345	-	-	\$6,800
Department of Homeland Security - U.S. Citizenship and Immigration Services	-	-	\$1,070	-	-	\$1,070	-	-	\$50
Department of Homeland Security - U.S. Customs and Border Protection	-	-	\$9,100	-	-	\$9,100	-	-	\$15,500
Department of Homeland Security - U.S. Immigration and Customs Enforcement	-	-	\$430	-	-	\$430	-	-	\$547
Department of Homeland Security - United States Coast Guard	-	-	\$1,950	-	-	\$1,950	-	-	\$100
Department of Homeland Security - United States Secret Service	-	-	\$1,700	-	-	\$1,700	-	-	\$1,000
Department of Justice - Federal Bureau of Investigation	-	-	\$22,000	-	-	\$22,000	-	-	\$21,800
Department of State	-	-	\$200	-	-	\$200	-	-	-
Intelligence Community Management Account	-	-	\$800	-	-	\$800	-	-	-
Library of Congress	-	-	\$500	-	-	\$500	-	-	\$400
Netherlands	-	-	\$300	-	-	\$300	-	-	-

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Sweden	-	-	\$200	-	-	\$200	-	-	-
Total Collections	-	-	\$96,525	-	-	\$96,525	-	-	\$120,667

**Science and Technology Directorate
Personnel Compensation and Benefits**

Pay Summary
(Dollars in Thousands)

	FY 2023 Enacted				FY 2024 Annualized CR				FY 2025 President's Budget				FY 2024 to FY 2025 Total			
	Pos.	FTE	Amount	Rate	Pos.	FTE	Amount	Rate	Pos.	FTE	Amount	Rate	Pos.	FTE	Amount	Rate
Operations and Support	572	544	\$118,247	\$208.76	572	544	\$118,247	\$208.76	571	563	\$139,203	\$238.31	(1)	19	\$20,956	\$29.56
Total	572	544	\$118,247	\$208.76	572	544	\$118,247	\$208.76	571	563	\$139,203	\$238.31	(1)	19	\$20,956	\$29.56
Subtotal Discretionary - Appropriation	572	544	\$118,247	\$208.76	572	544	\$118,247	\$208.76	571	563	\$139,203	\$238.31	(1)	19	\$20,956	\$29.56

Pay by Object Class
(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget	FY 2024 to FY 2025 Change
11.1 Full-time Permanent	\$74,920	\$74,920	\$88,790	\$13,870
11.3 Other than Full-time Permanent	\$6,450	\$6,450	\$6,962	\$512
11.5 Other Personnel Compensation	\$2,347	\$2,347	\$3,160	\$813
11.8 Special Personal Services Payments	\$4,684	\$4,684	\$5,033	\$349
12.1 Civilian Personnel Benefits	\$29,846	\$29,846	\$35,258	\$5,412
Total - Personnel Compensation and Benefits	\$118,247	\$118,247	\$139,203	\$20,956
Positions and FTE				
Positions - Civilian	572	572	571	(1)
FTE - Civilian	544	544	563	19

**Science and Technology Directorate
Non Pay Budget Exhibits**

Non Pay Summary
(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget	FY 2024 to FY 2025 Change
Operations and Support	\$265,860	\$265,860	\$244,282	(\$21,578)
Procurement, Construction, and Improvements	\$55,216	\$55,216	\$50,270	(\$4,946)
Research and Development	\$461,218	\$461,218	\$402,353	(\$58,865)
Total	\$782,294	\$782,294	\$696,905	(\$85,389)
Subtotal Discretionary - Appropriation	\$782,294	\$782,294	\$696,905	(\$85,389)

Non Pay by Object Class
(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget	FY 2024 to FY 2025 Change
21.0 Travel and Transportation of Persons	\$2,105	\$2,105	\$2,206	\$101
22.0 Transportation of Things	\$126	\$126	\$126	-
23.1 Rental Payments to GSA	\$613	\$613	\$613	-
23.2 Rental Payments to Others	\$2,315	\$2,315	\$2,287	(\$28)
23.3 Communications, Utilities, & Miscellaneous	\$1,408	\$1,408	\$1,491	\$83
24.0 Printing and Reproduction	\$382	\$382	\$382	-
25.1 Advisory & Assistance Services	\$231,814	\$231,814	\$212,350	(\$19,464)
25.2 Other Services from Non-Federal Sources	\$7,948	\$7,948	\$8,150	\$202
25.3 Other Purchases of goods and services	\$43,682	\$43,682	\$42,255	(\$1,427)
25.4 Operations & Maintenance of Facilities	\$23,959	\$23,959	\$23,686	(\$273)
25.5 Research & Development Contracts	\$338,511	\$338,511	\$282,283	(\$56,228)
25.7 Operation & Maintenance of Equipment	\$12,829	\$12,829	\$12,696	(\$133)
25.8 Subsistence and Support of Persons	\$4	\$4	\$4	-
26.0 Supplies & Materials	\$2,867	\$2,867	\$3,926	\$1,059
31.0 Equipment	\$34,269	\$34,269	\$38,003	\$3,734
32.0 Land and Structures	\$30,470	\$30,470	\$14,020	(\$16,450)
41.0 Grants, Subsidies, and Contributions	\$48,953	\$48,953	\$52,388	\$3,435
42.0 Insurance Claims and Indemnities	\$39	\$39	\$39	-
Total - Non Pay Budget Object Class	\$782,294	\$782,294	\$696,905	(\$85,389)

**Science and Technology Directorate
Supplemental Budget Justification Exhibits**

FY 2025 Counter Unmanned Aerial Systems (CUAS) Funding

Appropriation and PPA	<i>(Dollars in Thousands)</i>
Science and Technology Directorate Total	\$26,165
Research and Development	\$26,165
Research, Development and Innovation	\$26,165
Border Security Thrust Area	\$26,165

Narrative description of how the above funding will be used can be found in the associated chapter of this Budget.

Science and Technology Directorate
FY 2023 – FY 2025 Cyber Security Funding
(Dollars in Thousands)

NIST Framework	FY 2023 Actual	FY 2024 Annualized CR	FY 2025 President’s Budget
Detect	\$77	\$77	\$355
Identify	\$4,310	\$4,310	\$5,263
Protect	\$60,077	\$60,077	\$49,844
Recover	\$93	\$93	\$150
Respond	\$898	\$898	\$679
Grand Total	\$65,455	\$65,455	\$56,291

**Science and Technology Directorate
Status of Congressionally Requested Studies, Reports and Evaluations**

Fiscal Year	Due Date	Reference/Citation	Requirement	Status
2022	9/12/2022	Senate Report & Joint Explanatory Statement - Division F	Investments in Border Security - Initial Report	Pending
2023	2/27/2023	Joint Explanatory Statement – Division F	Border Security Capabilities and Performance Measurement Initial Report	Drafted – Under Review
2023	6/27/2023	House Report 117-396 & Joint Explanatory Statement – Division F	Rapid Technologies for Drug Interdiction: Research and Development	Transmitted – July 10, 2023
2023	6/27/2023	House Report 117-396 & Joint Explanatory Statement – Division F	Updated Cost and Schedule for the Detection Sciences Testing and Applied Research Project	Transmitted – September 11, 2023
2022	9/12/2023	Senate Report	Investments in Border Security - Final Report	Pending
2023	9/30/2023	House Report 117-396 & Joint Explanatory Statement – Division F	Binational Cooperative Program	Drafted – Under Review
2023	2/27/2024	Joint Explanatory Statement – Division F	Border Security Capabilities and Performance Measurement Final Report	Pending

**Science and Technology Directorate
Authorized/Unauthorized Appropriations**

Budget Activity <i>Dollars in Thousands</i>	Last year of Authorization	Authorized Level	Appropriation in Last Year of Authorization	FY 2025 President's Budget
	Fiscal Year	Amount	Amount	Amount
Operations and Support	N/A	N/A	N/A	\$383,485
Mission Support	N/A	N/A	N/A	\$175,140
Laboratory Facilities	N/A	N/A	N/A	\$130,590
Acquisition and Operations Analysis	N/A	N/A	N/A	\$77,755
Procurement, Construction, and Improvements	N/A	N/A	N/A	\$50,270
Construction and Facility Improvements	N/A	N/A	N/A	\$50,270
Critical Repair/Replacement Requirement	N/A	N/A	N/A	\$10,000
Plum Island Closure and Support	N/A	N/A	N/A	\$40,270
Detection Sciences Testing and Applied Research Center	N/A	N/A	N/A	\$0
Research and Development	N/A	N/A	N/A	\$402,353
Research, Development and Innovation	N/A	N/A	N/A	\$348,816
Border Security Thrust Area	N/A	N/A	N/A	\$100,500
Chemical, Biological, and Explosive Defense Thrust Area	N/A	N/A	N/A	\$17,046
Counter Terrorist Thrust Area	N/A	N/A	N/A	\$55,114
Cyber Security / Information Analysis Thrust Area	N/A	N/A	N/A	\$33,550
First Responder / Disaster Resilience Thrust Area	N/A	N/A	N/A	\$24,950

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Innovation Research and Foundational Tools Thrust Area	N/A	N/A	N/A	\$84,106
Physical Security and Critical Infrastructure Resilience Thrust Area	N/A	N/A	N/A	\$33,550
University Programs	N/A	N/A	N/A	\$53,537
Centers of Excellence (COE)	N/A	N/A	N/A	\$45,880
Minority Serving Institutions (MSI)	N/A	N/A	N/A	\$7,657
Total Direct Authorization/Appropriation	N/A	N/A	N/A	\$836,108

**Science and Technology Directorate
Proposed Legislative Language**

Operations and Support

For necessary expenses of the Science and Technology Directorate for operations and support, including the purchase or lease of not to exceed 5 vehicles, [\$384,107,000] *\$383,485,000*, of which [\$219,897,000] *\$208,345,000* shall remain available until September 30, [2025] *2026*: Provided, that not to exceed [\$10,000] *\$10,000* shall be for official reception and representation expenses.

Language Provision	Explanation
... [\$384,107,000] <i>\$383,485,000</i>	Dollar change only. No substantial change proposed.
... [\$219,897,000] <i>\$207,170,000</i>	Dollar change only. No substantial change proposed.
... [\$10,000] <i>\$10,000</i>	Dollar change only. No substantial change proposed.
... [2025] <i>2026</i>	<p>Fiscal year change; updated period of availability. No substantial change proposed. S&T continues two-year funding for Acquisition and Operations Analysis (AOA) and Laboratory Facilities PPAs in the O&S appropriation. AOA supports the multi-year Research, Development, and Innovation PPA within the Research and Development appropriation. The activities such as test and evaluation, systems engineering, technology transition and international cooperative programs, support R&D projects that span across multiple fiscal years. Two-year funding in this PPA is necessary to ensure S&T’s R&D programs have resources when needed, enabling timely program execution and support to DHS operational Components.</p> <p>Laboratory Facilities PPA supports the operations and facility maintenance of S&T’s aging laboratories. The funding requirements for S&T’s laboratory facilities are unique due to the nature of the assets and their complex operational needs. S&T’s facility maintenance can only be planned to a certain point, and many unforeseen costs arise as part of maintaining laboratory facilities and operations. S&T’s facilities range in age from 20 to 70 years old, like the Plum Island Animal Disease Center which opened in 1954, and the Transportation Security Lab which opened in 1992. All lab facilities require both end of life-cycle and emergency replacement of failing equipment. S&T’s biocontainment laboratories oftentimes have costly repairs such as water tank and pipe leakages in decontamination areas. Two-year funding allows S&T to maintain contingency funding for these types of repairs.</p>

Procurement, Construction, and Improvements

For necessary expenses of the Science and Technology Directorate for Procurement, Construction, and Improvements, [\$55,216,000] \$50,270,000, to remain available until September 30, [2028] 2029.

Language Provision	Explanation
... [\$55,216,000] \$50,270,000	Dollar change only. No substantial change proposed.
... [2028] 2029	Fiscal year change only. No substantial change proposed.

Research and Development

For necessary expenses of the Science and Technology Directorate for research and development, [\$461,218,000] \$402,353,000, to remain available until September 30, [2026] 2027.

Language Provision	Explanation
... [\$461,218,000] \$402,353,000	Dollar change only. No substantial change proposed.
... [2026] 2027	<p>Fiscal year change. S&T continues three-year funding for both its R&D PPAs, University Programs and Research, Development and Innovation.</p> <p>The nature of University Programs mission is to look at problems with uncertain outcomes through an innovative and fresh lens. Three-year funding allows time for team formulation, business/contract establishment between prime and subs, and experimentation and refinement of the technical approaches. This flexibility allows the Office of University Programs to make lower-risk determinations on whether a project and its resulting information will generate useful outcomes.</p> <p>In the Research, Development, and Innovation PPA, S&T conducts basic, applied, and developmental research to support DHS Components. Concepts must be developed, tested and validated to ensure that acquisition results in purpose-driven outcomes that lead to increased effectiveness, efficiency and safety for departmental missions. R&D is complex and can take months or years to address capability gaps depending on the research efforts to identify practical technologies, concepts and processes that can be incorporated into environments to increase the effectiveness, efficiency, and safety of operations.</p>

Department of Homeland Security

Science and Technology Directorate

Strategic Context



Fiscal Year 2025
Congressional Justification

Science and Technology Directorate Strategic Context

Component Overview

The Science and Technology Directorate (S&T) is the primary research and development arm of the Department. It provides Federal, state, and local officials with the technology and capabilities to protect the homeland.

The strategic context presents the performance budget by tying together programs with performance measures that gauge the delivery of results to our stakeholders. DHS has integrated a mission and mission support programmatic view into a significant portion of the Level 1 Program, Project, or Activities (PPAs) in the budget. A mission program is a group of activities acting together to accomplish a specific high-level outcome external to DHS, and includes operational processes, skills, technology, human capital, and other resources. Mission support programs are those that are cross-cutting in nature and support multiple mission programs. Performance measures associated with S&T's mission support program are presented in two measure sets, strategic and management measures. Strategic measures communicate results delivered for our agency mission and are considered our Government Performance and Results Act Modernization Act (GPRAMA) measures. Additional supporting measures, known as management measures, are displayed to enhance connections to resource requests.

Acquisition and Operations Analysis: The Acquisition and Operations Analysis program provides expert assistance to entities across the homeland security enterprise to ensure that the transition, acquisition, and deployment of technologies, information, and procedures improve the efficiency and effectiveness of operational capabilities. This program assists in testing and evaluation, standards development, requirements analysis, systems engineering, and supporting technology transition.

Management Measure

Measure Name:	Percent of completed studies that impacted customer policy, strategic, operational requirements, and/or capability assessments						
Strategic Alignment:	E.3 : Harness Data and Technology to Advance Mission Delivery						
Description:	This measure captures the impact of S&T's Operations and Requirements Analysis (ORA) Division in applying operational analysis to enhance DHS Component operational areas of responsibility leading to informed decisions, therefore, improving operational efficiency across DHS. Essentially, it measures the percent of completed studies within the current fiscal year where customers used the outcomes of the study to improve their operational efficiency. In turn, the results of these analyses inform the respective DHS Component customer of their policy, strategic, operational requirements, and/or, capability assessments in the current fiscal year.						
Fiscal Year:	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
Targets:	---	---	---	---	---	80%	80%
Results:	---	---	---	---	---	TBD	TBD

Measure Name:	Percent of Letters of Technical Assessments submitted in a timely manner						
Strategic Alignment:	E.3 : Harness Data and Technology to Advance Mission Delivery						
Description:	This measure gauges the effectiveness of the Systems Engineering and Standards Division (SES) in delivering Letter of Technical Assessments (LOTAs) to Acquisition decision-makers prior to ADE-2A to support informed decision-making. The purpose of a Technical Assessment is to provide information on the technical maturity of planned technology, evaluate manufacturing capability, and provide an independent assessment of the maturity of a program’s planned technologies, evaluate manufacturing capability, and overall technical risk. Technical Assessments are conducted for DHS Acquisition programs that are required under Acquisition Instruction 102-01-001 and Technical Assessment Instruction 102-05-001 to have a Technical Assessment conducted by the S&T SES Division.						
Fiscal Year:	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
Targets:	---	---	---	---	---	80%	80%
Results:	---	---	---	---	---	TBD	TBD

Research, Development, and Innovation: The Research, Development, and Innovation program provides state-of-the-art solutions to meet the needs of DHS Components and the first responder community. This includes customer-focused and output-oriented Research, Development, Test, and Evaluation (RDT&E) programs that balance risk, cost, impact, and time to delivery.

Strategic Measure

Measure Name:	Percent of technology or knowledge products transitioned to customers for planned improvements in the Homeland Security Enterprise						
Strategic Alignment:	E.3 : Harness Data and Technology to Advance Mission Delivery						
Description:	This measure reflects the percent at which S&T meets its planned fiscal year transitions of technology or knowledge products for research and development funded programs/projects. A successful transition is the ownership and/or operation of a technology or knowledge product by a customer within the Homeland Security Enterprise. Technology product is a piece of equipment, system, or component of a system, such as an algorithm to be embedded into a piece of software. Knowledge products may be assessments, standards, training, or documents for decision support. The transition of technology or knowledge products reflects the value that S&T provides in delivering solutions to secure key assets, enhance operational efficiencies and effectiveness, and enable the Department and first responders to do their jobs safer, better, and smarter.						
Fiscal Year:	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
Targets:	---	75%	75%	75%	72%	72%	72%
Results:	---	66%	72%	68%	83%	TBD	TBD
Explanation of Result:	S&T completed 86 of 104 planned transitions. We completed a preparation and compilation of biometric collection systems and relevant technical specifications and shared with the DHS Strategic Sourcing Biometrics Integrated Project team. S&T also delivered the FY 2023 prioritized threat list for Global Detection Standards Analysis and Rating Methodology to the customer. S&T exceeded its targets by establishing routine check ins with customer(s), closely monitoring progress to ensure milestones were met effectively and on time. In closing, we submitted a series of final technical reports and knowledge products to customers. At this time there are no current or anticipated challenges that would hinder S&T from continuing to meet established milestones.						

Management Measures

Measure Name:	Percent of research, development, and innovation program milestones that are met, as established in the fiscal year's budget execution plan						
Strategic Alignment:	E.1 : Mature Organizational Governance						
Description:	This measure reflects the percent at which S&T meets its research, development, and innovation (RD&I) milestones planned for the fiscal year. A milestone is defined as a scheduled point or event in a project signifying the completion of a major deliverable or a phase of work. The research, development, and innovation (RD&I) program refers to the Program, Project, and Activity (PPA) funding area for the S&T within the DHS Common Appropriations Structure. RD&I provides state-of-the-art technology and/or solutions to meet the needs of DHS Components and the first responder community. Completing these milestones indicate satisfactory progress toward advancing technology within the Department and its stakeholders.						
Fiscal Year:	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
Targets:	75%	75%	75%	75%	75%	75%	75%
Results:	70%	69%	76%	69%	75%	TBD	TBD
Explanation of Result:	The result of this measure consists of the S&T meeting its fiscal year budget milestones, which reflect the programmatic and technical events, accomplishments, or intermediate goals of programs and projects funded under the research, development, and innovation program. During FY 2023, S&T completed 242 out of 322 planned milestones, including: Completed software vulnerabilities testing with conformant Track 1 systems and began analysis of genuine documents, delivered three QLRs on MMW dielectric measurements of threats of interest as part of a surge effort in support of TSA and published S&T Technical Paper Series on "Demographic Effects Across 158 Facial Recognition Systems" which is available on dhs.gov. Completing these milestones indicate S&T's progress towards providing state of the art technology and/or solutions to meet the needs of DHS Components and the first responder community.						

Measure Name:	Percent of stakeholder counterdrug related requests fulfilled						
Strategic Alignment:	E.3 : Harness Data and Technology to Advance Mission Delivery						
Description:	This measure reflects the percent at which S&T fulfills requests from its stakeholders for counterdrug-related research and development program outputs and accomplishments. Stakeholder requests are information, data, or technology needs related to the detection, identification, and investigation of narcotics, such as opioids/fentanyl, and trafficking networks. Outputs and accomplishments encompass the delivery, demonstration, transfer, or transition of knowledge or technology products. Knowledge products include, but are not limited to, standards, technology assessments, test and evaluation results, training, data, and documents for decision support. Technology product is a piece of equipment, system, or component of a system, such as an algorithm to be embedded into a piece of software. This measure reflects the value that S&T provides in delivering capabilities to meet critical needs to support and improve homeland counterdrug missions.						
Fiscal Year:	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
Targets:	---	---	65%	65%	70%	75%	75%
Results:	---	---	100%	100%	100%	TBD	TBD
Explanation of Result:	In FY 2023 Q1 S&T had one counterdrug-related research output. The stakeholder request was for a Financial Crimes Enforcement Network (FinCEN) Analytics Technical Exchange, to demonstrate quality of evidence and value of target analytics that leverage FinCEN data for opioid trafficking investigations in a technical exchange meeting via a briefing and live demonstration. The S&T Opioids Program successfully completed this stakeholder request on November 18, 2022. In Q3, S&T received an additional counter-						

	drug related request from CBP. The request was for S&T to present on the technologies used for opioid/fentanyl detection at the CBP Systems Engineering Community of Practice. The output was a briefing on S&T’s opioid/fentanyl detection technology development and testing results, delivered via a virtual briefing on April 25th, 2023.
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Measure Name:	Percent of strategically aligned Department-wide research and development needs						
Strategic Alignment:	E.1 : Mature Organizational Governance						
Description:	This measure captures the success of S&T’s Operations Requirements Analysis Division (ORA) in ensuring strategic alignment of Department research and development (RD) investments. In particular, this measure assesses the percent of validated RD needs with strategic priorities of the homeland security enterprise (HSE) missions and/or external priorities such as administration executive orders, policies, and other guidance for the current fiscal year. The RD Coordination initiative at S&T creates stronger partnerships and ensures alignment between the Department's RD and acquisition communities by enhancing information sharing on priority needs that would benefit from RD investment. By conducting outreach to develop and implement policy and procedures that increase DHS-wide collaboration and transparency during RD planning, the results support optimized resourcing and mission impact.						
Fiscal Year:	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
Targets:	---	---	---	---	---	80%	80%
Results:	---	---	---	---	---	TBD	TBD

University Programs: University Programs supports critical homeland security-related research and education at U.S. colleges and universities to address high-priority DHS-related issues and to enhance homeland security capabilities over the long term. University Programs includes DHS Centers of Excellence and Minority Serving Institutions, creating a consortium of universities generating groundbreaking ideas for new technologies and critical knowledge for the homeland security enterprise.

Management Measure

Measure Name:	Percent of university programs milestones that are met, as established in the fiscal year's budget execution plan						
Strategic Alignment:	E.1 : Mature Organizational Governance						
Description:	This measure reflects the percent of university programs milestones that meet the programmatic and technical events, accomplishments, or intermediate goals in the life of programs and projects. A milestone is defined as a scheduled point or event in a project signifying the completion of a major deliverable or a phase of work. The Office of University Programs (OUP) engages the academic community to conduct research and analysis, provides education and training to enhance homeland security capabilities, works closely with its stakeholders to identify requirements, set goals for milestones and deliverables, discuss the status of projects, and plan for the allocation of resources. The percent of milestones met reflects the programmatic and technical events, accomplishments, or intermediate goals in the life of projects and programs. These milestones indicate satisfactory progress toward achieving long-term S&T performance goals and Department-wide goals and objectives.						
Fiscal Year:	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
Targets:	75%	75%	75%	75%	75%	75%	75%
Results:	83%	88%	86%	71%	95%	TBD	TBD
Explanation of Result:	The result of this measure consists of the Office of University Programs (OUP) meeting its fiscal year budget milestones, which reflect OUP’s work to streamline access to the expertise of the Nation’s colleges and universities to address pressing homeland security needs.						

	<p>During FY 2023, OUP completed 35 of 37 program milestones, including: Completing and demonstrating to DHS a prototype for the domain adaptation, initiating and implementing both case studies (School Security and Transportation Sector Security) through brainstorming, listening sessions, and venue visits (Oct 2022 – Sept 2023) and completed general and specific models for remaining supply chains (inorganic chemical manufacturing, oil extraction, medical instruments, and automobile engine & parts manufacturing). Completing these milestones indicates progress toward achieving long-term OUP performance goals as well as Department-wide goals and objectives.</p>
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Department of Homeland Security

Science and Technology Directorate

Operations and Support



Fiscal Year 2025

Congressional Justification

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Operations and Support

Budget Comparison and Adjustments

Comparison of Budget Authority and Request

(Dollars in Thousands)

	FY 2023 Enacted			FY 2024 Annualized CR			FY 2025 President's Budget			FY 2024 to FY 2025 Total Changes		
	Pos.	FTE	Amount	Pos.	FTE	Amount	Pos.	FTE	Amount	Pos.	FTE	Amount
Mission Support	439	411	\$164,210	439	411	\$164,210	439	431	\$175,140	-	20	\$10,930
Laboratory Facilities	133	133	\$127,522	133	133	\$127,522	132	132	\$130,590	(1)	(1)	\$3,068
Acquisition and Operations Analysis	-	-	\$92,375	-	-	\$92,375	-	-	\$77,755	-	-	(\$14,620)
Total	572	544	\$384,107	572	544	\$384,107	571	563	\$383,485	(1)	19	(\$622)
Subtotal Discretionary - Appropriation	572	544	\$384,107	572	544	\$384,107	571	563	\$383,485	(1)	19	(\$622)

The Operations and Support (O&S) appropriation for the Science and Technology Directorate (S&T) provides funding to ensure delivery of advanced technology solutions to Department of Homeland Security (DHS) Components and first responders. This appropriation also supports Systems Engineering, Standards, and Test and Evaluation (T&E) to ensure that S&T and DHS Components develop effective technologies that work in the operational environment. This includes costs necessary for operations and support activities to advance S&T’s mission, as well as salaries and benefits, and operating costs for five laboratory facilities.

The O&S appropriation has three Programs, Projects, and Activities (PPA):

Mission Support: The Mission Support PPA supports all S&T enterprise-level functions enabling technical divisions to manage the Research, Development, Test, and Evaluation (RDT&E) programs and provides funding for salaries and benefits, training and travel requirements, financial management, facility planning, maintenance, and other administrative functions. Offices supported under Mission Support include the Office of the Under Secretary, Administration and Support Division, Chief Information Office, Communications and Outreach, Compliance Division, Contract Acquisition Program Support, and the Finance and Budget Division. Additionally, this appropriation finances Diversity, Equity, Inclusion, & Accessibility efforts, and the Office of General Counsel requirements including Intellectual Property and trademark rights for DHS and its Components.

Laboratory Facilities: The Laboratory Facilities PPA provides funding for the operations and maintenance for S&T's Office of National Laboratories which includes five laboratory facilities and the salaries and benefits for employees. These laboratories and sites are national assets to DHS operational components and partners, and anchor a science, technology, engineering and math presence in the areas in which they reside. Whether the mission need requires applied research supporting requirements definition, threat characterization, detection, mitigation or response, S&T's lab network provides technologies and knowledge to help prevent terrorism, secure the homeland, and strengthen national preparedness and resilience. Laboratory Facilities coordinates the delivery of long-term capabilities vital to the homeland security mission through utilization of a coordinated network of S&T laboratories and Department of Energy (DOE) national laboratories.

Acquisition and Operations Analysis: The Acquisition and Operations Analysis (AOA) PPA provides resources that support expert assistance to entities across the Homeland Security Enterprise (HSE) to ensure that the transition, acquisition, and deployment of technologies, information, and procedures improve the efficiency and effectiveness of the operational capabilities across the HSE mission.

Operations and Support Budget Authority and Obligations

(Dollars in Thousands)

	FY 2023	FY 2024	FY 2025
Enacted/Request	\$384,107	\$384,107	\$383,485
Carryover - Start of Year	\$34,648	\$33,928	\$34,335
Recoveries	\$3,933	-	-
Rescissions to Current Year/Budget Year	(\$142)	-	-
Net Sequestered Resources	-	-	-
Reprogramming/Transfers	(\$1,866)	-	-
Supplementals	-	-	-
Total Budget Authority	\$420,680	\$418,035	\$417,820
Collections - Reimbursable Resources	\$73,125	\$73,125	\$108,167
Collections - Other Sources	-	-	-
Total Budget Resources	\$493,805	\$491,160	\$525,987
Obligations (Actual/Estimates/Projections)	\$459,415	\$456,363	\$492,939
Personnel: Positions and FTE			
Enacted/Request Positions	572	572	571
Enacted/Request FTE	544	544	563
Onboard and Actual FTE			
Onboard (Actual/Estimates/Projections)	509	547	571
FTE (Actual/Estimates/Projections)	507	536	563

**Operations and Support
Collections – Reimbursable Resources**
(Dollars in Thousands)

	FY 2023 Enacted			FY 2024 Annualized CR			FY 2025 President's Budget		
	Pos.	FTE	Amount	Pos.	FTE	Amount	Pos.	FTE	Amount
Department of Agriculture	-	-	\$3,100	-	-	\$3,100	-	-	\$1,485
Department of Defense	-	-	\$9,000	-	-	\$9,000	-	-	\$5,480
Department of Defense - Navy, Marine Corps	-	-	-	-	-	-	-	-	\$80
Department of Energy	-	-	\$500	-	-	\$500	-	-	\$700
Department of Health and Human Services - Department Wide	-	-	-	-	-	-	-	-	\$500
Department of Health and Human Services - Food and Drug Administration	-	-	\$2,650	-	-	\$2,650	-	-	-
Department of Homeland Security	-	-	\$500	-	-	\$500	-	-	\$10,500
Department of Homeland Security - Countering Weapons of Mass Destruction	-	-	\$2,300	-	-	\$2,300	-	-	\$16,250
Department of Homeland Security - Cybersecurity and Infrastructure Security Agency	-	-	\$11,300	-	-	\$11,300	-	-	\$14,500
Department of Homeland Security - Federal Emergency Management Agency	-	-	\$320	-	-	\$320	-	-	\$50
Department of Homeland Security - Federal Law Enforcement Training Centers	-	-	\$10	-	-	\$10	-	-	-
Department of Homeland Security - Intelligence and Analysis	-	-	-	-	-	-	-	-	\$8,000
Department of Homeland Security - Management Directorate	-	-	-	-	-	-	-	-	\$8,500
Department of Homeland Security - Office of Biometric Identity Mangement (OBIM)	-	-	\$2,000	-	-	\$2,000	-	-	\$1,925
Department of Homeland Security - Transportation Security Administration	-	-	\$10,345	-	-	\$10,345	-	-	\$6,800
Department of Homeland Security - U.S. Citizenship and Immigration Services	-	-	\$70	-	-	\$70	-	-	\$50
Department of Homeland Security - U.S. Customs and Border Protection	-	-	\$7,100	-	-	\$7,100	-	-	\$9,500
Department of Homeland Security - U.S. Immigration and Customs Enforcement	-	-	\$280	-	-	\$280	-	-	\$547
Department of Homeland Security - United States Coast Guard	-	-	\$450	-	-	\$450	-	-	\$100
Department of Homeland Security - United States Secret Service	-	-	\$1,500	-	-	\$1,500	-	-	\$1,000
Department of Justice - Federal Bureau of Investigation	-	-	\$21,000	-	-	\$21,000	-	-	\$21,800
Department of State	-	-	\$200	-	-	\$200	-	-	-
Library of Congress	-	-	\$500	-	-	\$500	-	-	\$400
Total Collections	-	-	\$73,125	-	-	\$73,125	-	-	\$108,167

Operations and Support Summary of Budget Changes

(Dollars in Thousands)

	Positions	FTE	Pay Amount	Non-Pay Amount	Amount
FY 2023 Enacted	572	544	\$118,247	\$265,860	\$384,107
FY 2024 Annualized CR	572	544	\$118,247	\$265,860	\$384,107
FY 2025 Base Budget	572	544	\$118,247	\$265,860	\$384,107
Total Technical Changes	-	-	-	-	-
Annualization of FY 2023 Enacted Program Changes	-	20	\$5,227	\$609	\$5,836
Total Annualizations and Non-Recurs	-	20	\$5,227	\$609	\$5,836
2025 Civilian Pay Raise	-	-	\$1,971	-	\$1,971
2024 Civilian Pay Raise	-	-	\$6,484	-	\$6,484
2023 Civilian Pay Raise Annualization	-	-	\$1,211	-	\$1,211
FPS Fee Adjustment	-	-	-	\$21	\$21
Capital Security Cost Sharing	-	-	-	\$4	\$4
Investment Cost Savings	-	-	-	(\$767)	(\$767)
Laboratory Facilities IT Investment	-	-	-	\$78	\$78
Salary Rightsizing	-	-	\$6,276	-	\$6,276
Total Pricing Changes	-	-	\$15,942	(\$664)	\$15,278
Total Adjustments-to-Base	-	20	\$21,169	(\$55)	\$21,114
FY 2025 Current Services	572	564	\$139,416	\$265,805	\$405,221
Transfer for Derived PIV Credential from S&T/O&S/MS to MGMT/O&S/OCSO	-	-	-	(\$17)	(\$17)
Total Transfers	-	-	-	(\$17)	(\$17)
AOA-Acquisition Support	-	-	-	(\$9,771)	(\$9,771)
AOA-Federally Funded Research and Development Centers	-	-	-	(\$1,291)	(\$1,291)
AOA-SAFETY Act	-	-	-	(\$850)	(\$850)
AOA-Technology Transition Support	-	-	-	(\$2,712)	(\$2,712)
Laboratory Operations and Maintenance	-	-	-	(\$273)	(\$273)
MS-Enterprise Shared Services	-	-	-	(\$6,577)	(\$6,577)
PIADC to NBAF Employee Transition	(1)	(1)	(\$213)	(\$32)	(\$245)
Total Program Changes	(1)	(1)	(\$213)	(\$21,506)	(\$21,719)
FY 2025 Request	571	563	\$139,203	\$244,282	\$383,485
FY 2024 TO FY 2025 Change	(1)	19	\$20,956	(\$21,578)	(\$622)

Operations and Support
Justification of Pricing Changes
(Dollars in Thousands)

	FY 2025 President's Budget				
	Positions	FTE	Pay Amount	Non-Pay Amount	Amount
Pricing Change 1 - 2025 Civilian Pay Raise	-	-	\$1,971	-	\$1,971
Mission Support	-	-	\$1,571	-	\$1,571
Laboratory Facilities	-	-	\$400	-	\$400
Pricing Change 2 - 2024 Civilian Pay Raise	-	-	\$6,484	-	\$6,484
Mission Support	-	-	\$5,163	-	\$5,163
Laboratory Facilities	-	-	\$1,321	-	\$1,321
Pricing Change 3 - 2023 Civilian Pay Raise Annualization	-	-	\$1,211	-	\$1,211
Mission Support	-	-	\$948	-	\$948
Laboratory Facilities	-	-	\$263	-	\$263
Pricing Change 4 - FPS Fee Adjustment	-	-	-	\$21	\$21
Laboratory Facilities	-	-	-	\$21	\$21
Pricing Change 5 - Capital Security Cost Sharing	-	-	-	\$4	\$4
Acquisition and Operations Analysis	-	-	-	\$4	\$4
Pricing Change 6 - Investment Cost Savings	-	-	-	(\$767)	(\$767)
Mission Support	-	-	-	(\$767)	(\$767)
Pricing Change 7 - Laboratory Facilities IT Investment	-	-	-	\$78	\$78
Laboratory Facilities	-	-	-	\$78	\$78
Pricing Change 8 - Salary Rightsizing	-	-	\$6,276	-	\$6,276
Mission Support	-	-	\$4,773	-	\$4,773
Laboratory Facilities	-	-	\$1,503	-	\$1,503
Total Pricing Changes	-	-	\$15,942	(\$664)	\$15,278

Pricing Change 1 – 2025 Civilian Pay Raise:

Base Activity Funding: This pricing change impacts civilian pay funding in the Base and Annualization, which totals \$133.1M.

Pricing Change Explanation: This pricing change represents the costs of 2.0 percent civilian pay increase for the first three quarters of the calendar year 2025. It is calculated by adding Base pay, the 2024 Pay Raise and the 2023 Civilian Pay Raise Annualization pricing change, multiplying by the pay rate increase (2.0 percent) and then by three-fourths to account for nine months of the 2025 calendar year.

Pricing Change 2 – 2024 Civilian Pay Raise:

Base Activity Funding: This pricing change impacts FY 2024 civilian pay funding in Base and Annualizations, which total \$133.1M.

Pricing Change Explanation: This pricing change represents the costs of 5.2 percent civilian pay increase for the full calendar year 2024. It is calculated by adding the FY 2023 Enacted Base Pay, Pay base of the Annualization of FY 2023 Enacted Program Changes, and the Annualization of Prior Year Pay Raise pricing change, and multiplying by the pay rate increase (5.2 percent).

Pricing Change 3 – 2023 Civilian Pay Raise Annualization:

Base Activity Funding: This pricing change accounts for the last quarter of civilian pay funding from the FY 2023 Enacted appropriation.

Pricing Change Explanation: This pricing change represents the costs of 4.6 percent civilian pay increase for the fourth quarter of the calendar year 2023. It is calculated by adding the civilian portion of the FY 2022 Enacted Base pay and the pay funding from the FY 2023 Enacted program changes, and multiplying by the pay rate increase (4.6 percent) and then by one-fourth to account for the three months of the 2023 calendar year.

Pricing Change 4 – FPS Fee Adjustment:

Base Activity Funding: This pricing change impacts fees paid for services from the Federal Protective Services (FPS) in the base and annualizations, which totals \$0.02M.

Pricing Change Explanation: This pricing change represents an increase in the FPS support provided to S&T. This increase is a result of non-pay inflationary increases in basic security services at S&T's building-specific locations.

Pricing Change 5 – Capital Security Cost Sharing:

Base Activity Funding: This pricing change represents increased costs to S&T for staff overseas, which total \$4,000.

Pricing Change Explanation: This pricing change reflects increases in the cost of Capital Security Cost Sharing agreements with the U.S. Department of State. S&T currently has two regional Attachés stationed in the U.S. Embassies in Canada and the United Kingdom. The regional Attachés coordinate with the host government to provide science and technology expertise, administer cooperative projects, and seek new technology opportunities. In FY 2025, S&T intends to hire a regional Attaché focused on the Indo-Pacific region based in the U.S. Embassy in Singapore.

Pricing Change 6 – Investment Cost Savings:

Base Activity Funding: This pricing change impacts the base funding for S&T's Mission Support non-major investments, which totals \$23.9M.

Pricing Change Explanation: This pricing change represents cost savings from S&T's financial system of record the Federal Financial Management System (FFMS) and S&T Analytical Tracking System (STATS) investments. Efficiencies realized from FFMS directly correspond to S&T streamlining processes to ensure clean financial system records for a total of \$0.4M. Efficiencies realized from STATS transitioning enhanced modules from a development to production phase in FY 2025 results in savings of \$0.3M. Additional efficiencies realized from the S&T Net, External VM Infrastructure Implementation, and S&T Collaboration Site for a total of \$0.06M.

Pricing Change 7 – Laboratory Facilities IT Investment:

Base Activity Funding: This pricing change impacts the base funding for S&T's Laboratories non-major investments, which totals \$31.3M

Pricing Change Explanation: This pricing change reflects costs associated with contractual non-pay inflation increases for the Laboratory Facility Investments for Genomic Data, Network and Analysis System, National Biodefense and Countermeasures Center (NBACC) Security Management System, and Safety Act Management System.

Pricing Change 8 – Salary Rightsizing:

Base Activity Funding: This pricing change impacts the base pay funding for salary rightsizing, which totals \$133.1M.

Pricing Change Explanation: This pricing change includes the full cost burden to fund nine of the 15 Laboratory vacancies, all 46 vacancies for Mission Support and 15 merit promotions for Mission Support. Vacancies within the Laboratories PPA include nine positions at a full year cost for three GS-14s, one GS-13s, one GS-12s, two GS-11s, and two Wage Grade positions, totaling \$1.5M. Vacancies within the Mission Support PPA funds 46 positions at a full year cost for nine GS-15s, 21 GS-14s, three GS-13s, five GS-12s, two GS-11s, and three GS-9s, and three Scientific positions, totaling \$4.4M. The Merit promotions within the Mission Support PPA include 15 positions at a full year promotion for six GS-15s, six GS-14s, and three GS-13s, totaling \$0.4M.

Operations and Support Justification of Transfer

(Dollars in Thousands)

	FY 2025 President's Budget				
	Positions	FTE	Pay Amount	Non-Pay Amount	Amount
Transfer 1 - Transfer for Derived PIV Credential from S&T/O&S/MS to MGMT/O&S/OCSO	-	-	-	(\$17)	(\$17)
Mission Support	-	-	-	(\$17)	(\$17)
Total Transfer Changes	-	-	-	(\$17)	(\$17)

Transfer 1 – Derived PIV Credential: Transfers funds to the Management Directorate (MGMT), Office of the Chief Security Officer (OCSO) Enterprise Security Services Division to support Derived Personal Identity Verification (PIV) Credential Service, which are required for DHS issued mobile devices and provides data security. This transfer will reduce administrative workloads, leverage economies of scale, and ensure procurement lead times are met.

Operations and Support Justification of Program Changes

(Dollars in Thousands)

	FY 2025 President's Budget				
	Positions	FTE	Pay Amount	Non-Pay Amount	Amount
Program Change 1 - AOA-Acquisition Support	-	-	-	(\$9,771)	(\$9,771)
Acquisition and Operations Analysis	-	-	-	(\$9,771)	(\$9,771)
Program Change 2 - AOA-Federally Funded Research and Development Centers	-	-	-	(\$1,291)	(\$1,291)
Acquisition and Operations Analysis	-	-	-	(\$1,291)	(\$1,291)
Program Change 3 - AOA-SAFETY Act	-	-	-	(\$850)	(\$850)
Acquisition and Operations Analysis	-	-	-	(\$850)	(\$850)
Program Change 4 - AOA-Technology Transition Support	-	-	-	(\$2,712)	(\$2,712)
Acquisition and Operations Analysis	-	-	-	(\$2,712)	(\$2,712)
Program Change 5 - Laboratory Operations and Maintenance	-	-	-	(\$273)	(\$273)
Laboratory Facilities	-	-	-	(\$273)	(\$273)
Program Change 6 - MS-Enterprise Shared Services	-	-	-	(\$6,577)	(\$6,577)
Mission Support	-	-	-	(\$6,577)	(\$6,577)
Program Change 7 - PIADC to NBAF Employee Transition	(1)	(1)	(\$213)	(\$32)	(\$245)
Laboratory Facilities	(1)	(1)	(\$213)	(\$32)	(\$245)
Total Program Changes	(1)	(1)	(\$213)	(\$21,506)	(\$21,719)

Program Change 1 – AOA-Acquisition Support:

<i>(\$ in thousands)</i>	Pos	FTE	Amount
Base: Current Services & Transfers	-	-	\$47,204
Program Change	-	-	(\$9,771)

Description

The FY 2025 Budget includes a decrease for the System of Systems Operational Analytics (SoSOA) program and its associated contracts.

Justification

The funding decrease is due to the conclusion of the Migrant Models Integration (MMI) effort which received funding in FY 2023. The MMI effort will conclude in FY 2024 with a functional analytical model describing DHS’ migrant processing operations and their associated resource requirements beginning it’s maintenance phase. In FY 2025, the MMI model will be available for use by all DHS analysts as part of the SoSOA platform, and there are no plans for additional model development.

SoSOA will continue to provide capabilities and resources to address operational analytics needs of DHS Components including CBP, ICE, and DHS Headquarters Offices including the Joint Requirements Council (JRC), Program Analysis and Evaluation (PA&E), and the Office of Homeland Security Statistics (OHSS). SoSOA scopes and solves complex problems across multiple DHS components, systems, or mission areas. The program continues to build on its current successes by leveraging the operational, policy, and resourcing expertise gained through the various analytic projects. SoSOA provides this subject matter expertise to analysts from across DHS. Additionally, SoSOA will continue enhancements to the SoSOA virtual environment and cloud infrastructure. This funding will allow SoSOA's pool of senior analysts and subject matter experts to continue providing analytical support to DHS Components to inform operational and resource decisions. This support has contributed to the success of major DHS efforts to include Operations Allies Welcome. Additionally, these efforts have led to the development of the MMI capability which is a decision support tool that captures the end-to-end process of all agencies involved in a migrant's movement through the immigration system, including how resource, policy, or process changes impact the flow of migrants from apprehension to removal.

Performance

SoSOA has transformed into an enterprise-level capability to increase the effectiveness and efficiency of DHS data analytics and enables the analysis of highly complex systems of interdependent components (system of systems) for Components, and Headquarters offices OHSS, PA&E and the JRC. Starting from several earlier proof-of-concept projects to the development of highly versatile modeling and simulation capabilities, the demand for a fully mature, enterprise-wide SoSOA capability is strong amongst the HSE. SoSOA provides Components an Enterprise-level capability with common analytic frameworks, tools, and training. Increasing the collaborative analysis capability for DHS results in cost and time savings - freeing up operators and resources for mission-critical operations execution.

SoSOA will continue developing capabilities to include:

- Assimilated visualization and analytic tools with fused data from disparate sources to improve decision support and reporting efficiency.
- Faster delivery of analyses to support decision making.
- Reduce costs for data-driven analysis by ensuring DHS Components leverage, share, reuse, and repurpose previously developed analyses.
- Enterprise analytic applications that include business analytics and visualization, statistical packages, modeling and simulation, decision analysis tools, and a library of online SoSOA analytics training manuals for 1,000 users across DHS.

Operational analysis activities include but are not limited to definition of one or more proposed R&D solution paths, identification of real-world constraints, assessment of benefits and risks, and application of advanced cost modeling techniques to estimate direct and indirect costs. S&T will review homeland security operations to identify ways to prioritize DHS capability gaps and duplications, as well as identify cost effective solutions for Component operations and process inefficiencies.

Program Change 2 – AOA-Federally Funded Research and Development Centers:

<i>(\$ in thousands)</i>	Pos	FTE	Amount
Base: Current Services & Transfers	-	-	\$6,696
Program Change	-	-	(\$1,291)

Description

The FY 2025 Budget includes a decrease for the Federally Funded Research and Development Center (FFRDC) Program Management Office (PMO).

Justification

In FY 2023 S&T was provided \$2.5M to support and report on the impact of the border security investments made in technology, personnel, and resources addressing border security needs. The Homeland Security Operational Analysis Center (HSOAC) FFRDC was assigned to perform this task. The funding for this one-time border assessment effort is not required in FY 2025. This effort will be in line with S&T’s plan of formalizing a rapid response mechanism for the FFRDCs. It will also support the DHS priority to "Increase our effectiveness through transformational, cross-cutting initiatives". The PMO will implement a plan for managing these funds and provide DHS leadership this unique service. It will include leveraging a governance model employed in other Departments that sponsor FFRDCs. With each rapid response effort, a subset of the overall funding pool is used to obtain analysis and recommendations from experts in the FFRDCs to inform decisions. Each effort includes a tangible output that leadership can use for evidence-based decision making. The \$1.2M increase is offset by the \$2.5M decrement resulting in an overall \$1.3M decrease in requirements.

Performance

The FFRDC’s support DHS by providing independent and objective resolutions to complex R&D related issues for: the DHS mission space, technical and systems engineering expertise and provide viable solutions to include the technology and systems necessary to secure the homeland and provide expertise that support DHS and its partners across the HSE respectively. Funding to the FFRDC PMO is essential to continue to support DHS’s R&D priorities.

Program Change 3 – AOA-SAFETY Act:

<i>(\$ in thousands)</i>	Pos	FTE	Amount
Base: Current Services & Transfers	-	-	\$18,750
Program Change	-	-	(\$850)

Description

The FY 2025 Budget includes a decrease for the Support Anti-Terrorism by Fostering Effective Technologies (SAFETY) Act application processing.

Justification

The volume of SAFETY Act applications has risen steadily for the past 10 years and the complexity of the requests has caused a doubling of the average workload since the Program's inception. Initially, SAFETY Act averaged 60 to 75 applications a year but that has increased to an average of 120 to 130 applications a year. Based on increased engagement efforts, the Office of SAFETY Act Implementation (OSAI) anticipates a 50 percent surge in application submissions over the next 18 to 24 months as organizations resume normal operations, specifically for large-scale venues. This increase is a forecast by industry interest indicators and is validated by the uptick in pre-applications, consultation requests, and inquiries OSAI received in FY 2023.

The Program will employ steps to address rising applications workload through the continuous use of the following mission essential elements:

- **Program and Technical Contractor Support:** To increase technical expertise for application evaluations, and to allow evaluation of additional technology types from diverse industry sectors, such as hospitality, gaming, and large-scale venues. An increased capacity to evaluate emerging technologies would afford the opportunity for SAFETY Act to increase outreach and engagement. Outreach activities encompass site visits, industry specific webinars, and direct consultations. Targeted engagement contributes to quality application submissions, streamlined program operations and evaluations, and long-term utilization of the SAFETY Act. Program contract support provides efficient and effective processing of applications, program management activities, such as change management, program planning, and communications management.
- **Critical Information Technology (IT) Modernization Support:** To continue modernization of the Safety Act Management System internal software application, and congressionally mandated enhancements to the public facing web portal to provide user-friendly and accessible information (i.e., dashboard highlighting program metrics) as well as to automate the evaluation of applications through a secure cloud-based, end-to-end service.

SAFETY Act has the potential to be a critical driver of innovation and change across multiple industry sectors to secure the nation's critical infrastructure from terrorist attacks. In order to fully sustain anticipated growth and meet the processing timelines as codified under 6 CFR 25, OSAI will apply the FY 2025 funding to (1) program and technical contractor staff to manage the rising application volume, and (2) perform critical IT development to its aged-out system the internal software and public facing website as congressionally mandated OSAI will continue to invest in program and technical contractor staff and IT development to increase efficiency and reduce the risk of resurgence of a backlog to the maximum extent possible.

Performance

OSAI will seek to address critical programmatic gaps, implement business process improvements, and update evaluation and programmatic policy to support repeatable, consistent standards and guidelines. Program and technical contractor staff will support OSAI's effort to maintain the average application processing time in accordance with the regulatory timeline. The SAFETY Act program will strive to maintain its critical function toward protecting our homeland, enhance its ability to interact with stakeholders by incentivizing the development of groundbreaking anti-terrorism technologies for the protection of critical infrastructure, national security, and public safety.

Program Change 4 – AOA-Technology Transition Support:

<i>(\$ in thousands)</i>	Pos	FTE	Amount
Base: Current Services & Transfers	-	-	\$13,425
Program Change	-	-	(\$2,712)

Description

The FY 2025 Budget includes a decrease for Technology Transition Support both stateside and overseas.

Justification

TST is a centralized matrix resource supporting all of S&T, and conducts activities that inform and support decisions through the entire R&D lifecycle. TST provides expertise to eliminate individual R&D activities from needing to re-create capabilities while generating repeatable, standardized and streamlined processes, tools, templates and training. TST provides support through four distinct Branches: Technology Scouting, Operational Experimentation (OpEx), Technology Transition and the Technology Clearinghouse (TCH). The technology scouting capability identifies alternative options and partnership opportunities for R&D efforts to ensure the most relevant available innovative solutions are considered in the make, buy or adapt solution approach decision. Technology Transition provides centralized support for planning and executing the transition of knowledge products and technologies to DHS Components and end users. OpEx facilitates and conducts operational experimentations with S&T program managers and DHS Component customers to evaluate the technical capabilities and operational use of new and emerging technologies. Discussion based activities can be used to explore end user requirements for emerging technologies and the implication for technology transition to mission operations. Technology demonstrations can expose end users to commercially available technologies to evaluate if these available technologies meet end user requirements. Field assessments allow end users to deploy emerging technologies in simulated operational scenarios to develop an in-depth understanding of how these technologies perform and what adaptations are necessary to meet end users’ operational needs. TST operates and maintains the DHS Technology Clearinghouse IT platform that serves as the Congressionally mandated repository for S&T program and project reports and artifacts to aid in knowledge sharing to enhance the successful development and deployment of innovative homeland security technology solutions and eliminate unnecessary spending for redundant activities.

S&T will continue to prioritize support based on the below R&D strategic priorities:

- OpEx will maintain a minimal capability to conduct technology demonstrations, field assessments, and discussion-based activities. These activities include collaboration to integrate DHS requirements into Federal partner experimentation activities, technology demonstrations, field assessments, and facilitated discussions such as tabletop exercises. Funding will allow for TST to plan and conduct a limited number of small-scale prioritized activities to gather data on operational requirements, the operational utility of a technology, or identification of gaps in tactics, techniques, or procedures in support of DHS Operational Component’s requirements. Reduced resources will affect the scale or delay a planned urban OpEx designed to enable operators to assess new technologies for First Responders.

- Technology Scouting (TS) will coordinate and facilitate activities to identify relevant shareable information on ongoing R&D projects, identify emerging cutting-edge technologies, and foster collaboration with other U.S. Government tech scouting programs. TS will reduce or eliminate the number of Rapid Technology Assessments conducted to move quickly from technology identification to end user acquisition. Various knowledge gaps still exist and technology scouting will prioritize efforts related to understanding the landscape environment for emerging trends, future activities, and opportunities to develop partnerships to stretch limited R&D dollars. In FY 2025 TCH will use resources to maintain basic web portal infrastructure to allow access to public information across the HSE and DHS Personal Identify Verification/Common Access Card holders access to sensitive content. FY 2025 funding will also support TCH operations and maintenance. TCH will delay initiating more content for discovery and system development granting other Federal, State and local homeland security agency access to sensitive content. Transition Planning will collaborate across S&T to identify and analyze the factors that will properly shape the transition planning efforts and delivery of S&T provided solutions to customers and identify opportunities to accelerate successful fielding of solutions or manage and mitigate risks to transition. Transition may not be able to expand capabilities in developing return on investment metrics support and baseline development for repeatable and objective risk assessments and may also impact the rigor of the reporting of the annual DHS R&D report to Congress.

Performance

In FY 2025, the Technology Scouting and Transition (TST) project under the Technology Transition Support program will focus on prioritizing and streamlining contractor resources and subscription services, while also providing fewer centralized resources to support program and project managers. The Office of Industry Partnerships’ (OIP) Technology Transfer and Commercialization branch will reduce the scope and portfolio to focus on more critical priorities.

Program Change 5 – Laboratory Operations and Maintenance:

<i>(\$ in thousands)</i>	Pos	FTE	Amount
Base: Current Services & Transfers	-	-	\$102,381
Program Change	-	-	(\$273)

Description

The FY 2025 Budget includes a decrease for Laboratory Operations and Maintenance.

Justification

The Plum Island Animal Disease Center (PIADC) provides a host of high-impact, indispensable preparedness and response capabilities to include vaccine R&D, diagnostics, training, and bioforensics. It also has an interagency mission to protect U.S. agriculture from the threat of high-consequence foreign animal diseases such as foot and mouth disease (FMD). The biologic countermeasure development at PIADC supports S&T’s agro-terrorism countermeasures program. Research at the facility occurs in biosafety level (BSL) 2 and 3 agricultural laboratory spaces. S&T is responsible for the management, operations, and maintenance of the facility. The laboratory is a self-sustaining operation with its own power plant, boiler plant, fuel storage, fire protection, waste disposal, security systems, and other critical infrastructures. S&T provides the only ferry transport to and from the island and is responsible for operation and maintenance of the ferries, docks, and harbor. S&T also manages day-to-day operational support, including the operations workforce and emergency response capabilities (fire, rescue, emergency medical). Major operational costs at PIADC include bio safety, security, operations and maintenance contract, IT and periodic upgrades to support regulatory requirements and equipment replacement to ensure safe facility operations. PIADC will be heavily involved in support of the safe and efficient transfer of the United States Department of Agriculture (USDA) biorepository to the National Bio and Agro-Defense Facility.

Performance

PIADC operations will continue to mitigate the effects of rising operations and maintenance and continue to execute the mission. PIADC will continue to operate through the transition of operations to the National Bio and Agro-Defense Facility (NBAF). Funding is used to maintain operations to include fuel costs, security, utilities, and contractor support.

Program Change 6 – MS-Enterprise Shared Services:

<i>(\$ in thousands)</i>	Pos	FTE	Amount
Base: Current Services & Transfers	57	57	\$24,500
Program Change	-	-	(\$6,577)

Description

The FY 2025 Budget includes a decrease for the Chief Information Office and the Contract Acquisition Program Support Office.

Justification

S&T remains committed to facilitating R&D initiatives by providing essential IT infrastructure support critical to S&T with IT networks, technical maintenance services and acquisition support services supporting S&T’s R&D mission. A breakdown of the programs is shown below:

Chief Information Office (CIO): (\$3.0M)

The CIO will continue to provide support with the ability to deliver IT infrastructure, systems, and services which provides a foundation for S&T's R&D mission, directly supporting the entire Directorate, and assisting in the transition of S&T IT solutions to its internal and external customers. These IT systems are required by several congressionally-funded R&D programs to function and it hosts over 1200 end users. The CIO provides oversight and governance of IT acquisitions to ensure alignment with statutory, regulatory, and Departmental policy and guidance.

Contract Acquisition Program Support (CAPS): (3.6M)

CAPS provides direct support to Program and Project Managers throughout S&T and facilitates the development of common repeatable standards, guidance, and program and project management and acquisition processes for the Directorate. CAPS funding continues to support collaboration, communication, consistency, transparency, and continuous process improvement to maximize the value S&T delivers to its customers. Contractor services provide program and project management support, governance and administrative services, documentation, methodology, and professional development services in accordance with departmental acquisition policy. Funding supports contract and acquisition contractors that perform non-inherently governmental functions like statement of work review/editing, market research, project milestone tracking, closeout of contracts, processing of Interagency Agreements (including the use of G-Invoicing) and streamlined acquisition approaches.

Performance

CIO is essential to meeting customer needs, responding to DHS Management Directives; and federal mandates, as well as maintaining mission integrity. Funding supports operations that link to the strategic R&D priorities of S&T, as well as to establish and sustain standardized project management practices, governance, and oversight. Additionally funding supports: transition from fixed data centers to cloud-based servers and storage, linking IT investments to the strategic R&D priorities of S&T, and satisfying the increasing demands to comply with cybersecurity mandates such as Federal Information Security Modernization Act. This request supports current service levels across S&T, DHS priorities, specifically Cybersecurity for a Zero Trust Environment, Customer Experience and Service Delivery Revolution, and Security IT Initiatives.

CAPS supports contract management of annual procurement efforts that S&T currently processes and manages. Currently, Federal employees within CAPS office manage approximately 325 contracts, varying in complexity and contract type and generate over 1,700 acquisition regulations annually. S&T will leverage strategic sourcing vehicles to improve contract management and increase acquisition package completeness and accuracy prior to submission to DHS's Procurement Office for processing. Resources also provide support to program managers in developing/articulating requirements, acquisition planning and conducting market research.

Program Change 7 – PIADC to NBAF Employee Transition:

<i>(\$ in thousands)</i>	Pos	FTE	Amount
Base: Current Services & Transfers	31	31	\$60,597
Program Change	(1)	(1)	(\$245)

Description

The FY 2025 Budget includes a decrease to support the employee transition from PIADC to the USDA in support of the NBAF.

Justification

S&T will transfer one GS-14 Federal position which is eligible for transfer to USDA, as a part of the PIADC closure and sale and the transfer of function to USDA NBAF.

Performance

S&T will be closing PIADC operations when USDA opens NBAF. There is no performance impact for this transfer.

**Operations and Support
Personnel Compensation and Benefits**

Pay Summary
(Dollars in Thousands)

	FY 2023 Enacted				FY 2024 Annualized CR				FY 2025 President's Budget				FY 2024 to FY 2025 Total			
	Pos.	FTE	Amount	Rate	Pos.	FTE	Amount	Rate	Pos.	FTE	Amount	Rate	Pos.	FTE	Amount	Rate
Mission Support	439	411	\$93,106	\$218.87	439	411	\$93,106	\$218.87	439	431	\$110,788	\$249.17	-	20	\$17,682	\$30.30
Laboratory Facilities	133	133	\$25,141	\$177.50	133	133	\$25,141	\$177.50	132	132	\$28,415	\$202.86	(1)	(1)	\$3,274	\$25.35
Total	572	544	\$118,247	\$208.76	572	544	\$118,247	\$208.76	571	563	\$139,203	\$238.31	(1)	19	\$20,956	\$29.56
Subtotal Discretionary - Appropriation	572	544	\$118,247	\$208.76	572	544	\$118,247	\$208.76	571	563	\$139,203	\$238.31	(1)	19	\$20,956	\$29.56

Pay by Object Class
(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget	FY 2024 to FY 2025 Change
11.1 Full-time Permanent	\$74,920	\$74,920	\$88,790	\$13,870
11.3 Other than Full-time Permanent	\$6,450	\$6,450	\$6,962	\$512
11.5 Other Personnel Compensation	\$2,347	\$2,347	\$3,160	\$813
11.8 Special Personal Services Payments	\$4,684	\$4,684	\$5,033	\$349
12.1 Civilian Personnel Benefits	\$29,846	\$29,846	\$35,258	\$5,412
Total - Personnel Compensation and Benefits	\$118,247	\$118,247	\$139,203	\$20,956
Positions and FTE				
Positions - Civilian	572	572	571	(1)
FTE - Civilian	544	544	563	19

Operations and Support
Permanent Positions by Grade – Appropriation
(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget	FY 2024 to FY 2025 Change
SES	22	22	22	-
EX	1	1	1	-
GS-15	212	212	212	-
GS-14	165	165	164	(1)
GS-13	89	89	89	-
GS-12	44	44	44	-
GS-11	2	2	2	-
GS-9	7	7	7	-
GS-8	1	1	1	-
Other Grade Positions	29	29	29	-
Total Permanent Positions	572	572	571	(1)
Total Perm. Employment (Filled Positions) EOY	547	547	546	(1)
Unfilled Positions EOY	25	25	25	-
Position Locations				
Headquarters Civilian	437	437	437	-
U.S. Field Civilian	133	133	132	(1)
Foreign Field Civilian	2	2	2	-
Averages				
Average Personnel Costs, ES Positions	\$212,131	\$212,131	\$203,212	(\$8,919)
Average Personnel Costs, GS Positions	\$206,185	\$206,185	\$247,222	\$41,037
Average Grade, GS Positions	14	14	15	1

**Operations and Support
Non Pay Budget Exhibits**

Non Pay Summary
(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget	FY 2024 to FY 2025 Change
Mission Support	\$71,104	\$71,104	\$64,352	(\$6,752)
Laboratory Facilities	\$102,381	\$102,381	\$102,175	(\$206)
Acquisition and Operations Analysis	\$92,375	\$92,375	\$77,755	(\$14,620)
Total	\$265,860	\$265,860	\$244,282	(\$21,578)
Subtotal Discretionary - Appropriation	\$265,860	\$265,860	\$244,282	(\$21,578)

Non Pay by Object Class
(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget	FY 2024 to FY 2025 Change
21.0 Travel and Transportation of Persons	\$1,241	\$1,241	\$1,255	\$14
22.0 Transportation of Things	\$126	\$126	\$126	-
23.1 Rental Payments to GSA	\$613	\$613	\$613	-
23.2 Rental Payments to Others	\$2,090	\$2,090	\$2,090	-
23.3 Communications, Utilities, & Miscellaneous	\$1,163	\$1,163	\$1,260	\$97
24.0 Printing and Reproduction	\$382	\$382	\$382	-
25.1 Advisory & Assistance Services	\$164,167	\$164,167	\$144,371	(\$19,796)
25.2 Other Services from Non-Federal Sources	\$6,402	\$6,402	\$6,404	\$2
25.3 Other Purchases of goods and services	\$37,965	\$37,965	\$36,586	(\$1,379)
25.4 Operations & Maintenance of Facilities	\$23,959	\$23,959	\$23,686	(\$273)
25.7 Operation & Maintenance of Equipment	\$11,836	\$11,836	\$11,577	(\$259)
25.8 Subsistence and Support of Persons	\$4	\$4	\$4	-
26.0 Supplies & Materials	\$1,461	\$1,461	\$1,467	\$6
31.0 Equipment	\$13,710	\$13,710	\$13,720	\$10
32.0 Land and Structures	\$20	\$20	\$20	-
41.0 Grants, Subsidies, and Contributions	\$682	\$682	\$682	-
42.0 Insurance Claims and Indemnities	\$39	\$39	\$39	-
Total - Non Pay Budget Object Class	\$265,860	\$265,860	\$244,282	(\$21,578)

Mission Support – PPA

Budget Comparison and Adjustments

Comparison of Budget Authority and Request

(Dollars in Thousands)

	FY 2023 Enacted			FY 2024 Annualized CR			FY 2025 President's Budget			FY 2024 to FY 2025 Total Changes		
	Pos.	FTE	Amount	Pos.	FTE	Amount	Pos.	FTE	Amount	Pos.	FTE	Amount
Mission Support	439	411	\$164,210	439	411	\$164,210	439	431	\$175,140	-	20	\$10,930
Total	439	411	\$164,210	439	411	\$164,210	439	431	\$175,140	-	20	\$10,930
Subtotal Discretionary - Appropriation	439	411	\$164,210	439	411	\$164,210	439	431	\$175,140	-	20	\$10,930

PPA Level 1 Description

Mission Support provides funding for financial management and procurement operations, IT management and critical infrastructure support, human capital and personnel security, real estate and facilities management, internal and external mission and research centric communications, and compliance support and oversight. Mission Support also funds compliance assurance, export controls, legal intellectual property services for R&D projects, and oversight of intellectual property and trademark rights for all of DHS. The administrative activities of non-laboratory personnel and offices have the important role of implementing RDT&E activities are supported by Mission Support resources.

The 431 FTE included in the FY 2025 Budget will support S&T’s policy analysis, planning, financial management, and guidance formulation. These FTE also manage and oversee IT and intellectual property, conduct program management, execution, oversight, and analysis, as well as operations and maintenance support for all S&T R&D programs in the RD&I, UP, and AOA PPAs.

Mission Support – PPA
Budget Authority and Obligations
(Dollars in Thousands)

	FY 2023	FY 2024	FY 2025
Enacted/Request	\$164,210	\$164,210	\$175,140
Carryover - Start of Year	-	-	-
Recoveries	-	-	-
Rescissions to Current Year/Budget Year	-	-	-
Net Sequestered Resources	-	-	-
Reprogramming/Transfers	-	-	-
Supplementals	-	-	-
Total Budget Authority	\$164,210	\$164,210	\$175,140
Collections - Reimbursable Resources	\$34,075	\$34,075	\$65,837
Collections - Other Sources	-	-	-
Total Budget Resources	\$198,285	\$198,285	\$240,977
Obligations (Actual/Estimates/Projections)	\$197,823	\$197,823	\$240,416
Personnel: Positions and FTE			
Enacted/Request Positions	439	439	439
Enacted/Request FTE	411	411	431
Onboard and Actual FTE			
Onboard (Actual/Estimates/Projections)	394	419	439
FTE (Actual/Estimates/Projections)	390	415	431

Mission Support – PPA
Collections – Reimbursable Resources
(Dollars in Thousands)

	FY 2023 Enacted			FY 2024 Annualized CR			FY 2025 President's Budget		
	Pos.	FTE	Amount	Pos.	FTE	Amount	Pos.	FTE	Amount
Department of Agriculture	-	-	-	-	-	-	-	-	\$1,485
Department of Defense	-	-	\$500	-	-	\$500	-	-	-
Department of Defense - Navy, Marine Corps	-	-	-	-	-	-	-	-	\$80
Department of Energy	-	-	-	-	-	-	-	-	\$200
Department of Health and Human Services - Food and Drug Administration	-	-	\$2,650	-	-	\$2,650	-	-	-
Department of Homeland Security	-	-	-	-	-	-	-	-	\$5,000
Department of Homeland Security - Countering Weapons of Mass Destruction	-	-	\$350	-	-	\$350	-	-	-
Department of Homeland Security - Cybersecurity and Infrastructure Security Agency	-	-	\$50	-	-	\$50	-	-	\$10,000
Department of Homeland Security - Federal Emergency Management Agency	-	-	\$70	-	-	\$70	-	-	-
Department of Homeland Security - Federal Law Enforcement Training Centers	-	-	\$10	-	-	\$10	-	-	-
Department of Homeland Security - Intelligence and Analysis	-	-	-	-	-	-	-	-	\$8,000
Department of Homeland Security - Management Directorate	-	-	-	-	-	-	-	-	\$8,500
Department of Homeland Security - Office of Biometric Identity Mangement (OBIM)	-	-	\$2,000	-	-	\$2,000	-	-	\$1,925
Department of Homeland Security - Transportation Security Administration	-	-	\$45	-	-	\$45	-	-	-
Department of Homeland Security - U.S. Citizenship and Immigration Services	-	-	\$20	-	-	\$20	-	-	-
Department of Homeland Security - U.S. Customs and Border Protection	-	-	\$7,000	-	-	\$7,000	-	-	\$8,550
Department of Homeland Security - U.S. Immigration and Customs Enforcement	-	-	\$30	-	-	\$30	-	-	\$297
Department of Homeland Security - United States Coast Guard	-	-	\$350	-	-	\$350	-	-	-
Department of Justice - Federal Bureau of Investigation	-	-	\$21,000	-	-	\$21,000	-	-	\$21,800
Total Collections	-	-	\$34,075	-	-	\$34,075	-	-	\$65,837

Mission Support – PPA
Summary of Budget Changes
(Dollars in Thousands)

	Positions	FTE	Pay Amount	Non-Pay Amount	Amount
FY 2023 Enacted	439	411	\$93,106	\$71,104	\$164,210
FY 2024 Annualized CR	439	411	\$93,106	\$71,104	\$164,210
FY 2025 Base Budget	439	411	\$93,106	\$71,104	\$164,210
Total Technical Changes	-	-	-	-	-
Annualization of FY 2023 Enacted Program Changes	-	20	\$5,227	\$609	\$5,836
Total Annualizations and Non-Recurs	-	20	\$5,227	\$609	\$5,836
2025 Civilian Pay Raise	-	-	\$1,571	-	\$1,571
2024 Civilian Pay Raise	-	-	\$5,163	-	\$5,163
2023 Civilian Pay Raise Annualization	-	-	\$948	-	\$948
Investment Cost Savings	-	-	-	(\$767)	(\$767)
Salary Rightsizing	-	-	\$4,773	-	\$4,773
Total Pricing Changes	-	-	\$12,455	(\$767)	\$11,688
Total Adjustments-to-Base	-	20	\$17,682	(\$158)	\$17,524
FY 2025 Current Services	439	431	\$110,788	\$70,946	\$181,734
Transfer for Derived PIV Credential from S&T/O&S/MS to MGMT/O&S/OCSSO	-	-	-	(\$17)	(\$17)
Total Transfers	-	-	-	(\$17)	(\$17)
MS-Enterprise Shared Services	-	-	-	(\$6,577)	(\$6,577)
Total Program Changes	-	-	-	(\$6,577)	(\$6,577)
FY 2025 Request	439	431	\$110,788	\$64,352	\$175,140
FY 2024 TO FY 2025 Change	-	20	\$17,682	(\$6,752)	\$10,930

**Mission Support – PPA
Personnel Compensation and Benefits**

Pay Summary
(Dollars in Thousands)

	FY 2023 Enacted				FY 2024 Annualized CR				FY 2025 President's Budget				FY 2024 to FY 2025 Total			
	Pos.	FTE	Amount	Rate	Pos.	FTE	Amount	Rate	Pos.	FTE	Amount	Rate	Pos.	FTE	Amount	Rate
Mission Support	439	411	\$93,106	\$218.87	439	411	\$93,106	\$218.87	439	431	\$110,788	\$249.17	-	20	\$17,682	\$30.30
Total	439	411	\$93,106	\$218.87	439	411	\$93,106	\$218.87	439	431	\$110,788	\$249.17	-	20	\$17,682	\$30.30
Subtotal Discretionary - Appropriation	439	411	\$93,106	\$218.87	439	411	\$93,106	\$218.87	439	431	\$110,788	\$249.17	-	20	\$17,682	\$30.30

The FTE Rate calculation does not include Object Class 11.8-Special Personal Services Payments or 13.0-Benefits for Former Personnel

Pay by Object Class
(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget	FY 2024 to FY 2025 Change
11.1 Full-time Permanent	\$58,428	\$58,428	\$70,124	\$11,696
11.3 Other than Full-time Permanent	\$5,983	\$5,983	\$6,459	\$476
11.5 Other Personnel Compensation	\$1,844	\$1,844	\$2,620	\$776
11.8 Special Personal Services Payments	\$3,151	\$3,151	\$3,395	\$244
12.1 Civilian Personnel Benefits	\$23,700	\$23,700	\$28,190	\$4,490
Total - Personnel Compensation and Benefits	\$93,106	\$93,106	\$110,788	\$17,682
Positions and FTE				
Positions - Civilian	439	439	439	-
FTE - Civilian	411	411	431	20

Pay Cost Drivers

	FY 2023 Enacted			FY 2024 Annualized CR			FY 2025 President's Budget			FY 2024 to FY 2025 Total Changes		
	FTE	Amount	Rate	FTE	Amount	Rate	FTE	Amount	Rate	FTE	Amount	Rate
Mission Support Personnel	411	\$89,955	\$218.87	411	\$89,955	\$218.87	431	\$107,393	\$249.17	20	\$17,438	\$30.30
Other PC&B Costs	-	\$3,151	-	-	\$3,151	-	-	\$3,395	-	-	\$244	-
Total - Pay Cost Drivers	411	\$93,106	\$218.87	411	\$93,106	\$218.87	431	\$110,788	\$249.17	20	\$17,682	\$30.30

Explanation of Pay Cost Drivers

Mission Support Personnel: These costs support personnel compensation, benefits, and performance awards for non-laboratory personnel supporting S&T’s operations and mission. The FY 2025 Budget supports 439 positions, 431 FTE, to maintain S&T’s current staffing. This increase also provides annualized pay inflation, merit promotions, and annualized pay for second year for the new positions provided in the FY 2023 Enacted appropriation.

Other PC&B Costs: These costs support subject matter experts that S&T uses from other government agencies on a reimbursable detailee basis.

**Mission Support – PPA
Non Pay Budget Exhibits**

Non Pay Summary
(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget	FY 2024 to FY 2025 Change
Mission Support	\$71,104	\$71,104	\$64,352	(\$6,752)
Total	\$71,104	\$71,104	\$64,352	(\$6,752)
Subtotal Discretionary - Appropriation	\$71,104	\$71,104	\$64,352	(\$6,752)

Non Pay by Object Class
(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget	FY 2024 to FY 2025 Change
21.0 Travel and Transportation of Persons	\$716	\$716	\$732	\$16
23.3 Communications, Utilities, & Miscellaneous	\$1,149	\$1,149	\$1,259	\$110
24.0 Printing and Reproduction	\$140	\$140	\$140	-
25.1 Advisory & Assistance Services	\$42,896	\$42,896	\$36,646	(\$6,250)
25.2 Other Services from Non-Federal Sources	\$1,729	\$1,729	\$1,731	\$2
25.3 Other Purchases of goods and services	\$4,842	\$4,842	\$4,442	(\$400)
25.4 Operations & Maintenance of Facilities	\$321	\$321	\$321	-
25.7 Operation & Maintenance of Equipment	\$11,235	\$11,235	\$10,981	(\$254)
26.0 Supplies & Materials	\$760	\$760	\$772	\$12
31.0 Equipment	\$7,316	\$7,316	\$7,328	\$12
Total - Non Pay Budget Object Class	\$71,104	\$71,104	\$64,352	(\$6,752)

Non Pay Cost Drivers

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget	FY 2024 to FY 2025 Total Changes
Contract Support Services	\$42,896	\$42,896	\$36,646	(\$6,250)
Other Costs	\$20,892	\$20,892	\$20,378	(\$514)
Information Technology Equipment	\$7,316	\$7,316	\$7,328	\$12
Total - Non-Pay Cost Drivers	\$71,104	\$71,104	\$64,352	(\$6,752)

Explanation of Non-Pay Cost Drivers

Contract Support Services: This cost driver reflects pay for contractor staff supporting the execution of headquarters functions including financial management, facility planning, personal property, maintenance, and other administrative functions. Through streamlining its portfolios S&T will effectively support the various IT services to include networks, enterprise architecture, information assurance, and service delivery support. Streamlined efficiencies also resulted in service levels for acquisition support services, program support and engagement, and a range of legislative analysis, strategic messaging, and advocacy support services.

Other Costs: This cost driver supports S&T’s headquarters operational functions, including business utilities, travel, training, office supplies, printing services, legal services, consolidated subscriptions, government-wide mandated services, non-major Investments, and DHS Freedom of Information Act system. This funding decrease supports reduced travel and contract requirements from the Science and Technology Net, External VM Infrastructure Implementation, and Science and Technology Collaboration Site investments.

Information Technology Equipment: This cost driver includes data centers, security and compliance software, the purchase and maintenance of IT equipment, including hardware (e.g., laptops, monitors, printers, etc.) and software (e.g., Microsoft Office, McAfee) as well as upgrades of this equipment. This funding increase assists with centralizes service levels for various IT services, acquisition support services, program support and engagement, and strategic engagement and analysis in FY 2025.

Laboratory Facilities – PPA

Budget Comparison and Adjustments

Comparison of Budget Authority and Request

(Dollars in Thousands)

	FY 2023 Enacted			FY 2024 Annualized CR			FY 2025 President's Budget			FY 2024 to FY 2025 Total Changes		
	Pos.	FTE	Amount	Pos.	FTE	Amount	Pos.	FTE	Amount	Pos.	FTE	Amount
Laboratory Facilities	133	133	\$127,522	133	133	\$127,522	132	132	\$130,590	(1)	(1)	\$3,068
Total	133	133	\$127,522	133	133	\$127,522	132	132	\$130,590	(1)	(1)	\$3,068
Subtotal Discretionary - Appropriation	133	133	\$127,522	133	133	\$127,522	132	132	\$130,590	(1)	(1)	\$3,068

PPA Level I Description

The Laboratory Facilities PPA provides funding to support operations, infrastructure capabilities, maintenance, and personnel requirements at S&T’s laboratory facilities. Laboratory Facilities is managed by the Office of National Laboratories (ONL), which oversees the continued operations of S&T’s laboratory facilities to include the NBACC, PIADC, Transportation Security Laboratory (TSL), National Urban Security Technology Laboratory (NUSTL), and Chemical Security Analysis Center (CSAC) to meet mission requirements while maintaining safe, secure, compliant, and efficient operations. ONL also maintains capabilities vital to DHS and the national homeland security mission through a coordinated network of S&T and DOE national laboratories. This network of laboratories houses some of the most advanced scientific expertise and capabilities in the world, enabling the HSE to leverage, apply, and share knowledge that helps to inform policy, improve operations, and advance research in support of homeland security.

ONL is a crucial contributor to technology efforts and is a key resource in S&T’s matrixed organization providing scientifically based RDT&E to deliver solutions. ONL provides an enduring capability of subject matter expertise and dedicated technical infrastructure critical to the success in each of S&T’s RD&I thrust areas.

The following operations and facilities are supported in this PPA:

National Biodefense Analysis and Countermeasures Center Operations: NBACC provides the capability to characterize current and future biological threats, assess their impacts, and inform the development of countermeasures and vaccines in response to events and identified threats. NBACC is part of the National Interagency Biodefense Campus, located at Ft. Detrick, MD. NBACC also collaborates closely with the Federal Bureau of Investigation (FBI) and national security agencies. The unique missions of threat characterization and bioforensics enhance the Nation’s overall biodefense capabilities. Maintaining this cutting-edge capability and technology at NBACC has allowed S&T to quickly pivot to emerging events like the COVID-19 pandemic.

NBACC is also utilized across the Federal Government and private sector through its “Work for Others” program. The “Work for Others” program conducts work for Federal agencies and non-Federal entities on a reimbursable basis. NBACC examines opportunities for the cooperative use of existing capacity to perform R&D for other Federal agencies. S&T operates NBACC as a FFRDC, which plans, manages, and executes the NBACC research programs and operates the facility. Some of the major operational costs include safety, security, addressing and maintaining regulatory compliance, IT and IT upgrades, utility and garrison support costs, and major facility and equipment upgrades. NBACC is a certified and registered biosafety level (BSL) 2, 3, and 4 laboratory and has completed the triennial Biological Select Agents and Toxins registration inspection.

Plum Island Animal Disease Center Operations: PIADC has an interagency mission to protect U.S. agriculture from the threat of high-consequence, foreign animal diseases such as FMD. In carrying out this mission, PIADC provides a host of high-impact, indispensable preparedness, and response capabilities including vaccine R&D, diagnostics, training, and bio forensics. The biological countermeasures development at PIADC supports S&T’s Food, Agriculture and Veterinary Defense program. Research at the facility occurs in BSL-2 and BSL-3 agricultural laboratory spaces and houses the North American FMD Vaccine Bank. S&T is responsible for the management, operations, and maintenance of the complex which is comprised of numerous structures that provide office space, laboratory facilities, warehousing, waste processing, and storage. PIADC operations are largely self-sustaining and include a power plant, boiler plant, chiller facility, fuel storage, fire protection, waste handling, security systems, and other critical infrastructure. S&T provides the only ferry transport to and from the island and is responsible for operation and maintenance of the ferries, docks, and harbor. S&T also manages day-to-day operational support, including the operations and maintenance workforce and emergency response capabilities (fire, rescue, emergency medical). Major operational costs at PIADC include bio safety, security, operations and maintenance contract management, IT, and periodic upgrades to meet regulatory requirements and equipment replacement to ensure safe, compliant facility operations. PIADC will be heavily involved in support of the safe and efficient transfer of the USDA biorepository to the NBAF.

Transportation Security Laboratory Operations: The TSL is responsible for researching, developing, testing, and evaluating technologies to detect and mitigate the threat of explosives and other weapons that may be used against our Nation’s transportation systems and infrastructure. TSL also leverages its capability and expertise to help DHS operating components address other detection problems (e.g., opioids). All Transportation Security Administration (TSA) threat detection systems are certified by TSL’s Independent Test and Evaluation Division. TSL supports TSA as its primary customer but also provides test and evaluation services to the CBP, United States Coast Guard, United States Secret Service (USSS), and other government organizations. TSL’s main campus is located at the Federal Aviation Administration’s (FAA) William J. Hughes Technical Center in Atlantic City, NJ. A remote test facility located at Tyndall Air Force Base, FL, collects homemade explosive detection data supporting transportation security equipment developmental testing and certification testing, while another TSL capability, the Detection Technology Center at Redstone Arsenal in Huntsville, AL, co-locates S&T alongside the FBI within the FBI Terrorist Explosive Device Analytical Center Improvised Explosive Detection and Synthesis Center, to conduct rapid home-made explosive characterization and assessment of detection system performance against emerging threats. Major operational costs include facility/tenant common costs, facility operations and maintenance, administrative and operation support contracts, certification testing support, utilities, physical security, explosives management and information technology support.

National Urban Security Technology Laboratory: NUSTL's capabilities in T&E and R&D help first responders prepare, protect, and respond to, and recover from homeland security challenges, threats, and hazards. NUSTL provides independent technology evaluations and assessments, thereby enabling informed acquisition and deployment decisions to ensure first responders have the best tools and technologies available to do their jobs safely and effectively. NUSTL is a preferred and trusted resource for first responder agencies across all levels of the government and works with end-users to promote the successful deployment of both commercial and emerging technologies into field use for law enforcement, fire, and other emergency response agencies. Staff experts work side-by-side with the Nation's first responders to effectively plan and execute tests, evaluations, and assessments in operational scenarios, assist with the fielding of technologies, sponsor Radiological/Nuclear Response and Recovery R&D and other critical R&D efforts including impacts to public safety from energy innovations, support the development of Concept of Operations (CONOPS), and provide post-deployment advisory support. Major operational costs include rent and security for its laboratory facility, T&E equipment purchase, maintenance, and upgrades such as radiation detectors and radiation sources, contractor support, and IT. NUSTL is located in Manhattan, New York due to the criticality of the partnership with the first responder community and access to complex urban test environments.

Chemical Security Analysis Center Operations: In accordance with the Homeland Security Act of 2002, Section 323, the CSAC shall be used to conduct studies, analyses, and research to assess and address domestic chemical security events. As such, CSAC conducts studies and analyses for assessing the threat and hazards associated with an accidental or intentional large-scale chemical event or chemical terrorism event. . CSAC, strategically co-located at the U.S. Army Combat Capabilities Development Command Chemical Biological Center at Aberdeen Proving Ground-Edgewood in Maryland, supports a variety of customers within DHS, the Federal Government, and the HSE, to include but not limited to S&T's Chemical and Biological work, DHS Components such as Cybersecurity and Infrastructure Security Agency (CISA), Countering Weapons of Mass Destruction Office, USSS, TSA, and Federal Emergency Management Agency and other Federal agencies, as well as the National Security Council. CSAC provides science- and technology-based quality assured information and experimental capabilities for acquiring, storing, indexing, evaluating, and providing cheminformatic data, technical reports, and other knowledge products across the chemical threat spectrum to support the unified effort to secure the Nation. Operational costs for this facility include rent, security, utilities, shared laboratory space, and IT. In FY 2025, CSAC will continue to explore the growing field of Artificial Intelligence/Machine Learning as it impacts the ability to efficiently fill critical data gaps for physical properties, toxicity, synthetic pathways and detection signatures for priority compounds. CSAC will also continue to experimentally fill critical data gaps needed for high priority compounds to close the uncertainty related to the risk and mitigation from these materials. CSAC will continue work to support the evaluation of risk in the rapidly expanding ammonia industry, especially related to port communities and the evaluation of expedient measures for those potentially impacted during a release. CSAC will continue to support development of the Homeland Explosives Consequence and Threat tool (HEXCAT) to include seeking additional patents for the capability, using the HEXCAT tool for the analyses of special events for the HSE and CISA full scale exercises.

Laboratory Facilities – PPA
Budget Authority and Obligations
(Dollars in Thousands)

	FY 2023	FY 2024	FY 2025
Enacted/Request	\$127,522	\$127,522	\$130,590
Carryover - Start of Year	\$25,906	\$16,081	\$15,171
Recoveries	\$2,792	-	-
Rescissions to Current Year/Budget Year	(\$142)	-	-
Net Sequestered Resources	-	-	-
Reprogramming/Transfers	(\$1,866)	-	-
Supplementals	-	-	-
Total Budget Authority	\$154,212	\$143,603	\$145,761
Collections - Reimbursable Resources	\$33,350	\$33,350	\$38,080
Collections - Other Sources	-	-	-
Total Budget Resources	\$187,562	\$176,953	\$183,841
Obligations (Actual/Estimates/Projections)	\$171,481	\$161,782	\$168,079
Personnel: Positions and FTE			
Enacted/Request Positions	133	133	132
Enacted/Request FTE	133	133	132
Onboard and Actual FTE			
Onboard (Actual/Estimates/Projections)	115	128	132
FTE (Actual/Estimates/Projections)	117	121	132

Laboratory Facilities – PPA
Collections – Reimbursable Resources
(Dollars in Thousands)

	FY 2023 Enacted			FY 2024 Annualized CR			FY 2025 President's Budget		
	Pos.	FTE	Amount	Pos.	FTE	Amount	Pos.	FTE	Amount
Department of Agriculture	-	-	\$3,100	-	-	\$3,100	-	-	-
Department of Defense	-	-	\$8,500	-	-	\$8,500	-	-	\$5,480
Department of Health and Human Services - Department Wide	-	-	-	-	-	-	-	-	\$500
Department of Homeland Security	-	-	-	-	-	-	-	-	\$5,000
Department of Homeland Security - Countering Weapons of Mass Destruction	-	-	\$1,050	-	-	\$1,050	-	-	\$15,750
Department of Homeland Security - Cybersecurity and Infrastructure Security Agency	-	-	\$10,300	-	-	\$10,300	-	-	\$4,000
Department of Homeland Security - Federal Emergency Management Agency	-	-	\$200	-	-	\$200	-	-	-
Department of Homeland Security - Transportation Security Administration	-	-	\$10,000	-	-	\$10,000	-	-	\$6,500
Department of Homeland Security - U.S. Customs and Border Protection	-	-	-	-	-	-	-	-	\$850
Department of State	-	-	\$200	-	-	\$200	-	-	-
Total Collections	-	-	\$33,350	-	-	\$33,350	-	-	\$38,080

Laboratory Facilities – PPA Summary of Budget Changes

(Dollars in Thousands)

	Positions	FTE	Pay Amount	Non-Pay Amount	Amount
FY 2023 Enacted	133	133	\$25,141	\$102,381	\$127,522
FY 2024 Annualized CR	133	133	\$25,141	\$102,381	\$127,522
FY 2025 Base Budget	133	133	\$25,141	\$102,381	\$127,522
Total Technical Changes	-	-	-	-	-
Total Annualizations and Non-Recurs	-	-	-	-	-
2025 Civilian Pay Raise	-	-	\$400	-	\$400
2024 Civilian Pay Raise	-	-	\$1,321	-	\$1,321
2023 Civilian Pay Raise Annualization	-	-	\$263	-	\$263
FPS Fee Adjustment	-	-	-	\$21	\$21
Laboratory Facilities IT Investment	-	-	-	\$78	\$78
Salary Rightsizing	-	-	\$1,503	-	\$1,503
Total Pricing Changes	-	-	\$3,487	\$99	\$3,586
Total Adjustments-to-Base	-	-	\$3,487	\$99	\$3,586
FY 2025 Current Services	133	133	\$28,628	\$102,480	\$131,108
Total Transfers	-	-	-	-	-
Laboratory Operations and Maintenance	-	-	-	(\$273)	(\$273)
PIADC to NBAF Employee Transition	(1)	(1)	(\$213)	(\$32)	(\$245)
Total Program Changes	(1)	(1)	(\$213)	(\$305)	(\$518)
FY 2025 Request	132	132	\$28,415	\$102,175	\$130,590
FY 2024 TO FY 2025 Change	(1)	(1)	\$3,274	(\$206)	\$3,068

Laboratory Facilities – PPA Personnel Compensation and Benefits

Pay Summary *(Dollars in Thousands)*

	FY 2023 Enacted				FY 2024 Annualized CR				FY 2025 President's Budget				FY 2024 to FY 2025 Total			
	Pos.	FTE	Amount	Rate	Pos.	FTE	Amount	Rate	Pos.	FTE	Amount	Rate	Pos.	FTE	Amount	Rate
Laboratory Facilities	133	133	\$25,141	\$177.50	133	133	\$25,141	\$177.50	132	132	\$28,415	\$202.86	(1)	(1)	\$3,274	\$25.35
Total	133	133	\$25,141	\$177.50	133	133	\$25,141	\$177.50	132	132	\$28,415	\$202.86	(1)	(1)	\$3,274	\$25.35
Subtotal Discretionary - Appropriation	133	133	\$25,141	\$177.50	133	133	\$25,141	\$177.50	132	132	\$28,415	\$202.86	(1)	(1)	\$3,274	\$25.35

The FTE Rate calculation does not include Object Class 11.8-Special Personal Services Payments or 13.0-Benefits for Former Personnel

Pay by Object Class *(Dollars in Thousands)*

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget	FY 2024 to FY 2025 Change
11.1 Full-time Permanent	\$16,492	\$16,492	\$18,666	\$2,174
11.3 Other than Full-time Permanent	\$467	\$467	\$503	\$36
11.5 Other Personnel Compensation	\$503	\$503	\$540	\$37
11.8 Special Personal Services Payments	\$1,533	\$1,533	\$1,638	\$105
12.1 Civilian Personnel Benefits	\$6,146	\$6,146	\$7,068	\$922
Total - Personnel Compensation and Benefits	\$25,141	\$25,141	\$28,415	\$3,274
Positions and FTE				
Positions - Civilian	133	133	132	(1)
FTE - Civilian	133	133	132	(1)

Pay Cost Drivers

	FY 2023 Enacted			FY 2024 Annualized CR			FY 2025 President's Budget			FY 2024 to FY 2025 Total Changes		
	FTE	Amount	Rate	FTE	Amount	Rate	FTE	Amount	Rate	FTE	Amount	Rate
Laboratory Personnel	133	\$23,608	\$177.50	133	\$23,608	\$177.50	132	\$26,777	\$202.86	(1)	\$3,169	\$25.35
Other PC&B Costs	-	\$1,533	-	-	\$1,533	-	-	\$1,638	-	-	\$105	-
Total - Pay Cost Drivers	133	\$25,141	\$177.50	133	\$25,141	\$177.50	132	\$28,415	\$202.86	(1)	\$3,274	\$25.35

Explanation of Pay Cost Drivers

Laboratory Personnel: These costs support personnel compensation, benefits, and performance awards for laboratory personnel overseeing the operations, core capabilities, and maintenance requirements at S&T’s laboratory facilities. The FY 2025 Budget supports 132 positions, 132 FTE to maintain S&T’s current staffing from the FY 2023 Enacted appropriation and funds the transfer of one Federal position to the USDA in support of the closure and sale of S&T’s PIADC and transition to NBAF. This increase also provides funding for annualized pay inflation, merit promotions and fully burdened cost for Laboratory vacancies.

Other PC&B Costs: These costs support subject matter experts from other government agencies on a reimbursable detailee basis.

**Laboratory Facilities – PPA
Non Pay Budget Exhibits**

Non Pay Summary
(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget	FY 2024 to FY 2025 Change
Laboratory Facilities	\$102,381	\$102,381	\$102,175	(\$206)
Total	\$102,381	\$102,381	\$102,175	(\$206)
Subtotal Discretionary - Appropriation	\$102,381	\$102,381	\$102,175	(\$206)

Non Pay by Object Class
(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget	FY 2024 to FY 2025 Change
21.0 Travel and Transportation of Persons	\$228	\$228	\$226	(\$2)
22.0 Transportation of Things	\$17	\$17	\$17	-
23.1 Rental Payments to GSA	\$613	\$613	\$613	-
23.2 Rental Payments to Others	\$2,090	\$2,090	\$2,090	-
23.3 Communications, Utilities, & Miscellaneous	\$14	\$14	\$1	(\$13)
24.0 Printing and Reproduction	\$222	\$222	\$222	-
25.1 Advisory & Assistance Services	\$51,738	\$51,738	\$51,812	\$74
25.2 Other Services from Non-Federal Sources	\$2,316	\$2,316	\$2,316	-
25.3 Other Purchases of goods and services	\$14,334	\$14,334	\$14,355	\$21
25.4 Operations & Maintenance of Facilities	\$23,587	\$23,587	\$23,314	(\$273)
25.7 Operation & Maintenance of Equipment	\$533	\$533	\$528	(\$5)
26.0 Supplies & Materials	\$634	\$634	\$628	(\$6)
31.0 Equipment	\$6,055	\$6,055	\$6,053	(\$2)
Total - Non Pay Budget Object Class	\$102,381	\$102,381	\$102,175	(\$206)

Non Pay Cost Drivers

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget	FY 2024 to FY 2025 Total Changes
Other Goods and Services from Federal Sources	\$45,697	\$45,697	\$46,425	\$728
Laboratory Contract Support	\$45,484	\$45,484	\$45,929	\$445
Laboratory Facilities Operations and Maintenance	\$4,109	\$4,109	\$3,836	(\$273)
Other Costs	\$3,000	\$3,000	\$3,222	\$222
Laboratory Supplies and Materials	\$2,150	\$2,150	\$2,150	-
Rental Payments to General Services Administration	\$1,941	\$1,941	\$613	(\$1,328)
Total - Non-Pay Cost Drivers	\$102,381	\$102,381	\$102,175	(\$206)

Explanation of Non-Pay Cost Drivers

Other Goods and Services from Federal Sources: These costs are driven by contractor services and interagency agreements for the purchase of goods and services for jointly funded projects. Examples include TSL’s agreement with the FAA for the FAA to provide facility support services on a reimbursable basis for various activities, including utilities, building maintenance, emergency services, air shuttle services, and IT services. FPS provides security at PIADC. The funding for the labs is slightly different from year to year and shifts between the cost drives based on priority.

Laboratory Contract Support: This cost driver supports contractor staff required to assist in managing the execution of business operations including financial management, facility planning, engineering and technical services, and other administrative functions. The funding for the labs is slightly different from year to year and shifts between the cost drives based on priority.

Laboratory Facilities Operations and Maintenance: These costs cover the upkeep of facilities to meet mission requirements while maintaining safe, secure, compliant, and efficient operations. Laboratory facilities O&M includes labor, management, supervision, equipment, software, firmware, and materials for all services required for the safe, reliable, effective, efficient, and compliant operations and maintenance under normal, abnormal, and emergency conditions. Also included are service contracts, routine repair of facilities and upkeep of land. PIADC must be maintained on a 24/7 basis. The funding for the labs is slightly different from year to year and shifts between the cost drives based on priority. The reduction in funding will have no significant impacts.

Other Costs: These costs include operations and maintenance of the laboratories' IT systems, payments to vendors, utilities, fleet maintenance, travel, training, supplies, and other costs.

Laboratory Supplies and Materials: These costs include business operations functions that pay for the purchase and maintenance of IT equipment, including hardware and software as well as upgrades of equipment. This cost driver also includes office supplies, materials, and vehicle maintenance.

Rental Payments to GSA: This cost driver is associated with rental payment to GSA for NUSTL. The reduction in funding was realigned to another rent cost driver.

Acquisitions and Operations Analysis – PPA

Budget Comparison and Adjustments

Comparison of Budget Authority and Request

(Dollars in Thousands)

	FY 2023 Enacted			FY 2024 Annualized CR			FY 2025 President's Budget			FY 2024 to FY 2025 Total Changes		
	Pos.	FTE	Amount	Pos.	FTE	Amount	Pos.	FTE	Amount	Pos.	FTE	Amount
Acquisition and Operations Analysis	-	-	\$92,375	-	-	\$92,375	-	-	\$77,755	-	-	(\$14,620)
Total	-	-	\$92,375	-	-	\$92,375	-	-	\$77,755	-	-	(\$14,620)
Subtotal Discretionary - Appropriation	-	-	\$92,375	-	-	\$92,375	-	-	\$77,755	-	-	(\$14,620)

PPA Level I Description

The AOA PPA provides funding to support expert assistance, including systems engineering, to entities across the HSE to ensure that the transition, acquisition, and deployment of technologies, information, and procedures improve the efficiency and effectiveness of the operational capabilities. This includes providing technological assessment of major acquisition programs in DHS to help ensure that technologies, CONOPS, and procedures meet operational requirements, technology analysis and technology review of analysis of alternatives at the beginning and throughout an acquisition program’s life; standards to support the homeland security mission; and administration of the SAFETY Act program.

FFRDC Program Management Office: The FFRDC PMO increases the strategic value and utilization of the FFRDCs by advancing and sharing work products delivered by each FFRDC that provide solutions to DHS’s most complex R&D issues. The FFRDC PMO provides centralized oversight and support to the two FFRDCs, the HSOAC and the HSSEDI. These FFRDCs work in the interest of the public to ensure the highest levels of excellence by bringing together the expertise and points-of-view of government, industry, and academia. The close, but independent, relationship between DHS and the FFRDC allows the FFRDCs to provide objective, independent research and analysis, free from conflicts of interest, that result in actionable recommendations and candid advice rooted in the context of a long-term trusted relationship. The HSOAC provides DHS with expertise, analytic rigor, and timely analysis to support operations, policy development, and decision-making for DHS and its partners across the HSE to transform mission-level goals into strategies, operational requirements, and performance metrics. The HSSEDI provides its independent and objective perspective, extensive knowledge of the DHS mission space, and deep technical and systems engineering expertise to identify and solve critical technical problems and accelerate to operational use, the technology and systems necessary to secure the homeland.

International Cooperative Programs Office: ICPO implements the Under Secretary's unique authorities within DHS to establish priorities for international cooperative RDT&E; to exchange personnel, classified information, and equipment in support of these cooperative RDT&E activities; and, to implement activities through mechanisms deemed appropriate under the legislative authority. International cooperation improves understanding between partners of shared security interests and leverages foreign direct investment in S&T RDT&E. ICPO establishes enduring relationships to provide access to international RDT&E knowledge across the innovation ecosystem (i.e., government, academia, laboratories, and industry), funding, and other unique capabilities and resources. Through bilateral and multilateral cooperation, including the Five Country Ministerial and North Atlantic Treaty Organization, ICPO coordinates across DHS operational Components, DHS Policy Office of International Affairs, and with the U.S. Government interagency, especially the Department of State, the development of strategic priorities for such activities.

Knowledge Management Office: This program enhances S&T's ability to gather and manage accumulated knowledge and essential information for the benefit of the HSE, to identify and evaluate existing or developing technologies, services, and emerging trends. The Knowledge Management program develops and maintains an environment where S&T employees share and access relevant knowledge and lessons learned, and foster collaborative development efforts. Proper management of knowledge and information helps to protect the privacy of all individuals, ensures compliance with Freedom of Information Act requirements, and cost-effectively shares important information with a wide and diverse homeland security enterprise audience. Knowledge Management acts as a knowledge connector across the HSE environment to encourage cost effective use of electronic knowledge sharing, while also facilitating efforts to promote an open and transparent government while prioritizing security and privacy.

Partnership Intermediary Agreements (PIA): The transfer and commercialization of Federally funded technologies is frequently a time consuming and expensive undertaking, especially when resources are constrained at Government agencies, including DHS. S&T utilizes its network of qualified Partnership Intermediary organizations to increase the maturity and market readiness of DHS funded technologies to prepare them for transfer and commercialization to meet DHS's operational needs and the needs of the wider HSE. This program allows S&T's Technology Transfer and Commercialization to expand its reach to promote and market DHS technologies; gain increased partnerships with a variety of businesses and educational institutions; gain insight on industry perspectives on DHS technologies; and increase the likelihood of impact from research outcomes. Multiple PIAs are required to capitalize on State and local relationships across the United States to identify subject matter experts and benefit from local economic development resources; tap regional angel and venture capital networks; and leverage existing contacts with State and local first responder/law enforcement/mass transit communities.

Office of the Chief Scientist (CS): The Chief Scientist serves as the senior science and technology advisor to the Under Secretary for Science and Technology (USST). The CS delivers insights into the effectiveness of S&T's investments to provide capabilities for the DHS operational community in the short, medium and long term. In addition, the CS scans the technical horizon to identify emerging technologies that can enhance national security, or present novel threats to it. Lastly, the CS conducts outreach to the domestic and international science community to promote increased cooperation. .

Operations and Requirements Analysis (ORA): Through the S&T-managed DHS Integrated Product Team (IPT) process, and in coordination with the DHS JRC, S&T identifies common or similar operational R&D needs by DHS Components and delivers operational analyses that support technical solutions to increase DHS overall efficiency and effectiveness. ORA’s management of the IPT process provides the mechanism to carry out these activities. The IPT process occurs annually, with ORA having responsibility to deliver the following: validated and coordinated list of DHS-wide R&D strategic priorities and capability gaps, and traceability of capability gaps to DHS missions and operations. ORA is also responsible for decomposing new capability gaps into actionable requirements. This requirements analysis along with the cost-drive business case inform S&T leadership decision-making on near and long-term R&D planning and resource allocation. The outputs also enable S&T to successfully deliver impactful solutions to DHS Components and first responders that meet their mission needs and make their operations safer and more efficient and effective. ORA also leads S&T activities required by the *Foundations for Evidence-Based Policymaking Act of 2018* (Evidence Act), which mandates DHS to develop a quadrennial learning agenda, annual evaluation plans, a quadrennial capacity assessment, and products used to assess, improve, and advise evidence building activities across DHS. S&T promotes the use of evidence to inform decision-making and informs the quadrennial DHS Learning Agenda to identify priority questions related to the programs, policies, regulations, and operations of the agency. ORA leads S&T efforts across the Directorate, including several evaluations currently published either in the quadrennial Learning Agenda or one of the Annual evaluation Plans, and works to integrate evidence building and utilization into key decision-making processes at S&T.

SAFETY Act: The SAFETY Act program is congressionally mandated to provide liability protections for Sellers of qualified anti-terrorism technologies that could save lives in the event of a terrorist attack. The program incentivizes the private sector to significantly improve anti-terrorism preparedness and resilience levels. The program is intended to serve the American public and interests by improving the anti- terrorism capability of the Nation. The program thus has a public security mission. It is an outward-facing program that serves private and public-sector stakeholders as they seek to manage risk from deployments of anti-terrorism capabilities. This program also creates pathways for S&T to work with industry and small businesses in a synchronized, strategic fashion to improve the pace and quality of solution development for the critical needs of the HSE. In addition, the SAFETY Act Program actively supports DHS programs and initiatives (e.g., the National Infrastructure Protection Plan, TSA’s Certified Cargo Screening Program, CBP’s Customs-Trade Partnership Against Terrorism and other Federal anti-terrorism programs) by developing a streamlined procedure for providing SAFETY Act coverage known as Block Designations.

Standards: S&T performs the statutory functions of the Standards Executive for DHS and implements DHS’s statutory responsibilities for the utilization of, and participation in, the development of consensus standards, facilitating the successful application of standards-enabled capabilities. This is conducted in six main functional areas executed across DHS by 1) providing advice, developing and overseeing standardization and conformity assessment policy; 2) coordinating standards and conformity assessment activities, ensuring DHS component standards activities are harmonized and compatible with the mission, authority, and priorities of DHS; 3) training and educating DHS personnel on standards and conformity assessment, enabling them to effectively engage in the standards process; 4) integrating standards into DHS programs and activities; 5) providing technical resources, subject matter expertise and strategic vision and direction on standardization; and 6) supporting and funding critical standardization projects or anticipatory standards development for rapidly emerging requirements when existing standards are insufficient for the missions. These responsibilities are executed through membership, participation, and leadership in, and coordination with multiple national and international standards development organizations and interagency groups. S&T provides technical standards, test methods, test kits and guidance to

DHS Components and the HSE. DHS and HSE equities are represented in numerous new standards each year that deliver interoperable and counter-terrorism technologies and solutions to the DHS, other Federal agencies, the first responder community and the private sector.

Strategy and Policy Office (SPO): S&T’s Strategy and Policy Office oversees S&T-wide strategy development and sets strategic direction for the organization. SPO is responsible for developing and maintaining the S&T Strategy, leading interagency/international/industry strategies engagement, and leading S&T planning, policy, and program alignment. Knowledge Management is another capability under the realm of program alignment. This discipline enhances the ability to gather, curate, and manage accumulated mission-related knowledge and essential information for easy retrieval and use. SPO also manages S&T’s Interagency Programs, which addresses high-priority homeland security needs through facilitation and collaboration with cooperative science, technology, and RDT&E endeavors with other Federal agencies, academia, and the private sector. This interagency function establishes trusted partnerships with government agencies to leverage their investments and other resources, acting as a force-multiplier for S&T programs and initiatives. It provides a key conduit for government agencies to capitalize on S&T innovation and leverages the capabilities and investments of external organizations to reduce duplication and identify unmet needs.

Systems Engineering: Systems Engineering enables DHS programs to improve the efficiency of identifying and transforming Component requirements into operational capabilities by applying a disciplined, consistent process for managing technical risk that facilitates achievement of cost, schedule, and performance objectives from concept definition to deployment. S&T conducts Technical Assessments of DHS Acquisition programs to identify major technical risks, provide recommendations to reduce those risks, support objective decision-making, and ensure that programs are technically sound. S&T assists DHS Acquisition and R&D programs in implementing systems engineering, leads the DHS Systems Engineering Center of Excellence, develops systems engineering guidance, and instructs the DHS Systems Engineering certification courses. S&T provides technical expertise to DHS Acquisition oversight offices including the Office of Program Accountability and Risk Management, Office of the Chief Information Officer, and the DHS JRC. S&T leads the development and implementation of the DHS Invention Secrecy Act compliance program to prevent the publication or disclosure of patent applications, or to withhold the granting of patents (“publication or grant of a patent”) when deemed to be detrimental to national security.

System of Systems Operational Analytics: This effort supports transforming SoSOA to an enterprise-level capability to increase the effectiveness and efficiency of DHS data analytics and enables the analysis of highly complex systems of interdependent components (system of systems) for Components, Headquarter Offices including the JRC, PA&E within the DHS Chief Financial Officer, and OHSS. Starting from several earlier proof-of-concept projects to the development of highly versatile modeling and simulation capabilities, the demand for a fully mature, enterprise-wide SoSOA capability is strong amongst the HSE. SoSOA provides Components an Enterprise-level capability with common analytic frameworks, tools, and training. Increasing the collaborative analysis capability for DHS results in cost and time savings – freeing up operators and resources for mission-critical operations execution. Planned capabilities include:

- Assimilated visualization and analytic tools with fused data from disparate sources to improve decision support and reporting efficiency.
- Faster delivery of analyses to support decision making.
- Reduce costs for data-driven analysis by ensuring DHS Components leverage, share, reuse, and repurpose previously developed analyses.
- Enterprise analytic applications that include business analytics and visualization, statistical packages, modeling and simulation, decision analysis tools, and a library of online SoSOA analytics training manuals for 1,000 users across DHS.

Test and Evaluation: T&E is the authoritative designee that provides a mechanism by which programs can better understand the capabilities and limitations of the system when operated and supported by trained users within the intended operational environment. T&E is also designated to support DHS by training the DHS Acquisition Workforce Test & Evaluation Career Field members. T&E performs these critical functions in support of delivering enhanced capabilities to DHS Operators to improve acquisition outcomes through comprehensive engagement in major acquisition programs and R&D efforts. T&E supports every major program on the Master Acquisition Oversight List; providing input at each Acquisition Review Board; reviewing and providing comments on each program Operational Requirements Document; reviewing and approving the selection of Independent Test Agents, T&E Master Plans, and Operational Test Plans. T&E prepares and issues Letters of Assessment, in support of initial and full production or deployment decisions that address operational effectiveness, operational suitability, and operational resilience. T&E provides support to development and certification for members of the T&E career field in the acquisition workforce. T&E provides assistance and guidance to programs regarding Cyber Resilience T&E, Scientific Test and Analysis Techniques, Reliability assessments, and effective mapping of government test facilities.

Technology Scouting and Transition: TST supports S&T strategic and tactical R&D investment decision-making by providing a better understanding of the state of technology, including new and emerging technology and the private sector innovation landscape, providing innovative and cutting-edge technology discovery, end to end transition support, while maintaining a knowledge repository for sharing information. TST conducts activities that inform and support R&D decisions, and the transition and knowledge sharing of solutions to meet DHS's customer requirements through technology scouting, operational experiments, transition planning and the Technology Clearinghouse. Technology Scouting's program goals are to improve alternative options, increase speed of project execution, and reduce costs for projects. Technology Transition provides centralized support management in planning for and executing the transitioning of knowledge products, capabilities, and technologies to DHS Components. Transition collaborates across S&T to understand the factors that will shape the transition effort and delivery of new solutions to customers and identify opportunities to accelerate successful fielding of solutions or manage and mitigate risks to transition. TST tracks, assesses, and reports transitions to comply with DHS's 2017 National Defense Authorization Act reporting requirements to Congress. TST leads the development, operation and maintenance of the DHS Technology Clearinghouse that serves as the repository for S&T program and project reports and artifacts to aid in knowledge sharing to enhance the successful development and deployment of innovative homeland security technology solutions. TST also manages the OpEx program, which facilitates and conducts operational experimentations and rapid technology demonstrations with S&T program managers and DHS Component customers in order to evaluate the technical capabilities and operational use of new and emerging technologies and reduce the risk of procurements that fail to meet the required capabilities.

Acquisitions and Operations Analysis – PPA Budget Authority and Obligations

(Dollars in Thousands)

	FY 2023	FY 2024	FY 2025
Enacted/Request	\$92,375	\$92,375	\$77,755
Carryover - Start of Year	\$8,742	\$17,847	\$19,164
Recoveries	\$1,141	-	-
Rescissions to Current Year/Budget Year	-	-	-
Net Sequestered Resources	-	-	-
Reprogramming/Transfers	-	-	-
Supplementals	-	-	-
Total Budget Authority	\$102,258	\$110,222	\$96,919
Collections - Reimbursable Resources	\$5,700	\$5,700	\$4,250
Collections - Other Sources	-	-	-
Total Budget Resources	\$107,958	\$115,922	\$101,169
Obligations (Actual/Estimates/Projections)	\$90,111	\$96,758	\$84,444
Personnel: Positions and FTE			
Enacted/Request Positions	-	-	-
Enacted/Request FTE	-	-	-
Onboard and Actual FTE			
Onboard (Actual/Estimates/Projections)	-	-	-
FTE (Actual/Estimates/Projections)	-	-	-

Acquisitions and Operations Analysis – PPA
Collections – Reimbursable Resources
(Dollars in Thousands)

	FY 2023 Enacted			FY 2024 Annualized CR			FY 2025 President's Budget		
	Pos.	FTE	Amount	Pos.	FTE	Amount	Pos.	FTE	Amount
Department of Energy	-	-	\$500	-	-	\$500	-	-	\$500
Department of Homeland Security	-	-	\$500	-	-	\$500	-	-	\$500
Department of Homeland Security - Countering Weapons of Mass Destruction	-	-	\$900	-	-	\$900	-	-	\$500
Department of Homeland Security - Cybersecurity and Infrastructure Security Agency	-	-	\$950	-	-	\$950	-	-	\$500
Department of Homeland Security - Federal Emergency Management Agency	-	-	\$50	-	-	\$50	-	-	\$50
Department of Homeland Security - Transportation Security Administration	-	-	\$300	-	-	\$300	-	-	\$300
Department of Homeland Security - U.S. Citizenship and Immigration Services	-	-	\$50	-	-	\$50	-	-	\$50
Department of Homeland Security - U.S. Customs and Border Protection	-	-	\$100	-	-	\$100	-	-	\$100
Department of Homeland Security - U.S. Immigration and Customs Enforcement	-	-	\$250	-	-	\$250	-	-	\$250
Department of Homeland Security - United States Coast Guard	-	-	\$100	-	-	\$100	-	-	\$100
Department of Homeland Security - United States Secret Service	-	-	\$1,500	-	-	\$1,500	-	-	\$1,000
Library of Congress	-	-	\$500	-	-	\$500	-	-	\$400
Total Collections	-	-	\$5,700	-	-	\$5,700	-	-	\$4,250

Acquisitions and Operations Analysis – PPA
Summary of Budget Changes
(Dollars in Thousands)

	Positions	FTE	Pay Amount	Non-Pay Amount	Amount
FY 2023 Enacted	-	-	-	\$92,375	\$92,375
FY 2024 Annualized CR	-	-	-	\$92,375	\$92,375
FY 2025 Base Budget	-	-	-	\$92,375	\$92,375
Total Technical Changes	-	-	-	-	-
Total Annualizations and Non-Recurs	-	-	-	-	-
Capital Security Cost Sharing	-	-	-	\$4	\$4
Total Pricing Changes	-	-	-	\$4	\$4
Total Adjustments-to-Base	-	-	-	\$4	\$4
FY 2025 Current Services	-	-	-	\$92,379	\$92,379
Total Transfers	-	-	-	-	-
AOA-Acquisition Support	-	-	-	(\$9,771)	(\$9,771)
AOA-Federally Funded Research and Development Centers	-	-	-	(\$1,291)	(\$1,291)
AOA-SAFETY Act	-	-	-	(\$850)	(\$850)
AOA-Technology Transition Support	-	-	-	(\$2,712)	(\$2,712)
Total Program Changes	-	-	-	(\$14,624)	(\$14,624)
FY 2025 Request	-	-	-	\$77,755	\$77,755
FY 2024 TO FY 2025 Change	-	-	-	(\$14,620)	(\$14,620)

Acquisitions and Operations Analysis – PPA
Non Pay Budget Exhibits

Non Pay Summary
(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget	FY 2024 to FY 2025 Change
Acquisition and Operations Analysis	\$92,375	\$92,375	\$77,755	(\$14,620)
Total	\$92,375	\$92,375	\$77,755	(\$14,620)
Subtotal Discretionary - Appropriation	\$92,375	\$92,375	\$77,755	(\$14,620)

Non Pay by Object Class
(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget	FY 2024 to FY 2025 Change
21.0 Travel and Transportation of Persons	\$297	\$297	\$297	-
22.0 Transportation of Things	\$109	\$109	\$109	-
24.0 Printing and Reproduction	\$20	\$20	\$20	-
25.1 Advisory & Assistance Services	\$69,533	\$69,533	\$55,913	(\$13,620)
25.2 Other Services from Non-Federal Sources	\$2,357	\$2,357	\$2,357	-
25.3 Other Purchases of goods and services	\$18,789	\$18,789	\$17,789	(\$1,000)
25.4 Operations & Maintenance of Facilities	\$51	\$51	\$51	-
25.7 Operation & Maintenance of Equipment	\$68	\$68	\$68	-
25.8 Subsistence and Support of Persons	\$4	\$4	\$4	-
26.0 Supplies & Materials	\$67	\$67	\$67	-
31.0 Equipment	\$339	\$339	\$339	-
32.0 Land and Structures	\$20	\$20	\$20	-
41.0 Grants, Subsidies, and Contributions	\$682	\$682	\$682	-
42.0 Insurance Claims and Indemnities	\$39	\$39	\$39	-
Total - Non Pay Budget Object Class	\$92,375	\$92,375	\$77,755	(\$14,620)

Non Pay Cost Drivers

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget	FY 2024 to FY 2025 Total Changes
Contract Support Services	\$56,390	\$56,390	\$47,430	(\$8,960)
Other Goods and Services from Federal Sources	\$29,663	\$29,663	\$24,882	(\$4,781)
Other Costs	\$6,322	\$6,322	\$5,443	(\$879)
Total - Non-Pay Cost Drivers	\$92,375	\$92,375	\$77,755	(\$14,620)

Explanation of Non-Pay Cost Drivers

Contract Support Services: Costs include contract services for business operations including financial management, studies, analyses, and evaluations in support of IT and R&D activities, as well as other administrative functions. S&T's AOA programs rely on contracting services to provide analyses, engineering, test expertise, and products for operational end users within DHS and JRC. Through streamlining its portfolio to gain efficiencies, this decrease enables S&T to support the Evidence Act Officer and develop the capability to analyze and execute the results of formal S&T program evaluations; support the FFRDC PMO with contract support necessary to handle the quantity of tasks related to the demands of FFRDC services; and provide OSAI with program, technical support and subject matter expertise to address demands.

Other Goods and Services from Federal Sources: Costs include Interagency agreements for contractual services for the purchase of goods and services for jointly funded projects. For example, OSAI relies heavily on the Institute of Defense Analyses and the RAND Corporation to provide studies, and analyses, in determining whether to designate a particular technology as a Qualified Anti-Terrorism Technology. This decrease allows S&T to support the program and analysis requirements for independent continuous evaluation of current policies, procedures, and process.

Other Costs: Costs include operations and maintenance of the SAFETY Act Management System, travel, conferences, and direct support of major acquisitions and systems essential to planning, R&D, or maintenance of the acquisition or system. Through streamlining its portfolio to gain efficiencies, this decrease allows S&T to support these services in 2025 for the Evidence Act Officer, the FFRDC PMO and the OSAI with their day-to-day operational requirements.

Department of Homeland Security

Science and Technology Directorate

Procurement, Construction, and Improvements



Fiscal Year 2025

Congressional Justification

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Procurement, Construction, and Improvements

Budget Comparison and Adjustments

Comparison of Budget Authority and Request

(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget	FY 2024 to FY 2025 Change
Construction and Facility Improvements	\$55,216	\$55,216	\$50,270	(\$4,946)
Total	\$55,216	\$55,216	\$50,270	(\$4,946)
Subtotal Discretionary - Appropriation	\$55,216	\$55,216	\$50,270	(\$4,946)

S&T’s Procurement, Construction & Improvements (PC&I) appropriation provides resources to ensure the core capabilities of its laboratory infrastructure are operational in support of DHS mission requirements. PC&I funding allows S&T to make essential investments in construction, maintenance, modernization, and asset replacement or removal as necessary to support requirements generated by DHS Components. In addition, PC&I funding enables S&T to invest in equipment and information technology to ensure that S&T laboratories maintain operational readiness and associated accreditations.

S&T performs innovative Research, Development, Test and Evaluation (RDT&E) at its laboratories to support foundational science capabilities in direct support of identified DHS and Homeland Security Enterprise (HSE) capability gaps.

Construction and Facilities Improvement PPA: This PPA supports all major construction and improvements for S&T’s laboratories above the real property threshold of \$2.0M set for minor construction in Operations and Support (O&S) appropriation.

Procurement, Construction, and Improvements

Budget Authority and Obligations

(Dollars in Thousands)

	FY 2023	FY 2024	FY 2025
Enacted/Request	\$55,216	\$55,216	\$50,270
Carryover - Start of Year	\$16,945	\$41,516	\$54,560
Recoveries	\$515	-	-
Rescissions to Current Year/Budget Year	-	-	-
Net Sequestered Resources	-	-	-
Reprogramming/Transfers	-	-	-
Supplementals	-	-	-
Total Budget Authority	\$72,676	\$96,732	\$104,830
Collections - Reimbursable Resources	-	-	-
Collections - Other Sources	-	-	-
Total Budget Resources	\$72,676	\$96,732	\$104,830
Obligations (Actual/Estimates/Projections)	\$31,160	\$42,172	\$45,034
Personnel: Positions and FTE			
Enacted/Request Positions	-	-	-
Enacted/Request FTE	-	-	-
Onboard and Actual FTE			
Onboard (Actual/Estimates/Projections)	-	-	-
FTE (Actual/Estimates/Projections)	-	-	-

Procurement, Construction, and Improvements

Summary of Budget Changes

(Dollars in Thousands)

	Positions	FTE	Amount
FY 2023 Enacted	-	-	\$55,216
FY 2024 Annualized CR	-	-	\$55,216
FY 2025 Base Budget	-	-	-
Critical Repair/Replacement Requirement	-	-	\$10,000
Plum Island Closure and Support	-	-	\$40,270
Total Investment Elements	-	-	\$50,270
FY 2025 Request	-	-	\$50,270
FY 2024 TO FY 2025 Change	-	-	(\$4,946)

Procurement, Construction, and Improvements

Non Pay Budget Exhibits

Non Pay by Object Class

(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget	FY 2024 to FY 2025 Change
21.0 Travel and Transportation of Persons	\$31	\$31	\$31	-
23.2 Rental Payments to Others	\$200	\$200	\$170	(\$30)
23.3 Communications, Utilities, & Miscellaneous	\$100	\$100	\$69	(\$31)
25.1 Advisory & Assistance Services	\$2,135	\$2,135	\$9,000	\$6,865
25.5 Research & Development Contracts	\$1,000	\$1,000	\$1,000	-
26.0 Supplies & Materials	\$1,000	\$1,000	\$2,000	\$1,000
31.0 Equipment	\$20,300	\$20,300	\$24,000	\$3,700
32.0 Land and Structures	\$30,450	\$30,450	\$14,000	(\$16,450)
Total - Non Pay Budget Object Class	\$55,216	\$55,216	\$50,270	(\$4,946)

**Procurement, Construction, and Improvements
Capital Investment Exhibits**

Capital Investments
(Dollars in Thousands)

	Acquisition Level	IT/ Non-IT	MAOL	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget
N024_000008122 - Detection Sciences Testing and Applied Research Center	Level 3	Non-IT	Yes	\$6,000	\$6,000	-
N/A - Critical Repair/Replacement Requirement	Non-Major	Non-IT	No	\$35,750	\$35,750	\$10,000
N/A - Plum Island Closure and Support	Level 3	Non-IT	No	\$13,466	\$13,466	\$40,270

Construction and Facility Improvements – PPA**Budget Comparison and Adjustments****Comparison of Budget Authority and Request***(Dollars in Thousands)*

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget	FY 2024 to FY 2025 Change
Critical Repair/Replacement Requirement	\$35,750	\$35,750	\$10,000	(\$25,750)
Plum Island Closure and Support	\$13,466	\$13,466	\$40,270	\$26,804
Detection Sciences Testing and Applied Research Center	\$6,000	\$6,000	-	(\$6,000)
Total	\$55,216	\$55,216	\$50,270	(\$4,946)
Subtotal Discretionary - Appropriation	\$55,216	\$55,216	\$50,270	(\$4,946)

PPA Level I Description

The Construction and Facility Improvements (CFI) PPA supports all major construction and improvements for S&T's laboratories. S&T's laboratory facilities include the National Biodefense Analysis and Countermeasures Center (NBACC) at Fort Detrick in Frederick, Maryland; Plum Island Animal Disease Center (PIADC) on Plum Island, New York; Transportation Security Laboratory (TSL) in Atlantic City, New Jersey; National Urban Security Transportation Laboratory (NUSTL) in New York, New York; and Chemical Security Analysis Center (CSAC) at Aberdeen Proving Ground in Maryland. S&T's five laboratories are vital to the national homeland security mission, enabling America's brightest scientists and engineers to apply their expertise and develop solutions that address our most dangerous threats and homeland security vulnerabilities.

This PPA provides funding for completing facility maintenance and repair, replacing outdated laboratory equipment, and investing in capital improvements – including IT modernization – to meet evolving mission requirements. All investments support critical scientific and technical capabilities necessary to conduct RDT&E for DHS and HSE. This PPA also includes funding required to close PIADC following the transfer of function to the National Bio and Agro-Defense Facility (NBAF). This PPA is comprised of the following investments:

Critical Repair/Replacement Requirement: The FY 2025 Budget continues to support a capital investment program to enable S&T labs to meet regulatory requirements, maintain modern technological standards, and perform end-of-life replacements for mission-critical equipment.

Plum Island Closure and Support (PICS): The FY 2025 Budget continues to support the PICS Program and activities needed for the transition, closure, and conveyance of all Plum Island real property (including the Orient Point property) and all related personal property and transportation

assets after the PIADC science mission is fully transferred to the National Bio- and Agro-defense Facility (NBAF) in October 2026. The PICS activities include the following:

- Biological decontamination of the laboratory facilities
- Completion of environmental regulatory compliance activities (e.g., remediation of remaining waste management areas)
- Facility maintenance and closure activities
- Disposition of all records, personal property, real property, and IT assets; and
- Preservation/disposition of historic assets

S&T is managing the PICS Program as a Level III non-acquisition program. The PICS current total estimate of \$150.0M will enable S&T to achieve closure of the island while enabling PIADC operations through mission transition to USDA. Once the PICS Program is completed, Plum Island will be closed and available for release from DHS to another entity through the General Services Administration (GSA). Note that the Program is undergoing a re-baseline effort due to current conditions and the extension of mission.

Detection Sciences Testing and Applied Research (DSTAR) Center: The construction of the DSTAR Center facility will include partially automated, state-of-the-art laboratories to provide for the safe and effective validation of explosive screening devices. It also will include sterile areas for test and evaluation of trace detection devices and modern computational infrastructure for analyzing and archiving threat images from computed tomography and millimeter wave threat screening devices. This project is consistent with S&T's congressionally mandated Infrastructure Master Plan for the TSL from 2010 through present day.

Construction and Facility Improvements – PPA

Budget Authority and Obligations

(Dollars in Thousands)

	FY 2023	FY 2024	FY 2025
Enacted/Request	\$55,216	\$55,216	\$50,270
Carryover - Start of Year	\$16,945	\$41,516	\$54,560
Recoveries	\$515	-	-
Rescissions to Current Year/Budget Year	-	-	-
Net Sequestered Resources	-	-	-
Reprogramming/Transfers	-	-	-
Supplementals	-	-	-
Total Budget Authority	\$72,676	\$96,732	\$104,830
Collections - Reimbursable Resources	-	-	-
Collections - Other Sources	-	-	-
Total Budget Resources	\$72,676	\$96,732	\$104,830
Obligations (Actual/Estimates/Projections)	\$31,160	\$42,172	\$45,034
Personnel: Positions and FTE			
Enacted/Request Positions	-	-	-
Enacted/Request FTE	-	-	-
Onboard and Actual FTE			
Onboard (Actual/Estimates/Projections)	-	-	-
FTE (Actual/Estimates/Projections)	-	-	-

Construction and Facility Improvements – PPA**Summary of Budget Changes***(Dollars in Thousands)*

	Positions	FTE	Amount
FY 2023 Enacted	-	-	\$55,216
FY 2024 Annualized CR	-	-	\$55,216
FY 2025 Base Budget	-	-	-
Critical Repair/Replacement Requirement	-	-	\$10,000
Plum Island Closure and Support	-	-	\$40,270
Total Investment Elements	-	-	\$50,270
FY 2025 Request	-	-	\$50,270
FY 2024 TO FY 2025 Change	-	-	(\$4,946)

Construction and Facility Improvements – PPA**Non Pay Budget Exhibits****Non Pay by Object Class***(Dollars in Thousands)*

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget	FY 2024 to FY 2025 Change
21.0 Travel and Transportation of Persons	\$31	\$31	\$31	-
23.2 Rental Payments to Others	\$200	\$200	\$170	(\$30)
23.3 Communications, Utilities, & Miscellaneous	\$100	\$100	\$69	(\$31)
25.1 Advisory & Assistance Services	\$2,135	\$2,135	\$9,000	\$6,865
25.5 Research & Development Contracts	\$1,000	\$1,000	\$1,000	-
26.0 Supplies & Materials	\$1,000	\$1,000	\$2,000	\$1,000
31.0 Equipment	\$20,300	\$20,300	\$24,000	\$3,700
32.0 Land and Structures	\$30,450	\$30,450	\$14,000	(\$16,450)
Total - Non Pay Budget Object Class	\$55,216	\$55,216	\$50,270	(\$4,946)

Construction and Facility Improvements – PPA
Capital Investment Exhibits

Capital Investments
(Dollars in Thousands)

	Acquisition Level	IT/ Non-IT	MAOL	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget
N024_000008122 - Detection Sciences Testing and Applied Research Center	Level 3	Non-IT	Yes	\$6,000	\$6,000	-
N/A - Critical Repair/Replacement Requirement	Non-Major	Non-IT	No	\$35,750	\$35,750	\$10,000
N/A - Plum Island Closure and Support	Level 3	Non-IT	No	\$13,466	\$13,466	\$40,270

**Critical Repair/Replacement Requirement– Investment
Capital Investment Exhibits**

Construction

(Dollars in Thousands)

	Acquisition Level	IT/ Non-IT	MAOL	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget
N/A - Critical Repair/Replacement Requirement	Non-Major	Non-IT	No	\$35,750	\$35,750	\$10,000

Description

This investment includes major PC&I facility infrastructure, replacement, and upgrade or improvement projects associated with S&T’s laboratory facilities, which include NBACC, TSL, NUSTL, PIADC, and CSAC. The S&T laboratory network is composed of both DHS-built and inherited laboratory facilities to include all assets and liabilities. Management of the laboratory network includes management of assets from design and construction through decommission. Critical repairs and replacements are needed in S&T’s laboratories to ensure the safety of its people, enduring science capability, and delivery of mission requirements. Additionally, these investments will allow S&T to meet regulatory requirements and support required for 24x7 operations and research capability in support of operators. Specifically, projects are driven by the Facility Condition Assessment (FCA) program that identifies repairs and modifications necessary to support regulatory compliance and full facility functionality, as well as address safety issues that can no longer be deferred until a failure in infrastructure occurs.

This investment ensures each respective laboratories’ ability to perform their duties in a safe and reliable manner. Investing in improvements to S&T laboratories, to include IT infrastructure, will maximize the use of shared resources and reduce the maintenance and troubleshooting burden on IT staff that results from managing diverse legacy equipment and software. Additionally, this investment will improve the availability and reliability of the IT infrastructure upon which the critical RDT&E work of the S&T laboratories depends.

Justification

The FY 2025 Budget includes \$10.0M to support the Laboratory Capital Investment Program and address deficiencies at the laboratory facilities to meet evolving mission requirements.

Project: Laboratory Capital Investment Program

Funding Requirement: The FY 2025 Budget includes \$10.0M to support S&T’s capital investment program that enables the laboratories to continue to meet regulatory requirements, maintain modern technological standards, and perform end-of-life replacements for mission-critical equipment. This funding supports an ongoing, annual program of projects required to maintain S&T’s laboratory network in a state of operational readiness, addressing both ongoing facility needs as well as laboratory instrumentation needs.

Description: To sustain S&T's labs, funding must cover depreciation of the laboratory buildings and assets to support functionality of facilities, systems, and equipment and prevent them from degrading to a state of dysfunction. Funding supports NBACC, TSL, CSAC, NUSTL, and PIADC to sustain existing laboratory capabilities by completing facility maintenance and repairs for real and personal property assets, to include replacing laboratory equipment, based on expected service lifecycles. The basis for prioritizing and addressing individual lab needs on a cyclical basis are FCA, environmental, safety, and health inspections, as well as internal lab facilities and equipment inspections and audits.

Justification: S&T maintains laboratory assets (including facilities and equipment) in excess of \$270.0M. In FY 2021, S&T completed an analysis of the replacement lifecycles and depreciation costs of infrastructure across multiple labs and systems to determine the requirement for approximately \$10.0M to maintain the current functionality of facilities and systems to prevent them from degrading to a state of dysfunction and to fund equipment modernization that enables the labs to meet their respective mission requirements. S&T lab's physical infrastructure is depreciating at a rate of \$6.0M per year. Real property items at NBACC, TSL, and PIADC include all aspects of physical buildings including the physical structure, HVAC, waste disposal systems, and electrical systems. The S&T critical scientific and IT equipment is experiencing obsolescence at an annual rate of \$4.0M per year based on their expected service lives. S&T estimated the amount of funding necessary to sustain its physical laboratory-based assets by calculating their depreciation rates based Internal Revenue Service (IRS) Publication 946, which provides a basis for depreciation calculations and how assets degrade over time. The funding will enable the laboratories to support state-of-the-art facilities while allowing for flexibility in obtaining items that are expensive and difficult to repair or replace, as well as accommodating longer lead times in procurement timelines for more specialized laboratory equipment and improvements which are not as readily available.

- \$3.0M is included for NBACC to replace end of life laboratory equipment and to replace Security Management System Servers, Access Control Systems, Explosives Detection System, Intrusion Detection System, and Lobby X-ray Machine. These systems are past their life cycle and without the replacement there is potential for failure of these security systems which has a significant impact on the NBACC security posture.
- \$3.1M is included for the procurement and installation of 280' new steel sheet pile, anchor wall, and associated navigational infrastructure for the Plum Island Harbor. The existing section of bulkhead, including a fuel oil pipeline terminus at Plum Island Harbor is all 33+ years old. Visual evidence of impending failures includes broken steel waler fixing bolts, splash zone steel section loss, small sink holes behind bulkhead, and fender compression. The section of bulkhead has the greatest load due to dredge depths maintained for oil barge deliveries. Failure to repair would compromise passenger ramp, rubber turning fender, fuel pipeline, oil barge receipt capability, security lighting, and cameras and create a risk of potential environmental release if the fuel pipeline is damaged or undermined.
- \$2.0M is included for the decontamination and decommissioning of the former DOE laboratory space inherited by DHS (now NUSTL). Decontamination is needed to address surface and ductwork metals contamination.
- \$1.9M is included for TSL to replace end of life laboratory equipment including a liquid chromatography mass spectrometer, which is approaching end of lifecycle.

Construction and Facility Improvements – PPA

Critical Repair/Replacement Requirement

The Office of National Labs (ONL) maintains a schedule of assets, including real and personal property, which require replacement or improvement that exceed the threshold for O&S funding. This schedule is evaluated quarterly to determine the highest priority projects that require funding for the following fiscal year. Specific equipment and capabilities repaired or replaced are subject to change based on a quarterly prioritization and as higher priority and unplanned items arise, such as equipment failures or unforeseen cost increases for higher priority projects.

Impact: This program will enable S&T laboratories to maintain compliance with regulatory requirements, modern technology standards, and perform end of life replacements for mission-critical equipment. S&T will be able to bring aging facilities up to current standards by addressing necessary repairs and replacements in excess of the PC&I thresholds for real property and personal property, thereby enabling core science work to occur in the laboratories. Facility maintenance and equipment replacements that meet the PC&I thresholds will be able to occur on schedule, generating less impact to mission execution, and more importantly, ensuring the safety of our laboratory employees. S&T will be able to continue to ensure regulatory compliance with applicable facility codes and standards including 7 and 9 CFR (Code of Federal Regulation) (Federal Select Agent Program), Biosafety in Microbiological and Biomedical Laboratories (BMBL, 6th Edition), 10 CFR (Nuclear Regulatory Commission radioactive materials standards), 29 CFR (Occupational Safety and Health Administration general industry standards, e.g. electrical, fire protection, environmental controls; and laboratory standards, e.g. hazardous materials management, chemical hygiene, laboratory fume hoods and exhaust), and 40 CFR (Clean Air Act, Clean Water Act, hazardous waste requirements). FY 2025 funding is projected to provide for the replacement of liquid chromatography mass spectrometers at TSL, replacement of Security Management System Servers, Access Control Systems, Explosives Detection, Intrusion Detection System and Lobby X-ray Machine at NBACC, decontamination and decommissioning at NUSTL, and needed repairs to the harbor at PIADC.

**Plum Island Closure and Support– Investment
Capital Investment Exhibits**

Construction

(Dollars in Thousands)

	Acquisition Level	IT/ Non-IT	MAOL	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget
N/A - Plum Island Closure and Support	Level 3	Non-IT	No	\$13,466	\$13,466	\$40,270

Description

The FY 2025 Budget includes \$40.3M to continue support for the PICS Program. The PICS Program’s total cost is currently \$150.0M with a proposed 10-year funding profile and 10-12-year multi-phased execution effort, in coordination with PIADC operations, to achieve closure of the island estimated in FY 2031. A re-baseline effort is underway to quantify timing and cost based upon a recent delay in mission transfer by USDA until October 2026 from the current date (in the PICS Program) of December 2023.

The PICS Program involves the transition, closure, and conveyance of the ‘Plum Island Asset’ (all real and personal Plum Island property and transportation assets (including the Orient Point Property)) after the PIADC mission is fully transferred to NBAF located in Manhattan, Kansas. The PICS Program is a unique, multi-year effort which S&T is managing as a Level III non-acquisition program (ADE-2B milestone achieved in September 2021, enabling the transition to project execution). Initial funding primarily focused on planning and analysis activities (including regulatory requirements), equipment purchases, and targeted decontamination activities. The remainder of the project focuses on the complex physical decontamination of the BSL-3 containment facilities and other structures to meet regulatory health, safety, and environmental requirements prior to conveyance; and on the physical separation of usable assets (utilities for all buildings except Building 101 and Building 111). This program is the largest closure and conveyance of a biocontainment facility ever in the United States.

S&T established a PICS PMO to coordinate PICS planning activities with PIADC operations, regulators, DHS Management, GSA, and other key stakeholders. PICS Program funding also supports the Program Management Office (PMO) efforts in planning and development, implementation of the approach for surface and terminal decontamination and decommissioning of Building 101, and Building 111, continued reduction of the contaminated waste areas within Building 101, limited physical decontamination efforts in Building 101 (transition dependent), completion of execution of required decontamination efforts for Building 102 and, potentially, Building 257 as required by the New York State Department of Environmental Conservation (NYSDEC), monitoring of remaining Waste Management Areas remediation as required by the NYSDEC (fixed period after remediation efforts as per NYSDEC), initiation of physical utility service changes for remaining post-closure buildings, and continued records disposition activities as required by law for facility mission transfer, as well as a number of other minor related activities. This request also supports full implementation of the Scientific, Technical and Engineering Support (STENS) contract which provides senior technical level expertise to collaborate in planning/executing applied scientific activities for decontamination method assessment and development, develops decontamination and validation plans, delivers engineering and logistics to implement physical activities, and provides third-party verification testing.

Justification

The PICS Program and activities are required for the transition, closure, and conveyance of the ‘Plum Island Asset’ after the PIADC science mission is fully transferred to the NBAF. The PICS Program funding enables S&T to achieve closure of the island while enabling PIADC operations through mission transition to USDA at NBAF. Once the PICS Program is completed, Plum Island will be closed and available for release from DHS to another entity through conveyance by the GSA.

The scope of activities, key performance objectives, needed to close the PIADC facility and prepare the island for conveyance include:

- biological decontamination of the laboratory facilities,
- completion of environmental regulatory compliance activities (e.g., remediation of remaining waste management areas),
- facility maintenance and closure activities,
- disposition of all records, personal property, real property, and IT assets, and
- preservation/disposition of historic assets.

Continuation of the STENS contract implementation will provide five specific areas of support to address complexities associated with the work, including: Routine Operation of the Mobile Decontamination Laboratory; Matrixed Support of Subject Matter Experts with Experience in Biological Decontamination at Facility-Scale; Design and Execution of Applied Scientific Activities to Enable Biocontainment Facility Decontamination; Facility Modification Engineering, Planning, and Implementation; and Management of an Independent Third-Party Laboratory for Biological and Chemical Indicator Verification and Decontamination Sample Analysis.

- Facilities: The assessment, sampling, preparation, and ultimate decontamination of real property to regulatory standards that support the closure and conveyance of Plum Island; as well as the engineering and modification associated with maintaining valued assets to prepare for transfer. (\$36.5M)
- Program Management: The programmatic and administrative support to manage the PICS Program; records management activities; and historic preservation/disposition of PIADC assets. (\$3.7M)
- Regulatory Compliance: Costs associated with maintaining current regulatory compliance and decommissioning/decontamination activity compliance with the State of New York, Environmental Protection Agency, and USDA’s Agriculture Select Agent Services. (\$0.1M)
- Mission Closeout: The drafting of plans to end the DHS science mission at PIADC and associated records management; and the transfer of assets to NBAF or other Federal entities, and transfer of records to National Archives & Records Administration. (\$.01M)

FY 2021 and FY 2022 projects within the PICS Program provided baseline assessment and engineering direction for the rest of the program, FY 2023 and out-year projects through FY 2031 mature those efforts through project plan execution. There are several long-lead, specialty devices included that will ensure S&T has the needed capabilities to start the physical decontamination of PIADC biocontainment facilities when the science mission transfers. Funding also supports decontamination efforts in two older and smaller facilities, to ensure acceptance of the regulatory agreement

with our chosen decontamination methodologies on PIADC’s larger (and currently in-use) infrastructure moving forward. PICS will continue planning efforts and as many non-mission impacting preparatory efforts to ensure physical facility decontamination can occur immediately after mission transfer. The overall value of this approach is cost avoidance for decontamination re-work in the larger facilities later in the project, while concurrently benefiting from regulatory buy-in of the chosen processes; and ensuring early preparedness to meet the overall project schedule.

DHS has the responsibility to close and convey Plum Island through the FY 2012 DHS Appropriations Act (P.L. 112-74). P.L. 116-260 (Division FF, Title V, Section 501) repeals all previous ‘direct sale’ language and mandates the Administrator of GSA to dispose of all personal and real property and transportation assets, “as a single consolidated asset” under the Property Act. S&T has the responsibility to manage the closure of Plum Island to prepare all real and personal property assets for closure and conveyance by the GSA on behalf of DHS.

Impact

The rate of completion for the various phases of the PICS Program, as well as their congruity with the completion and transfer of the NBAF facility, is critical to the success of, and maintaining the cost estimate for this program. (Note that current expected delays in the USDA transition of the science mission to NBAF has, and will continue to, delay the start of PICS-related decontamination and closure activities in Building 101 from FY 2024 to FY 2027, as shown in the table below). The current funding profile will allow S&T the ability to execute key activities in the short term that are critical to supporting the program schedule for completion of PICS. However, current science mission transfer delays, increased escalation of recent years, addition of projects such as Waste Management Area (WMA) work, building 257 biological risk assessment, and potential Fort Terry records issues will require re-baselining of the Program. This re-baseline effort is currently underway. In addition, PICS will prepare the island for closure and conveyance by late-FY 2031, based upon the new mission transfer schedule.

The mission transfer delay announced by USDA in February 2024 impacts S&T’s mission. S&T will not be able to withdraw from Plum Island in a timely manner, which will result in cost increases to the PICS Program and extend the program schedule to approximately 2030 to 2031. Furthermore, there will be the continued need for operational funding for the PIADC at the current levels to ensure the ongoing mission for operations, contracted programmatic support and federal staffing of PIADC beyond the transition of science programs to NBAF until the completion of the PICS Program. The PICS Program execution also requires PIADC operations and staff to provide the island logistics, utilities, security, and regulatory compliance in accordance with environmental and USDA Select Agent requirements.

Project Schedule:

Activity	Actual (A) / Estimated Schedule
Started Investigate & Delineate WMAs	FY 2021 Q4 (A)
Developed Science, Technical, Engineering and Support Package	FY 2022 Q2 (A)
Prepared Bio-Indicator Test Lab Planning Package	FY 2022 Q2 (A)
Provided procurement requisition (PR) package into system for Historical Records Management Activities	FY 2022 Q2 (A)
Provided PR Package into system for Science, Technical, Engineering and Support Package	FY 2022 Q3 (A)
Completed Building 102 Interior Surface Decontamination Planning	FY 2022 Q4 (A)
Started Validation Studies	FY 2022 Q4 (A)
Completed NEPA and NHPA Activities	FY 2023 Q2 (A)
Delivered Bio-Indicator Test Lab	FY 2023 Q2 (A)
Delivered Building 101 New Autoclaves	FY 2023 Q2 (A)
Started Building 101 New Autoclaves Installation	FY 2023 Q2 (A)
Started Utilities Planning Package	FY 2023 Q3 (A)
Award Package for Science, Technical, Engineering, and Support Package	FY 2024 Q2
Autoclaves Acceptance Testing	FY 2024 Q2
Start Building 102 Interior Surface Decontamination (pending regulatory approval)	FY 2024 Q2/3
Complete Building 102 Terminal Decontamination Validation Verification	FY 2024 Q3/4
Start Building 101 Decontamination Planning Package	FY 2024 Q3
Provide request for information (RFI) package into system for Building 257 Sampling or Decontamination (pending decision by regulatory agency)	FY 2024 Q2
Start Final Closure Activities for the Remaining WMAs	FY 2024 Q3
Complete Building 101 new autoclaves install and validation (pending regulatory approvals)	FY 2024 Q3/4
Start Building 257 Sampling or Decontamination Plan Execution	FY 2024 Q4
Implement Elements of Utilities Physical Work	FY 2025 Q2

Construction and Facility Improvements – PPA**Plum Island Closure and Support**

Activity	Actual (A) / Estimated Schedule
Complete Building 102 Interior Surface Decontamination & Independent Sampling	FY 2025 Q2
Deliver and Install 16 TOMi Steramist Units	FY 2025 Q2
Complete Final Closure Activities for the Remaining WMAs	FY 2025 Q3
End Building 101 Decontamination Planning	FY 2025 Q2
Start Building 101 Limited Physical Decontamination	FY 2026 Q1
Continue Building 101 Decontamination based upon results	FY 2026 Q3
Complete Building 257 Sampling or Decontamination Plan Execution	FY 2026 Q3
Complete Building 101 Decontamination & Validation	FY 2031 Q1

**Detection Sciences Testing and Applied Research Center– Investment
Capital Investment Exhibits**

Construction

(Dollars in Thousands)

	Acquisition Level	IT/ Non-IT	MAOL	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget
N024_000008122 - Detection Sciences Testing and Applied Research Center	Level 3	Non-IT	Yes	\$6,000	\$6,000	-

Construction Description

TSL is responsible for researching, developing, testing, and evaluating technologies to detect and mitigate the threat of explosives and other weapons that may be used against our Nation’s transportation systems and infrastructure. Working closely with security equipment manufacturers and DHS Component Acquisition Managers, TSL ensures that operational components of the HSE acquire detection and mitigation solutions that meet their respective operational requirements with a primary customer focus on TSA’s explosives screening needs.

TSL’s aging scientific equipment and outdated infrastructure limits the ability of the lab to fully meet its mission. The construction and facility improvement projects for TSL will allow S&T to better fulfill its mission and ensure its lasting impact in the future.

This investment is critical to ensure that the TSL maintains its ability to conduct RDT&E of explosive and threat screening devices.

Justification

The FY 2025 Budget does not include funding for this project.

Department of Homeland Security

Science and Technology Directorate

Research and Development



Fiscal Year 2025

Congressional Justification

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Research and Development

Budget Comparison and Adjustments

Comparison of Budget Authority and Request

(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget	FY 2024 to FY 2025 Change
Research, Development and Innovation	\$407,681	\$407,681	\$348,816	(\$58,865)
University Programs	\$53,537	\$53,537	\$53,537	-
Total	\$461,218	\$461,218	\$402,353	(\$58,865)
Subtotal Discretionary - Appropriation	\$461,218	\$461,218	\$402,353	(\$58,865)

The scope and diversity of the Department of Homeland Security's (DHS) missions require the Science and Technology Directorate (S&T) to address a wide range of programs supporting DHS Components' near-term needs for new operational capabilities, improved operational effectiveness, efficiency, and safety for the Homeland Security Enterprise (HSE). S&T has Research, Development, Test and Evaluation (RDT&E) responsibilities related to understanding and creating solutions for threats related to explosives, border security, cyber security, biological, chemical, and asymmetrical threats. S&T's enduring research provides the essential building blocks for incremental scientific advances in collaboration with public and private sector research partners. S&T's analytics and knowledge products also are equally important to supporting analysis of alternatives for technology options; risk and threat assessments; operational testing and evaluation of technologies proposed for acquisition; and detailed technical characterization of potential biological threat organisms for both human and agricultural biodefense. S&T's RDT&E efforts are prioritized to the homeland's highest threats. In addition, S&T's capacity to engage R&D activities worldwide is augmented by S&T's university-based Centers of Excellence (COEs) and 14 bilateral international agreements.

S&T's Research and Development (R&D) appropriation provides resources necessary to identify, explore, and demonstrate new technologies and capabilities that enable DHS and its partners to prevent, protect against, respond to, and mitigate nuclear, chemical, radiological, and biological threats and incidents. Additionally, S&T's Small Business Innovation Research (SBIR) Program ensures U.S. small businesses participation in Federal research and development programs by offering competitive programs to bring innovative homeland security solutions to reality with the potential for commercialization. R&D funds support Technology Readiness Levels (TRLs) 1-7:

Basic Research		Applied Research		Technology Development	Technology Demonstration	System Development
TRL-1	TRL-2	TRL-3	TRL-4	TRL-5	TRL-6	TRL-7
Basic Principles Observed/Reported	Technology Concept/Application Formulated	Critical Function or Characteristic Proof of Concept	Validation in Lab Environment	Validation in Relevant Environment	System Prototypes in Relevant Environment	System Prototypes in Operational Environment

S&T has two Programs, Projects, and Activities (PPAs) in its R&D appropriation:

Research, Development, and Innovation (RD&I): Provides state-of-the-art technology and/or solutions to meet the needs of DHS Components and the First Responder community. RD&I includes partner-focused, near-term, and output-oriented RDT&E programs that balance risk, cost, impact, and time to delivery. S&T’s enduring research supports scientific advances in collaboration with public and private sector research partners. In addition, S&T explores emerging science and technology areas and their potential threat or application to future DHS missions. S&T’s research and development activities also include technology demonstrations, university and industry partnerships, technology transfer, and commercialization.

University Programs (UP): Supports critical homeland security related research and education at U.S. colleges and universities to address high-priority DHS-related issues and to enhance homeland security capabilities over the long term. UP includes COEs and Minority Serving Institutions (MSI), a consortium of universities generating groundbreaking ideas for new technologies and critical knowledge for the HSE.

Research and Development Budget Authority and Obligations

(Dollars in Thousands)

	FY 2023	FY 2024	FY 2025
Enacted/Request	\$461,218	\$461,218	\$402,353
Carryover - Start of Year	\$386,286	\$371,498	\$358,485
Recoveries	\$27,849	-	-
Rescissions to Current Year/Budget Year	-	-	-
Net Sequestered Resources	-	-	-
Reprogramming/Transfers	(\$5,778)	-	-
Supplementals	-	\$13,846	-
Total Budget Authority	\$869,575	\$846,562	\$760,838
Collections - Reimbursable Resources	\$23,400	\$23,400	\$12,500
Collections - Other Sources	-	-	-
Total Budget Resources	\$892,975	\$869,962	\$773,338
Obligations (Actual/Estimates/Projections)	\$521,477	\$511,477	\$442,577
Personnel: Positions and FTE			
Enacted/Request Positions	-	-	-
Enacted/Request FTE	-	-	-
Onboard and Actual FTE			
Onboard (Actual/Estimates/Projections)	-	-	-
FTE (Actual/Estimates/Projections)	-	-	-

Research and Development Summary of Budget Changes

(Dollars in Thousands)

	Positions	FTE	Amount
FY 2023 Enacted	-	-	\$461,218
FY 2024 Annualized CR	-	-	\$461,218
FY 2025 Base Budget	-	-	-
Border Security Thrust Area	-	-	\$100,500
Chemical, Biological, and Explosive Defense Thrust Area	-	-	\$17,046
Counter Terrorist Thrust Area	-	-	\$55,114
Cyber Security / Information Analysis Thrust Area	-	-	\$33,550
First Responder / Disaster Resilience Thrust Area	-	-	\$24,950
Innovation Research and Foundational Tools Thrust Area	-	-	\$84,106
Physical Security and Critical Infrastructure Resilience Thrust Area	-	-	\$33,550
Centers of Excellence	-	-	\$45,880
Minority Serving Institutions (MSI)	-	-	\$7,657
Total Research and Development Projects	-	-	\$402,353
FY 2025 Request	-	-	\$402,353
FY 2024 TO FY 2025 Change	-	-	(\$58,865)

Research and Development Non Pay Budget Exhibits

Non-Pay by Object Class

(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget	FY 2024 to FY 2025 Change
21.0 Travel and Transportation of Persons	\$833	\$833	\$920	\$87
23.2 Rental Payments to Others	\$25	\$25	\$27	\$2
23.3 Communications, Utilities, & Miscellaneous	\$145	\$145	\$162	\$17
25.1 Advisory & Assistance Services	\$65,512	\$65,512	\$58,979	(\$6,533)
25.2 Other Services from Non-Federal Sources	\$1,546	\$1,546	\$1,746	\$200
25.3 Other Purchases of goods and services	\$5,717	\$5,717	\$5,669	(\$48)
25.5 Research & Development Contracts	\$337,511	\$337,511	\$281,283	(\$56,228)
25.7 Operation & Maintenance of Equipment	\$993	\$993	\$1,119	\$126
26.0 Supplies & Materials	\$406	\$406	\$459	\$53
31.0 Equipment	\$259	\$259	\$283	\$24
41.0 Grants, Subsidies, and Contributions	\$48,271	\$48,271	\$51,706	\$3,435
Total - Non Pay Budget Object Class	\$461,218	\$461,218	\$402,353	(\$58,865)

Research and Development
Research and Development Projects

Summary of Projects

(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget
Border Security Thrust Area	\$83,007	\$83,007	\$100,500
Chemical, Biological, and Explosive Defense Thrust Area	\$21,510	\$21,510	\$17,046
Counter Terrorist Thrust Area	\$60,983	\$60,983	\$55,114
Cyber Security / Information Analysis Thrust Area	\$48,567	\$48,567	\$33,550
First Responder / Disaster Resilience Thrust Area	\$55,950	\$55,950	\$24,950
Innovation Research and Foundational Tools Thrust Area	\$95,106	\$95,106	\$84,106
Physical Security and Critical Infrastructure Resilience Thrust Area	\$42,558	\$42,558	\$33,550
Centers of Excellence	\$45,880	\$45,880	\$45,880
Minority Serving Institutions (MSI)	\$7,657	\$7,657	\$7,657

Research, Development, and Innovation – PPA

Budget Comparison and Adjustments

Comparison of Budget Authority and Request

(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget	FY 2024 to FY 2025 Change
Border Security Thrust Area	\$83,007	\$83,007	\$100,500	\$17,493
Chemical, Biological, and Explosive Defense Thrust Area	\$21,510	\$21,510	\$17,046	(\$4,464)
Counter Terrorist Thrust Area	\$60,983	\$60,983	\$55,114	(\$5,869)
Cyber Security / Information Analysis Thrust Area	\$48,567	\$48,567	\$33,550	(\$15,017)
First Responder / Disaster Resilience Thrust Area	\$55,950	\$55,950	\$24,950	(\$31,000)
Innovation Research and Foundational Tools Thrust Area	\$95,106	\$95,106	\$84,106	(\$11,000)
Physical Security and Critical Infrastructure Resilience Thrust Area	\$42,558	\$42,558	\$33,550	(\$9,008)
Total	\$407,681	\$407,681	\$348,816	(\$58,865)
Subtotal Discretionary - Appropriation	\$407,681	\$407,681	\$348,816	(\$58,865)

PPA Level I Description

The RD&I PPA provides state-of-the-art technology and/or solutions to meet the needs of DHS’s Components and the First Responder community. This PPA supports partner-focused and output-oriented RDT&E programs that balance risk, cost, impact, and time-to-delivery resulting in technology demonstrations and transfer of new capabilities to DHS Components. It includes the following Thrust Areas:

Border Security: Invests in technologies and solutions to prevent the illicit movement and illegal entry or exit of people, weapons, dangerous goods, and contraband, and manage the risk posed by people and goods in transit.

Chemical, Biological, and Explosive (CBE) Defense: Funds R&D in technologies and solutions to support development of prevention and protective strategies and coordinated surveillance and detection to address CBE threats.

Counter Terrorist: Invests in technologies, methods, and procedures to counter terrorism.

Cyber Security / Information Analysis R&D: Conducts and supports RDT&E and the transition of advanced cybersecurity and information assurance technologies to secure the Nation’s current and future cyber and critical infrastructures.

First Responder / Disaster Resilience: Invests in technologies and solutions, which reduce vulnerability of key leadership, critical infrastructure, and events from terrorist attacks and other hazards. Also, increases the level of preparedness of State, local, regional, tribal, territorial partners, non-governmental organizations, private sector, and public, while improving the capabilities of DHS to lead in emergency management.

Innovative Research and Foundational Tools: Identifies gaps through analysis and requirements prioritization and focuses on identifying and analyzing potential solutions while working with partners to select the best approach to delivering solutions, including knowledge and advice.

Physical Security and Critical Infrastructure Resilience: R&D technologies, methods, and procedures to enhance the physical security of the Nation’s critical infrastructure which includes the Nation’s air travel system, mass transportation systems, and schools as well as soft targets such as mass public gatherings.

**Research, Development, and Innovation – PPA
Budget Authority and Obligations**

(Dollars in Thousands)

	FY 2023	FY 2024	FY 2025
Enacted/Request	\$407,681	\$407,681	\$348,816
Carryover - Start of Year	\$342,069	\$339,107	\$329,781
Recoveries	\$27,495	-	-
Rescissions to Current Year/Budget Year	-	-	-
Net Sequestered Resources	-	-	-
Reprogramming/Transfers	(\$5,761)	-	-
Supplementals	-	\$13,846	-
Total Budget Authority	\$771,484	\$760,634	\$678,597
Collections - Reimbursable Resources	\$22,900	\$22,900	\$12,000
Collections - Other Sources	-	-	-
Total Budget Resources	\$794,384	\$783,534	\$690,597
Obligations (Actual/Estimates/Projections)	\$455,277	\$453,753	\$387,408
Personnel: Positions and FTE			
Enacted/Request Positions	-	-	-
Enacted/Request FTE	-	-	-
Onboard and Actual FTE			
Onboard (Actual/Estimates/Projections)	-	-	-
FTE (Actual/Estimates/Projections)	-	-	-

Research, Development, and Innovation – PPA
Summary of Budget Changes
(Dollars in Thousands)

	Positions	FTE	Amount
FY 2023 Enacted	-	-	\$407,681
FY 2024 Annualized CR	-	-	\$407,681
FY 2025 Base Budget	-	-	-
Border Security Thrust Area	-	-	\$100,500
Chemical, Biological, and Explosive Defense Thrust Area	-	-	\$17,046
Counter Terrorist Thrust Area	-	-	\$55,114
Cyber Security / Information Analysis Thrust Area	-	-	\$33,550
First Responder / Disaster Resilience Thrust Area	-	-	\$24,950
Innovation Research and Foundational Tools Thrust Area	-	-	\$84,106
Physical Security and Critical Infrastructure Resilience Thrust Area	-	-	\$33,550
Total Research and Development Projects	-	-	\$348,816
FY 2025 Request	-	-	\$348,816
FY 2024 TO FY 2025 Change	-	-	(\$58,865)

**Research, Development, and Innovation – PPA
Non Pay Budget Exhibits**

Non Pay by Object Class
(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget	FY 2024 to FY 2025 Change
21.0 Travel and Transportation of Persons	\$809	\$809	\$913	\$104
23.2 Rental Payments to Others	\$25	\$25	\$27	\$2
23.3 Communications, Utilities, & Miscellaneous	\$145	\$145	\$162	\$17
25.1 Advisory & Assistance Services	\$64,810	\$64,810	\$58,783	(\$6,027)
25.2 Other Services from Non-Federal Sources	\$1,546	\$1,546	\$1,746	\$200
25.3 Other Purchases of goods and services	\$4,025	\$4,025	\$4,546	\$521
25.5 Research & Development Contracts	\$334,000	\$334,000	\$280,021	(\$53,979)
25.7 Operation & Maintenance of Equipment	\$993	\$993	\$1,119	\$126
26.0 Supplies & Materials	\$406	\$406	\$459	\$53
31.0 Equipment	\$239	\$239	\$270	\$31
41.0 Grants, Subsidies, and Contributions	\$683	\$683	\$770	\$87
Total - Non Pay Budget Object Class	\$407,681	\$407,681	\$348,816	(\$58,865)

**Research and Development
Research and Development Projects**

Summary of Projects

(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget
Border Security Thrust Area	\$83,007	\$83,007	\$100,500
Chemical, Biological, and Explosive Defense Thrust Area	\$21,510	\$21,510	\$17,046
Counter Terrorist Thrust Area	\$60,983	\$60,983	\$55,114
Cyber Security / Information Analysis Thrust Area	\$48,567	\$48,567	\$33,550
First Responder / Disaster Resilience Thrust Area	\$55,950	\$55,950	\$24,950
Innovation Research and Foundational Tools Thrust Area	\$95,106	\$95,106	\$84,106
Physical Security and Critical Infrastructure Resilience Thrust Area	\$42,558	\$42,558	\$33,550

**Border Security Thrust Area
Research and Development**

Technology Readiness Level Exhibit
(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget
Border Security Thrust Area	\$83,007	\$83,007	\$100,500

R&D Thrust Area Description

BORDER SECURITY THRUST AREA: DHS secures the borders, territorial waters, ports, terminals, waterways, and air, land, and sea transportation systems of the United States. S&T invests in border security research and development for technologies and solutions to prevent illicit movement and illegal entry or exit of people, weapons, dangerous goods, and contraband, and manage risks posed by people and goods in transit. The table that follows shows initiatives and funding levels for FY 2025 in this area.

BORDER SECURITY THRUST AREA <i>(Dollars in Thousands)</i>				
Program	Project	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget
Air, Land and Port of Entry (POE) Security		\$28,592	\$28,592	\$29,739
	Air Security	\$14,000	\$14,000	\$14,000
	Enhanced Trade Technologies	\$1,100	\$1,100	\$1,100
	Ground Based Technologies	\$4,150	\$4,150	\$4,150
	POE Data Visualization and Emerging Analytics (formerly POE Forensics and Investigations)	\$2,500	\$2,500	-
	POE Mail	\$1,975	\$1,975	-
	POE Non-Intrusive Inspection (NII) and Alternate Technologies (formerly POE Scanning Technologies and Analytics)	\$3,367	\$3,367	-
	POE Security	-	-	\$10,489
	Tunnel Detection and Surveillance	\$1,500	\$1,500	-

BORDER SECURITY THRUST AREA <i>(Dollars in Thousands)</i>				
Program	Project	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President’s Budget
Biometrics and Identity Management		\$3,250	\$3,250	\$3,250
	Biometrics and Identity Screening	\$3,250	\$3,250	\$3,250
Counter Unmanned Aircraft Systems		\$26,165	\$26,165	\$26,165
	Counter UAS	\$26,165	\$26,165	\$26,165
Forensics and Criminal Investigations		\$9,800	\$9,800	\$27,746
	Combatting Fentanyl/Opioid Abuse	-	-	\$6,746
	Countering Child Sexual Exploitation and Abuse	-	-	\$6,700
	Digital Forensics	\$3,800	\$3,800	\$3,800
	Illegal Immigration Investigations	\$1,000	\$1,000	-
	Transnational Organized Crime and Counter Networks	\$5,000	\$5,000	\$10,500
Immigration Services		\$1,500	\$1,500	\$1,500
	Immigration-Based Technologies	\$1,500	\$1,500	\$1,500
Maritime Safety & Security		\$13,700	\$13,700	\$12,100
	Integrated Multi-Domain Enterprise (IMDE)	\$2,600	\$2,600	\$500
	Port and Coastal Surveillance	\$1,500	\$1,500	\$1,500
	Port and Waterway Resiliency	-	-	\$500
	Remote Maritime Technologies	\$9,600	\$9,600	\$9,600
Total – Border Security Thrust		\$83,007	\$83,007	\$100,500

Air, Land and Port of Entry (POE) Security – This program develops and transitions technical capabilities that strengthen the security of our national airspace and land border by detecting and preventing the flow illicit goods and people through the land and air domain while facilitating and safeguarding lawful trade and travel through the ports of entry.

Air Security

- **Problem:** DHS is experiencing an unprecedented surge in illicit transnational activity across the borders where current operational capabilities are insufficient to properly detect, track, and interdict these activities. DHS needs Intelligence, Surveillance and Reconnaissance (ISR) capabilities that facilitate persistent domain awareness of the national border-space, and capabilities that facilitate the automation of missions, where possible, to safeguard agents and officers from threats and hazards within the area of operations.

DHS lacks a sufficient capability to collect, organize, and analyze the vast amounts of data and information available, or that could be available if collection was enhanced, to provide strategic warning or forecast future resourcing of DHS assets, one such use case is migration when using advanced statistical modeling of migration in the western hemisphere. DHS needs the ability to collect and rapidly analyze—including through the application of artificial intelligence and machine learning—data related to drivers of migration (such as geopolitical and economic conditions, violent crime, other immigration policies, and perception of US immigration policy). In the absence of such capability, DHS is unable to provide quality and timely intelligence to enable effective operational and resource planning and provide decision-advantage for DHS and U.S. Government leadership.

- **Solution:** The Air Security projects within this program advance critical technologies to close critical capability gaps within the air, land, and space domains. The following activities directly support the development, advancement, and deployment of critical capabilities to support border operations:
 - Large Unmanned Aerial Vehicle Improvements (Big Wing, VADER Gen II, and SeaVue): The Big Wing modification and integration of the SeaVue Multi-Role (SV MR) maritime radar are critical improvements and updates to transform the aging CBP Air and Marine Operations (AMO) MQ-9 fleet that will dramatically increase the operational range, endurance, and sensor capabilities to provide consistent ISR coverage. The SV MR will replace the legacy maritime radar and as a result allow for the detection of maritime traffic at significantly higher altitudes. Further enhancements will automate critical operational tasks and increase target recognition capability.
 - Enterprise Architecture and Tools: This effort focuses on the development of the ISR capabilities roadmap, processes, technologies, and tools required to support Enterprise Exploitation and Dissemination of ISR feeds. The goal of this effort is to support sharing and collaboration between Government agencies at the Federal, State, local, and tribal level. The current tactical ISR feed architecture managed by DHS Components presents data exchange limitations.
 - Commercial High Speed Data Link Technologies: This technology leverages recent advancements in commercial satellite-based data transfer services to facilitate communications between DHS manned and unmanned patrol aircrafts with command and control (C2) for maritime and ground-based operations. Given the deployment of advanced sensor and mission systems aboard aircraft, current data link systems are insufficient in their ability to transmit required amounts of data within mission timeframes. This effort will focus on the evaluation of commercial off the shelf (COTS) and government off the shelf (GOTS) data services for use in the HSE developing and evaluating system

architecture technologies to transform DHS's capabilities to communicate C2 via a high-speed data link network. The outcome of this effort is to provide an advanced concept technology demonstration to evaluate the capabilities of a Beyond Line-of-Sight system to provide high speed data rates and improve coverage in key areas. To provide those rates and improved coverage, an airborne terminal will need to be installed. The airborne terminal will need to interface with a mission management system that provides a common system for controlling sensors, fusing, and displaying sensor data, and communicating target and track information between various platforms and ground locations. Also within this project area is the advancement of the tools and systems to enable persistent radar-based change detection capabilities of the entire border of the CONUS. Developments within this area will leverage collaborations with other government agencies and the commercial sector.

- Air Domain Awareness (ADA) – ADA work includes the effective understanding of information, threats, and anything associated with the air domain that could impact the security safety, or economy of the U.S. ADA efforts are supporting the Counter Unmanned Airspace Program defense chain to detect, track, and identify small Unmanned Aircraft Systems (sUAS) operating in the National Air Space. S&T is collaborating with NASA, the Air Force Research Laboratory, and the State of Virginia in coordination with its different contractors to understand how to integrate and effectively use air traffic data that will come from future sUAS ecospheres and other ADA data sources. The ADA activity is working collaboratively with CBP AMO to integrate sUAS software into the ADA picture and test sensors that can detect, track, and identify sUAS that are not complying with sUAS identification regulations. Achieving ADA will be a whole of government approach and will partner with other Federal and State agencies to share ADA data. These efforts will enable DHS Components to separate compliant from non-complaint sUAS. This effort will research, evaluate, and identify Remote Identification systems for use on DHS Unmanned Aircraft Systems (UAS).
- **Justification:** The FY 2025 Budget provides \$14.0M for this project, which is consistent with the FY 2023 Enacted. The funding for this project advances the development of vital innovative and evolving aerospace technologies, such as UAS, ISR sensors, UAS Traffic Management (UTM), sUAS technologies, and commercial satellite technology critical to support HSE border operations. Additionally, funds will support DHS Components with mission-critical air security tools needed for enhanced detection, classification, and tracking of illicit activities; augment emergency response capabilities; and improve resiliency and systems interoperability.
- **Impact:** The Air Security project directly supports the operations of U.S. Immigration and Customs Enforcement (ICE), U.S. Secret Service (USSS), U.S. Customs and Border Protection (CBP), Office of Intelligence and Analysis (I&A), and U.S. Coast Guard (USCG) and will continue: 1) the test and evaluation of capabilities to detect, track and classify manned and unmanned aircraft; 2) advance the development, integration and transition of ISR sensor technology with C2 and advance air mobility for applicable HSE operational scenarios; 3) advance current architecture to open tactical ISR feeds and allow DHS Components to share intelligence; 4) development and testing of sUAS platforms, sensors, and related technologies to close operational gaps limited by current technology, as sUAS technology continues to evolve; and 5) improve baseline operational asset technologies to enable a measurable increase in operational flight hours and area of operation while reducing life cycle costs. Air security threats are increasingly becoming more sophisticated. As such, DHS must invest in air security technologies to remain ahead of drug cartels, human traffickers, unauthorized drone operators, and other nefarious actors.

Type of Research

Developmental

Technical Readiness Level

TRL for project efforts range from TRL-5 to TRL-7. This project's R&D efforts typically start by performing a market survey of available COTS and GOTS technology that could be adapted for DHS Component use. Identified technology is then prototyped and evaluated first in a relevant environment (TRL-6) then in an operational environment (TRL-7) prior to transition. Examples from the R&D milestones detailed below:

- Currently initiating R&D efforts to prototype and evaluate ISR technologies such as Vehicle and Dismount Exploitation Radar (VADER) in a relevant environment (TRL-6).
- Individual air detection, track, and ID systems (TRL-7); and
- Integration of the disparate sensors and system (TRL-5 to start, then 6-7, and completion).

Transition Plans

- Provide resources to enable the development of ISR capability for use by CBP and USCG.
- Develop technologies to enable the transfer of mission data and live video from patrol assets to C2 elements within CBP, USCG and other mission partners.
- Develop high speed data infrastructure prototype to enable the transfer of large amounts of data from patrol assets to C2 elements within CBP, USCG and ICE.
- Develop technologies to advance the high endurance and all-weather capability of large UAS for CBP-AMO.
- Design and develop the “Big Wing” modification kit with de-icing capability for AMO's MQ-9.
- Develop next generation radar system optimized for detecting and tracking sUAS's.
- Develop Federal UAS Service Supplier software based on NASA-proposed data standard and integrate into air domain awareness operations center.
- Develop DHS UAS UTM and Remote ID capabilities and policies that conform with Federal Aviation Administration (FAA) regulatory requirements.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Completed MQ-9 Big Wing modification kit and testing for CBP AMO.	FY 2023 Q1	FY 2023 Q4	5-6
Conducted at least one cybersecurity vulnerability assessment that meets Chief Information Security Officer requirements to procure and operate UAS.	FY 2023 Q1	FY 2023 Q4	N/A
Delivered UAS Service Supplier architecture to appropriate Air Domain Awareness Operations center.	FY 2023 Q1	FY 2023 Q4	6-7
Initiated the design of a DHS owned multi-mission small, unmanned aircraft system.	FY 2023 Q1	FY 2023 Q4	5-6
Received high endurance UAS prototypes and technical data packages from Department of Energy’s Savannah River National Laboratory.	FY 2023 Q1	FY 2023 Q4	N/A
Transitioned SHAKE reporting application to Intelligence & Analysis for implementation into the DHS Intelligence, Surveillance, and Reconnaissance infrastructure.	FY 2023 Q1	FY 2023 Q4	6-7
	FY 2024		
Collaborate with CBP AMO to integrate sUAS software into the ADA picture and test sensors that can detect, track, and identify sUAS that are not complying with sUAS identification regulations.	FY 2024 Q1	FY 2024 Q4	5-7
Complete operational evaluation of high-speed data airborne terminal.	FY 2024 Q1	FY 2024 Q4	5-6
Complete the first OCONUS deployment of Big Wing.	FY 2024 Q1	FY 2024 Q4	5-7
Develop Concept of Operations by NASA for the Collaborative Low Altitude UAS Integration Effort (CLUE) Project.	FY 2024 Q1	FY 2024 Q4	5-6
Develop Intelligence, Surveillance, and Reconnaissance capabilities roadmap to advance the current Enterprise architecture and tools to enable sharing of ISR data.	FY 2024 Q1	FY 2024 Q4	6-7
Identify and evaluate existing sensor technologies and data exchange architectures that can be leveraged to develop a remote identification capability that integrates into the DHS air domain awareness system.	FY 2024 Q1	FY 2024 Q4	6-7
Perform integration and flight testing of SeaVue Multi-Role Radar for Big Wing.	FY 2024 Q1	FY 2024 Q4	5-7

Research, Development, and Innovation – PPA

Border Security Thrust Area

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2025		
Finalize testing and evaluation of SeaVue MR	FY 2024 Q3	FY 2025 Q3	5-6
Test and evaluate High Speed, Low Latency SATCOM system (aka, high speed data technology) on CBP AMO’s aircraft. Demonstrate the geographic limitations of the current SATCOM system and how eliminating it will further maximize the operational impact of the Big Wing aircraft.	FY 2024 Q2	FY 2025 Q4	5-6
Evaluate Starlink (or high-speed) hardware for use on a Multi-Role Enforcement Aircraft (MEA) to maximize the operational impact by eliminating geographic limitations of the current SATCOM footprint.	FY 2024 Q4	FY 2025 Q4	5-6
Test and evaluate the feasibility of the Starlink Low-Earth Orbit system (aka, high-speed data technology) on CBP AMO’s aircraft against High-Speed Data requirements	FY 2024 Q1-Q3	FY 2025 Q4	5-6
Design a REMOTE ID solution that monitors UAS activities in a geographic area (e.g., city, county, precinct) that may result in risks to the public safety or indicate criminal activity.	FY 2024 Q2	FY 2025 Q4	5-6
Install CLUE software on a DHS cloud in preparation for future Authority to Operate accreditation (beyond FY 2025) to assist with air domain awareness.	FY 2025 Q1	FY 2025 Q4	5-6
Integrate at least one State or non-Federal external sensor and/or data source into the CLUE system installed at the CBP Air and Marine Operations Center (AMOC) to assist with air domain awareness.	FY 2025 Q1	FY 2025 Q4	6

Enhanced Trade Technologies

- **Problem:** CBP’s Office of Trade works to secure and facilitate imports arriving in the United States, collecting duties, taxes, and other fees; targeting illegal or fraudulent commerce; and enforcing U.S. trade law. CBP needs technology to safeguard the American public and promote legitimate international commerce, while considering the increasing volume and complexities of international trade. The capability for target agencies to enforce trade laws against counterfeit, unsafe, and fraudulent inbound goods, while facilitating lawful trade requires advanced analytics and machine learning analysis to enhance trade operations.
- **Solution:** This program identifies and develops technology to enhance CBP’s ability to facilitate and secure the import of trade goods. The program’s goal is to identify, assess, and develop new technology within the parameters of CBP’s business needs, as well as inform the acquisition of technology to proactively pursue improvements in the execution of their duties. Such technology will be oriented around collection of cargo data, performance of advanced data and risk analytics, and modeling to target illegal cargo while expediting the delivery of legitimate cargo.
- **Justification:** The FY 2025 Budget provides \$1.1M for this project, which is consistent with the FY 2023 Enacted. This project will target international trade violators, high risk shipments, counterfeit, unsafe, and fraudulent goods, which specifically tie to CBP’s concern of long wait times for cargo processing and delivery to market.
- **Impact:** Impacts include: (1) Expedited processing of legitimate commerce that benefit American markets, (2) enhanced ability to protect American consumers by targeting illegal or fraudulent cargo, (3) enhanced ability to efficiently collect duties, taxes, and tariffs, and (4) improved ability to enforce U.S. Trade law.

Type of Research

Applied and Developmental

Technical Readiness Level

The targeted initial TRL for projects ranges from TRL-1 to TRL-7. This project’s R&D efforts will start by performing a market survey of available COTS and GOTS technology that could be adapted for CBP use. Identified technology is then adapted and validated in a laboratory or relevant environment (TRL-4/5). Following successful validation, the most promising solution(s) are then prototyped and evaluated first in a relevant environment (TRL-6) then in an operational environment (TRL-7) prior to transition. Using electronic systems to expedite the clearance of merchandise entries and to ensure effective customs controls (TRL-4).

Transition Plans

Transition analyses, knowledge products, technologies to CBP Office of Trade to support future request for proposals for enhancing targeting capabilities.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2023			
Developed a strategic capability roadmap that defines the prioritized operational challenges to the security of traded goods processing through the U.S. ports of entry. This roadmap shall identify time phased executable investments in technology advancements which address the gaps.	FY 2023 Q1	FY 2023 Q4	2
FY 2024			
Begin executing against capabilities roadmap to include identifying project area, engaging customer needs via the S&T Business Process Flow (BPF) matrix, identifying candidates to execute work, and awarding contract.	FY 2024 Q1	FY 2024 Q4	1
Forced Labor Detection: Develop requests for information and award new contracts to performers in collaboration with a Federally Funded Research and Development Center's forced labor detection efforts.	FY 2024 Q1	FY 2024 Q4	1-3
FY 2025			
Collaborate with Federally Funded Research and Development Centers on execution of studies based on trade patterns in relation to forced labor detection with an emphasis on large language models.	FY 2025 Q2	FY 2025 Q4	1-3

Ground Based Technologies

- **Problem:** CBP, USSS, and ICE lack reliable and accurate detection, identification, classification, tracking, and interdiction capabilities to locate illegal ground-based activity. CBP and ICE also have limited capabilities to reliably detect cross-border tunnels, investigate discovered tunnels without putting an agent in the tunnel, and perform forensic analysis of the discovered tunnel to support investigations and prosecutions. The task is further complicated by commercial telecommunications companies deploying new networks across the country that pose challenges to law enforcement who use digital tools to legally find and investigate cross-border criminal and terrorist activity on telecommunications networks.
- **Solution:** The program is partnering with DHS Components to identify, develop, and transition innovative technologies that can be leveraged to enhance land border security between the POEs as well as improve agent safety and law enforcement investigative capabilities. This includes developing and deploying technology that provide law enforcement officers (LEOs) the ability to perform lawful telecommunications investigations. In response to being able to reliably detect cross-border tunnels, this project is developing modeling and simulation capabilities to enhance CBP U.S. Border Patrol's (USBP's) knowledge of the state of technology modalities in detecting tunnels under diverse environmental conditions.
- **Justification:** The FY 2025 Budget provides \$4.2M for this project, which is consistent with the FY 2023 Enacted. The work conducted under the Tunnel Detection and Surveillance project will be re-aligned as an activity under Ground Based Technologies beginning in FY 2024. This project will develop, test, and evaluate technologies designed to enhance the detection, identification, classification, and tracking of illicit activity in remote areas of the U.S. land border; assist USSS in evaluating changes in threats and potential countermeasures to current and emergent technologies, methods, and tactics, techniques and procedures (TTPs); enable improved asset use and informed resource requests to assist CBP in tactical deployment of existing assets; and test, validate, and transition products to assist ICE in locating and investigating criminal suspects.
- **Impact:** Impacts include: (1) enhanced land domain awareness, (2) increased detection, tracking, and interdiction of illicit border activity, (3) enhanced data sharing and analytics to support CBP and ICE Homeland Security Investigations (HSI) intelligence and investigations, (4) enhanced effectiveness of field agents/officers while carrying out their duties, (5) new tools and methods to lawfully investigate and prosecute criminal and terrorist suspects, (6) technical risk reduction to future activities of USBP's Cross Border Tunnel Threat (CBTT) program of record, (7) increased ability to investigate/exploit discovered tunnels safely, (8) increased arrests and prosecution of individuals involved in the creation/use of tunnels, (9) increased drug seizures and (10) reduction in CBP and ICE labor hours.

Type of Research

Developmental

Technical Readiness Level

TRL varies for specific portfolio projects between TRL-1 and TRL-7. This project’s R&D efforts typically start by performing a R&D requirements analysis and market survey of available COTS and GOTS technology that could be adapted for DHS Component use. Identified technology is then adapted and validated in a relevant environment (TRL-5). Following successful validation, the most promising solution(s) are then prototyped and evaluated first in a relevant environment (TRL-6) then in an operational environment (TRL-7) prior to transition. Examples from the R&D milestones detailed below:

- Develop a collaborative platform for immersive visualization capabilities accessible to DHS Components.
- Development of new products and methods to lawfully investigate and prosecute criminal and terrorist suspects.

Transition Plans

- Transition enhanced cross-domain (Air, Land, Maritime, Space, Cyber) enterprise information sharing capabilities such as Tactical Chat, all-domain tracks, and sensor system information inform strategic planning.
- Transition products to aid ICE in locating and investigating criminal suspects.
- Transition products to USSS to provide immersive visualization capabilities.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Completed data ingestion system development to automate interactable object and material setup.	FY 2023 Q1	FY 2023 Q4	1-7
Developed electronic technologies for use by investigators to apprehend nefarious actors.	FY 2023 Q1	FY 2023 Q4	3-7
Imported existing site models as part of baseline activities needed to transition current VBS3 training solution to a modern commercial-off-the-shelf gaming environment.	FY 2023 Q1	FY 2023 Q4	1-7

Research, Development, and Innovation – PPA

Border Security Thrust Area

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2024		
Conduct best practices for new start activities to include conducting project solicitation, contract award, and project kick off.	FY 2024 Q1	FY 2024 Q4	N/A
Demonstrate third party integration for Modeling Asset Past Performance for Border Planning (MAPP-BP).	FY 2024 Q1	FY 2024 Q4	6-7
Detection Through Vegetation: Conduct requirements analysis and market survey for Vegetation Penetration and deliver report on findings.	FY 2024 Q1	FY 2024 Q4	2
Develop a collaborative platform for Unreal Engine accessible to DHS Components for immersive visualization capabilities.	FY 2024 Q1	FY 2024 Q4	6-7
Evaluate and modernize existing software capabilities, including enhancement of 4-screen simulation system and upgrade of Unreal Engine platform for immersive visualization capabilities.	FY 2023 Q1	FY 2024 Q2	6-7
Immersive Visualization: Complete an IMS that defines a project timeline that meets end user goals.	FY 2024 Q1	FY 2024 Q4	3
Immersive Visualization: Complete requirements document in collaboration with USSS to define transition requirements for Unreal Engine.	FY 2024 Q1	FY 2024 Q4	1-3
Provide Operational Use Period testing support to USBP Program Management Office Directorate for the evaluation of detection systems acquired under the CBTT program.	FY 2024 Q1	FY 2024 Q4	N/A
Tunnel Detection: Transition geophysical operational system tool for use in operational testing of seismic detection systems under evaluation.	FY 2024 Q1	FY 2024 Q4	7
Tunnel Detection: Complete model verification and validation activities at each system deployment location.	FY 2024 Q1	FY 2024 Q4	7
	FY 2025		
Transition the S&T funded research & development for the Simulation Laboratory to Unreal platform for the USSS.	FY 2025 Q1	FY 2025 Q4	7-6
Build a secured collaborative Modeling and Simulation (M&S) platform.	FY 2025 Q1	FY 2025 Q4	6-7
Transition the MAPP-BP software model tool for Land Border Analysis to CBP for operational needs.	FY 2025 Q1	FY 2025 Q4	6-7
Deliver the Operational Use Period Testing Report San Diego Sector site to CBP’s USBP.	FY 2025 Q1	FY 2025 Q3	N/A

POE Data Visualization and Emerging Analytics

- **Problem:** CBP Office of Field Operations (OFO) POE Security has an imperative need to develop advanced technologies to address supply chain security and to test those technologies for functionality and ultimately for certification as acceptable security devices and/or methodologies.
- **Solution:** S&T is working with CBP OFO and the University of Arkansas to pursue research and development related to data visualization and emerging analytics that can enhance tracking for cargo and people from origin to destination with advanced interactive visual analytics to better identify transnational activity and provide additional insights into customs recovery, threat detection in the supply chain, while expediting trade.
- **Justification:** The FY 2025 Budget does not include funding for this project. The work that was being done in this project will align under POE Security project beginning in FY 2024, along with the work that had been done under POE Mail and POE NII and Alternate Technologies.
- **Impact:** Impacts include (1) enhanced ability to investigate illegal activity and detection of illegal goods and (2) potential to save thousands of CBP labor hours.

Type of Research

Developmental

Technical Readiness Level

TRL 5-7. This project's R&D efforts will leverage earlier work done with University of Arkansas and Sandia National labs. The Technology Readiness Level of this effort between S&T with the university has not been determined yet. To date, the program has focused on developing methods to improve image quality of non-intrusive inspection systems. Following successful validation, the solution(s) are then prototyped and evaluated first in a relevant environment (TRL-6) then in an operational environment (TRL-7) prior to transition.

Transition Plans

This project's R&D efforts are TRL 5-7. Software design requirements and deliverables will be developed in conjunction with customer and technical personnel. Transition will follow demonstration of these systems in a laboratory environment.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2023			
Evaluated algorithms on x-ray data for automated threat recognition of agricultural and biological threats.	FY 2023 Q1	FY 2023 Q4	4-5
FY 2024			
N/A	-	-	-
FY 2025			
N/A	-	-	-

POE Mail

- **Problem:** CBP has ineffective processes and technology to support international mail inspection. Despite legislative requirements to target and prevent illegal imports, CBP inspects only a limited number of the hundreds of thousands of incoming international mail each day, largely due to inadequate guidance, equipment, and resources. These international mail inspection deficiencies hinder CBP's efforts to prevent prohibited items from entering the United States.
- **Solution:** The project will prototype available technologies, which incorporate automated threat recognition software algorithms, to improve the inspection of incoming international mail. The project will conduct analyses to determine what additional staff and technology solutions are needed to adequately address the large volume of international mail.
- **Justification:** The FY 2025 Budget does not include funding for this project. The work that was being done for this project will align under POE Security project beginning in FY 2024, along with the work that had been done under POE Data Visualization and Emerging Analytics and POE NII and Alternate Technologies.
- **Impact:** Impacts include: (1) expedited processing of mail (2) enhanced ability to interdict illegal or fraudulent mail, and (3) enhanced ability to efficiently collect duties, taxes, and tariffs.

Type of Research

Developmental

Technical Readiness Level

We anticipate the TRL will vary between TRL-6 and TRL-7 depending on the activity. This project's R&D efforts will typically start by performing a market survey of available COTS and GOTS technology that could be adapted for DHS Component use. Identified technology will then be adapted and validated in a laboratory or relevant environment. Following successful validation, the most promising solution(s) will then be prototyped and evaluated first in a relevant environment (TRL-6-7) then in an operational environment (TRL-7) prior to transition.

Transition Plans

Transition technology to CBP conveyance and security division for improvements in CBP international mail inspection.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2023			
Identified solution and executed request for proposal POE Mail technical solution.	FY 2023 Q1	FY 2023 Q4	N/A
Reviewed qualified candidates and selected performer for solution execution.	FY 2023 Q1	FY 2023 Q4	N/A
FY 2024			
N/A	-	-	-
FY 2025			
N/A	-	-	-

POE Non-Intrusive Inspection and Alternate Technologies

- **Problem:** CBP’s NII systems technology requires R&D improvements to maintain parity with emerging threats. The volume of inbound goods and people projected to pass through the POEs is increasing from year to year, however, CBP manpower is not projected to increase proportionately. New, improved, or alternate technology can be a force multiplier to help address these challenges.
- **Solution:** This program develops alternate technology and future NII R&D technologies to enhance their detection performance and expand the range of detectable threats. These technologies will improve data integration and remote image analysis at common NII viewers. Other improvements include NII imaging for high-throughput package screening, automated anomaly detection, and other advanced technologies. This program will conduct R&D in three alternative areas to improve border security: R&D on a next-generation composite shipping container which will improve inspection capabilities; Improvements in NII software algorithms which will inform inspectors of new risks and investing in new and novel technologies.
- **Justification:** The FY 2025 Budget does not include funding for this project. The work that was being done in this project will be aligned to POE Security project beginning in FY 2024, along with the work that had been done under POE Data Visualization and Emerging Analytics and POE Mail.
- **Impact:** Impacts include: (1) dramatic increase in interdiction rates without additional staffing, (2) increase in the speed of commerce (greater/faster throughput), and (3) improved resource loading providing a significant increase in efficiency.

Type of Research

Developmental

Technical Readiness Level

TRL varies for specific project activities between TRL-6 and TRL-7. This project’s R&D efforts typically start by performing a market survey of available COTS and GOTS technology that could be adapted for CBP use. Identified technology is then adapted and validated in a relevant environment. Following successful validation, the most promising solution(s) are then prototyped and evaluated first in a relevant environment then in an operational environment (TRL-6-7) prior to transition.

- Imaging systems technology to inspect and screen at CBP POEs.

Transition Plans

Upon successful completion and operational assessment of the software/hardware upgrades, S&T will deliver prototype systems for laboratory testing, and if successful for operational demonstration. S&T will then deliver assessments of developed technologies and techniques to CBP to inform their acquisition process followed by transitioning technology integrating new imaging technology to the CBP OFO.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Ag Threat Detection: Executed award in support of library and algorithm development.	FY 2023 Q1	FY 2023 Q4	N/A
Modeling & Simulation: Ran predictive modeling in support of resource event response development.	FY 2023 Q1	FY 2023 Q4	N/A
Modified workflow to enable data exchange between one airline carrier and common viewer air system.	FY 2023 Q1	FY 2023 Q4	5-6
	FY 2024		
N/A	-	-	-
	FY 2025		
N/A	-	-	-

Port of Entry (POE) Security

- **Problem:** CBP requires improved inspection infrastructure to enhance detection of threats allowing legal trade and public consumption with minimal economic disruption. CBP needs advanced scanning and non-intrusive inspection technologies at POEs (Seaports, Land Ports, Inland Ports, Airports, and International Mail Facilities) to rapidly screen cargo, people, and goods for contraband and from potential threats. To achieve this goal, development of innovative technologies and practices to enable ease of inspection, contraband detection and provide supply chain security at the POEs into the United States are required.
- **Solution:** The project will review operational capabilities to improve technology and address the large volume of diverse types of trade and conduct analyses to determine what technology solutions are needed to adequately address inspection challenges. This program develops alternate technology and future R&D technologies to enhance CBP’s detection performance and expand the range of detectable threats, by improving data integration, and image analysis. Other improvements include NII technologies for imaging of high-throughput package screening, automated anomaly detection, improvement in NII software algorithms, machine learning, threat detection, and other advanced technologies.
- **Justification:** The FY 2025 Budget provides \$10.5M for this project, which is a \$10.5M increase over the FY 2023 Enacted. As POE detection solutions continue to mature, additional resources ensure the efficient transition of screening technologies that enhance operational capabilities at ports of entry to facilitate lawful trade and travel and detect and interdict illicit contraband to ensure the safety of U.S. citizens. This project aggregates the individual POE projects this initiative had previously executed: POE Mail, POE Data Visualizations & Emerging Analytics, and POE NII and Alternate Technologies. Funding for this project will improve the current CBP inspection technologies of people and goods. Improved image quality, increased threat detection, greater predictive analytical capabilities, and higher efficiency practices will expedite contraband detection and ease legitimate trade and travel processing times.
- **Impact:** Impacts include: (1) maximizing productivity and efficiency of public resources by increasing interdiction rates without additional staffing, (2) bolstering the American marketplace by increasing in the speed of commerce (greater/faster throughput of products to American markets), (3) increasing the percentage of vehicles crossing into the U.S. that undergo x-ray screening, and (4) safeguarding America by significantly reducing the flow of narcotics, contraband, and other illegal goods into the country.

Type of Research

Applied and Developmental

Technical Readiness Level

S&T anticipates the TRL will vary between TRL-2 and TRL-7 depending on the activity. This project’s R&D efforts will typically start by performing a market survey of available COTS and GOTS technology that could be adapted for DHS Component use. Identified technology will then be adapted and validated in a laboratory or relevant environment. Following successful validation, the most promising solution(s) will then be prototyped and evaluated first in a relevant environment (TRL-6-7) then in an operational environment (TRL-7) prior to transition.

Transition Plans

Transition technology to CBP OFO and Office of Trade for integration into existing architecture.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2023			
N/A	-	-	-
FY 2024			
Data Visualization and Emerging Analytics: Facilitated the procurement process to select and award the project vision work scope to a qualified contractor or firm.	FY 2024 Q1	FY 2024 Q4	4-5
Develop an Automated Threat Recognition (ATR) algorithm plan for agricultural and biological threats.	FY 2024 Q1	FY 2024 Q4	5-7
Modeling & Simulation: Transition existing modeling and simulation digital twin knowledge products to customer.	FY 2024 Q1	FY 2024 Q4	6
POE Mail: Reviewed qualified candidates and select performer for solution execution.	FY 2024 Q1	FY 2024 Q1	1-3
Pulse Low Energy X-Ray Interference of Radiation Producing Machines: Contract Award Kick-Off Upgrade of existing Low Energy Portals with pulsing capability.	FY 2024 Q1	FY 2024 Q3	5-7
Track execution of funds and ensure contract execution meets predefined project milestones and timetables.	FY 2024 Q1	FY 2024 Q4	2
Work with customer, performer, and transition team to begin kickoff.	FY 2024 Q1	FY 2024 Q4	2
FY 2025			
Agricultural Threat Detection: Complete delivery of the decision support software application.	FY 2025 Q1	FY 2025 Q4	N/A
Common Viewer Air System (CVAS): Execute a demonstration at one airport to assess overall technical functionality, operational feasibility, and repeatability of CVAS.	FY 2025 Q1	FY 2025 Q4	5-7
Project Vision: Conduct a comprehensive evaluation of the systems integration process, coupled with an initial assessment of the Automated Threat Recognition algorithm effectiveness.	FY 2024 Q3	FY 2025 Q4	5-7
POE Mail: Deliver knowledge product from completed testing and evaluation of various machine learning algorithms for camera-technology utilizing pattern recognition at international mail facilities.	FY 2025 Q1	FY 2025 Q4	6-7
Pulsed Low Energy X-Ray Interference of Radiation Producing Machines: Coordinate with industry to complete the nonrecurring engineering for the development of a pulsed source Low Energy Portal to address Customs and Border Protection’s need for systems at Ports of Entry.	FY 2024 Q3	FY 2025 Q4	5-7

Tunnel Detection and Surveillance

- **Problem:** CBP and ICE have a limited capability to (1) reliably detect cross-border tunnels, (2) investigate discovered tunnels without putting an agent in the tunnel, and (3) perform forensic analysis of the discovered tunnel to support investigations and prosecutions.
- **Solution:** This program is conducting market research, modeling and simulations, and operational experiments (OpEx) to enhance USBP’s knowledge of the state of technology modalities to detect, exploit, and seal cross-border dug tunnels. The program will conduct technology assessments to investigate the ability to detect tunnels under varying environmental conditions and collect and analyze samples from discovered tunnels to enable investigations/prosecutions.
- **Justification:** The FY 2025 Budget does not include funding for this project. The work that was being done in this project aligns under Ground Based Technologies project beginning in FY 2024.
- **Impact:** Impacts include: (1) technical risk reduction to future activities of CBP’s Cross Border Tunnel Threat (CBTT) program of record, (2) increased ability to investigate/exploit discovered tunnels safely, (3) increased arrests and prosecution of individuals involved in the creation/use of tunnels, (4) reduction of hundreds of tons of drugs kept off U.S. streets, and (5) savings of thousands of CBP and ICE labor hours.

Type of Research

Developmental

Technical Readiness Level

TRL varies for portfolio projects between TRL-4 and TRL-7. This project’s R&D efforts start by performing a market survey of available COTS and GOTS technology that could be adapted for DHS Component use. Identified technology is then further assessed and considered for evaluation in an OpEx in a relevant environment (TRL-6) or operational environment (TRL-7).

Transition Plans

Deliver to CBP a geophysical model that approximates seismic and acoustic wave attenuation for tunnel detection system performance analysis.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Conducted validation and verification activities to refine a mathematical model that approximates the physics of seismic and acoustic wave attenuation.	FY 2023 Q1	FY 2023 Q4	N/A
Finalized emulator calibration and deployment test procedures for use in operational test and evaluation of detection systems being evaluated by USBP.	FY 2023 Q1	FY 2023 Q3	N/A
	FY 2024		
N/A	-	-	-
	FY 2025		
N/A	-	-	-

Biometrics and Identity Management Program – This Program currently consists of two separate Projects: (1) Biometric and Identity Screening and (2) Biometric and Identity Concepts. The S&T Biometric and Identity Screening Project activities increase the Nation’s security at POEs while expediting legitimate travel and improving passengers’ experience. The S&T Biometric and Identity Concept Project leverages S&T’s full matrix of services to pursue research, development, test, and evaluation of emerging biometric capability.

Biometrics and Identity Screening

- **Problem:** DHS Components require more effective identity and biometric capabilities to improve screening and inspection of people accessing secure Federal facilities as well as arriving in, departing from, and traveling within the United States. These capabilities must balance security concerns with ongoing needs to facilitate lawful trade and travel, by improving accuracy, flexibility, and scalability of solutions.
- **Solution:** Apply proven systems engineering approach to identify opportunities for changes to existing operations and present anticipated improvements, consequences, and costs of new solutions process and technology improvements. This is accomplished by conducting technology foraging, technology readiness evaluations, and operational readiness assessments to inform DHS acquisition planning for more capable/lower cost technologies, including biometric recognition capabilities, to strengthen vetting and facilitate lawful and legitimate travel. This supports the evaluation of the cost effectiveness of capabilities and technologies to effectively adjust to evolving security and safety needs and use available manpower to adjust and scale operations. This will be accomplished through the following activities with the prioritization, initiation, and completion dependent on available funding and Component input.
 - Incorporate Facial Recognition into Vetting Capabilities: Advise and provide technical assistance to measure and operationalize enhancements to CBP Face Recognition capabilities. Activities include Automated Traveler Verification Service (TVS) face recognition performance monitoring based on National Institute of Standards and Technology (NIST) recommendation; Informing incremental TVS performance enhancements; Comparative evaluations of human performance and system performance; Enhancing overall system performance through Officer and automated algorithm collaboration.
 - Biometric Integration with Office of Biometric and Identity Management (OBIM): Assist DHS Components in developing rigorous and technically defensible processes and tools to combine the capabilities of analysts/end-users with automated OBIM Biometric (e.g., Face, Finger, Iris) capabilities to enhance the speed and quality of intelligence products. The goal is to provide knowledge products and SME support on best practices and workflows to utilize Homeland Advanced Recognition Technology biometric matching services.
 - Biometrics for Vehicles at POEs: Apply RDT&E to determine how to effectively use biometric technology to rapidly verify the identity of individuals in vehicles entering (and exiting) the United States at land POEs.
- **Justification:** The FY 2025 Budget provides \$3.3M for this project, which is consistent with the FY 2023 Enacted. Funding for this project will support CBP OFO and USSS gaps, advise and supply technical assistance to measure and operationalize enhancements to the use of biometrics, and apply RDT&E to determine how Components can effectively use biometric technology to rapidly verify or identify the identity of individuals within their respective mission areas.

- **Impact:** Impacts include (1) enhanced traveler identification validation; (2) improved ability to detect terrorists, criminals, and dangerous individuals; (3) streamlined, scalable, and cost-effective security, screening, and inspection operations; (4) reduced technical risk in DHS acquisition of secure, interoperable, enterprise solutions, (5) improved DHS staffing efficiency, and (6) improved traveler throughput and satisfaction.

Type of Research

Applied

Technical Readiness Level

The Biometric Screening Project's R&D efforts typically start with COTS or GOTS that are in use or being considered by DHS Components for mission operations. Identified technology is then validated in a relevant environment to answer the following questions: 1) how technologies advance or perform relative to each other and their limits of technical performance; 2) how technology performs for an intended use, the suitability of a system for an intended use, and demographic performance issues that cannot be answered through operational testing; and 3) how technology performs within the specific operational environment and with specific users, and whether the technology meets specific operational performance benchmarks.

Transition Plans

Transition is for knowledge products based on research and development (R&D) conducted under the S&T Biometric and Identity Screening Project's activities, namely within the Biometric Technology Center's Maryland Test Facility (MdTF). Efforts in the MdTF are conducted per Component related requirements and multiple distinct transitions are expected to occur each Fiscal Year.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2023			
Completed test and evaluation to recognize viable applications of biometric commercial off the shelf/government off the shelf technologies that can be recommended to DHS Components.	FY 2023 Q1	FY 2023 Q4	N/A
Delivered assessment report of COTS/GOTS biometric modality collection systems technical specifications for use in Components’ acquisition plans for meeting new Joint Requirements Council (JRC) requirements and Biometric Enterprise Management Reform Act requirements.	FY 2023 Q1	FY 2023 Q4	N/A
Obtained current Component technical specifications for various biometric modality collection systems and data quality based on mission requirements.	FY 2023 Q1	FY 2023 Q3	N/A
Published reports on biometric collection COTS/GOTS solutions that identify and assess further development, modification, and integration requirements to support integration into DHS Components’ operational mission spaces.	FY 2023 Q2	FY 2023 Q4	N/A
FY 2024			
Deliver to CBP OFO a Biometric Test and Evaluation report findings on COTS technologies that evaluate the capture of high-quality facial images of the vehicle driver and all passengers prior to the vehicle arriving at a land port of entry inspection booth.	FY 2024 Q1	FY 2024 Q4	N/A
Conduct Rally to inform DHS on Identity and Biometric technologies that both meet current Component operational use cases and preserve privacy.	FY 2024 Q3	FY 2024 Q4	N/A
Deliver results of biometric workflow analysis and evaluation of technologies to support the incorporation and integration of USSS biometric-enabled missions with the Office of Biometric Identity Management Homeland Advanced Recognition Technology system. The results will inform the USSS in planning current enterprise improvements and future acquisition programs.	FY 2024 Q1	FY 2024 Q4	N/A
FY 2025			
Conduct and deliver technology evaluation results to support the incorporation and integration of USSS biometric-enabled missions with the Office of Biometric Identity Management Homeland Advanced Recognition Technology system and assist the USSS in planning current enterprise improvements and future acquisition programs.	FY 2025 Q1	FY 2025 Q4	N/A
Conduct and deliver additional test and evaluation results on COTS technologies that capture facial images of people inside a vehicle and at land POE inspection booths. These COTS solutions will help inform CBP/OFO in planning future field evaluations and acquisition programs.	FY 2025 Q1	FY 2025 Q4	N/A
Conduct testing of new and emerging biometric technology systems at the Biometric Rally to inform DHS on Facial Recognition technologies that both meet current Component operational use cases and preserve privacy.	FY 2025 Q3	FY 2025 Q4	N/A

Counter Unmanned Aircraft Systems Program – This program conducts research, tests, evaluates and transitions technical capabilities that strengthen the security of DHS covered assets and facilities by detecting, tracking, identifying, and mitigating the threat posed by nefarious sUAS.

Counter Unmanned Aircraft Systems (C-UAS)

- **Problem:** Recent technology advances have resulted in a flood of inexpensive and easily obtainable sUAS that are used for multiple legitimate and illegitimate uses. As a result of the Preventing Emerging Threats Act of 2018, DHS was charged with the responsibility for the safety, security, and/or protection of personnel, facilities, or assets, from unmanned aircraft systems (UAS) that pose a risk to a covered facility or asset. DHS Components have limited capabilities to detect, track, identify, and mitigate sUAS under Title VI, Section 124n when performing certain congressionally approved missions. Currently, DHS has four Components that are authorized by the Secretary of DHS to field capabilities that operationally mitigate the threat of nefarious sUAS use. Given the rapid proliferation of sUAS in the marketplace and their ever-increasing capabilities, S&T must work with industry, government, and our international partners to develop and test new and innovative C-UAS capabilities that detect, track, identify and mitigate these advanced threats. S&T is also responsible for ensuring the C-UAS equipment can be used safely and securely by performing specialized testing and analysis and then coordinating that data with interagency partners such as the Department of Transportation (DOT) FAA among others.
- **Solution:** The program will accomplish the following objectives:
 - Identify or update and document initial DHS Component requirements based on specific mission sets and provide those initial requirements reports to DHS Components to be used in standing up their C-UAS acquisition and/or procurement programs.
 - Identify potential COTS or GOTS solutions that best meet requirements, document those findings, and provide the artifacts to DHS Components.
 - Modify/tailor/adapt COTS/GOTS and other mature technologies to address urgent needs.
 - Assist DHS Components in deployment of C-UAS technologies by adhering to all requirements, developing appropriate documentation, and coordinating with DOT/FAA to ensure there is minimal or no impact to the US National Airspace.
 - Determine the direction of sUAS technology advancement in the future to inform RD&I investments to counter these improvements.
 - Leverage industry and schools of higher education in the creation of novel technical methods to defeat sUAS using challenge events.
 - Pursue technologies that can improve the Unmanned Traffic Management system to help determine friend vs. foe UAS in the US National Air Space; and
 - Perform research and development on capability gaps found in the 2019 DHS Capability Assessment Report (CAR) and prioritized DHS Component gaps identified and documented during the 2020 C-UAS DHS issue team.
- **Justification:** The FY 2025 Budget provides \$26.2M for this project, which is consistent with the FY 2023 Enacted. Funding will support a test event focused on C-UAS preparation for the World Cup in 2026 and an operational test of an airborne drone detection technology that is in development. Overall, the funding will address four R&D focus areas that encompass 24 different efforts in the C-UAS Capability Development Roadmap. The four R&D focus areas are: 1) Defense Chain Effectiveness, 2) Interoperability and Operational Coordination, 3) Deployment and Interagency Coordination, and 4) New and Emerging CUAS Technologies and Systems Engineering.

These activities will ensure safe integration and testing of C-UAS in national airspace in accordance with 6 U.S.C 124n, assist DHS Components (such as Federal Protective Service (FPS), CBP AMO, CBP USBP, USCG, USSS, and Transportation Security Administration (TSA)) in defending the Nation from current sUAS threats by providing RDT&E of available C-UAS technologies, and RDT&E of new and emerging technologies to address DHS Component requirements for countering sUAS threats. FY 2025 will be year four of execution against the five-year capability roadmap plan that is guiding S&T C-UAS program RDT&E.

- **Impact:** Impacts include 1) preparing DHS operational Components for large C-UAS covered events like World Cup 2026, 2) identifying and testing low collateral effect kinetic mitigation technologies applicable to DHS mission sets, 3) incorporating agent feedback from extended user evaluations of person-portable and airborne-based C-UAS prototypes, 4) researching, documenting and recommending C-UAS data protocols to enable inter and intra-agency interoperability, 5) providing an opportunity to test and evaluate C-UAS technologies in an urban environment to optimize system performance and establish data sharing processes for Federal, State and local collaboration when addressing a drone threat and 6) furthering research, test and evaluation into emerging communication methods, like 5G.

Type of Research

Developmental

Technical Readiness Level

TRL varies for specific portfolio projects between TRL-5 and TRL-7. C-UAS solutions are tested and evaluated in the operational environment (TRL-7) prior to transition. Some milestones do not have TRL's associated with them because they are knowledge products/artifacts.

Transition Plans

- Transition C-UAS systems from prototype pilots into operational systems to be used by DHS Components for protection of high priority facilities or assets as designated by the Secretary of DHS.
- Incremental C-UAS improvements based on the capability gaps identified by the 2019 validated C-UAS CAR will be folded into C-UAS pilot systems in preparation for transition.
- Provide program knowledge product artifacts such as market research, test results, operational assessment reports, and draft operational requirements reports to DHS Components to assist with their C-UAS procurement or acquisition activities.
- Transition initial Cyber testing methodologies and processes developed to assess security posture of C-UAS systems.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2023			
Developed a market survey report for C-UAS technologies that can detect and possibly exploit advanced command and control links (e.g., 5G).	FY 2023 Q1	FY 2023 Q4	N/A
Developed a report on passive radar capability to detect, track, and identify sUAS.	FY 2023 Q1	FY 2023 Q4	N/A
Developed and tested modular, rapid roll-on roll-off detect, track, identify, and mitigate prototype capability for departmental response.	FY 2023 Q1	FY 2023 Q4	6
Developed and tested prototype web-based tool for use by Cybersecurity and Infrastructure Security Agency (CISA) to analyze the vulnerability of critical infrastructure to threats posed by sUAS.	FY 2022 Q1	FY 2023 Q4	6
Modified and tested existing DHS prototype systems for DHS interoperability with another partner agency.	FY 2023 Q1	FY 2023 Q4	6-7
Tested and assessed C-UAS detect, track, identify, and mitigated capability against multiple sUAS simultaneously.	FY 2023 Q1	FY 2023 Q4	6
Tested detection and mitigation of non-emitting sUAS.	FY 2023 Q1	FY 2023 Q4	6
FY 2024			
Conduct Low Collateral Kinetic Mitigation Test Event Two.	FY 2024 Q1	FY 2024 Q4	N/A
Document test results from long-range passive radar testing and provide to DHS Components.	FY 2024 Q1	FY 2024 Q4	6
Initiate airborne C-UAS integration process for DHS Component specified aircraft or unmanned platform.	FY 2024 Q1	FY 2024 Q4	N/A
Integrate disparate person-portable technologies for enhanced detect, track, and identify.	FY 2024 Q1	FY 2024 Q4	6
Test Automated threat chain execution with remote identification data.	FY 2024 Q1	FY 2024 Q4	6
Deliver the Web-based Flight Restriction tool to CISA.	FY 2024 Q1	FY 2024 Q4	7

Research, Development, and Innovation – PPA

Border Security Thrust Area

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2025			
Conduct a C-UAS event focused on the World Cup 2026 scenario involving C-UAS authorized DHS Components.	FY 2025 Q1	FY 2025 Q4	6
Execute test of innovative technologies focused on emerging threats such as those that use cellular communications links.	FY 2025 Q1	FY 2025 Q4	5
Execute test to evaluate drone detection, tracking, and identification from an airborne platform.	FY 2025 Q1	FY 2025 Q4	6
Integrate drone remote identification data feed into C-UAS situational awareness tool, Team Awareness Kit (TAK).	FY 2025 Q1	FY 2025 Q4	6
Integrate long-range passive radar into C-UAS situational awareness tool, TAK.	FY 2025 Q1	FY 2025 Q4	6
Test and evaluate integrated system with data fusion of disparate C-UAS data feeds.	FY 2025 Q1	FY 2025 Q4	5

Forensic and Criminal Investigations Program – S&T established the Forensics and Criminal Investigations Program to assist DHS and other law enforcement partners with research and development of tools and technologies that can be applied across multiple mission and application areas for Federal, State, and local law enforcement. It is imperative for DHS and other law enforcement partners to have the necessary investigative tools to automatically recognize, collect, ingest, process, analyze, and share information to disrupt and dismantle criminal activity quickly and to safeguard our citizens and the Nation from threats.

Combating Fentanyl/Opioid Abuse

- **Problem:** The final report of the Commission on Combating Drug Addiction and the Opioid Crisis recognized challenges that limit DHS’s ability to disrupt the flow of synthetic opioids, like fentanyl, that cross U.S. land, sea, and air borders, including international mail. The top challenges faced by DHS Components is the interdiction of opioids, which can be trafficked in very small or dilute quantities, and the discovery and disruption of Transnational Criminal Organizations (TCOs)/Drug Trafficking Organizations (DTOs), criminal networks, and individuals who support illicit manufacturing and trafficking of synthetic opioids and precursor materials. DHS Components, and law enforcement partners, have identified critical needs for advanced technologies to aid in their missions to target, investigate, and dismantle illicit opioid and other narcotic trafficking into the United States.
- **Solution:** In coordination with DHS Components, S&T is developing a layered set of solutions enabling the fusion and analysis of data through advanced analytics which can be deployed rapidly within existing operational environments. To enable agile and responsive support to DHS counter-narcotics and supply chain disruption missions, S&T will pursue an iterative, integrated developmental approach and operational assessments. S&T will deliver capabilities to increase disruption of TCOs/DTOs through the development of analytics, such as deep learning algorithms for decision support, data visualization, and pattern recognition, to exploit available data (e.g., dark web commerce, cryptocurrency transactions, communications) and fuse information with other investigative holdings to discover and disrupt criminal networks and the activities they conduct.
- **Justification:** The FY 2025 Budget provides \$6.8M for this project, which is a \$6.8M increase over the FY 2023 Enacted. This funding will support the development of analytic capabilities and software tools to aid investigators in collection and analysis of evidentiary data to identify, dismantle, and prosecute criminal drug distribution networks. This funding will support transition and implementation of developed capabilities into operational environments to support Component efforts to combat drug trafficking.
- **Impact:** With the capabilities provided by this project, DHS Components and law enforcement partners will be equipped with advanced and operationally effective detection and investigative capabilities. These new capabilities will enable confident targeting and interdiction of opioids and other narcotics, while also increasing seizure and prosecution rates, to maximize the impact on disrupting drug trafficking into the United States.

Type of Research

Basic, Developmental, Applied

Technical Readiness Level

TRL varies for specific project activities between TRL-2 and TRL-7. This project's R&D efforts typically start by performing a market survey of available COTS and GOTS technology that could be adapted for DHS Component use. Identified technology is then adapted and validated in a laboratory or relevant environment (TRL-4/5). Following successful validation, the most promising solution(s) are then prototyped and evaluated first in a relevant environment (TRL-6) then in an operational environment (TRL-7) prior to transition.

Transition Plans

This project works closely with DHS Components and end-users throughout the development cycle for advanced investigative analytic capabilities. Datasets will be transitioned to DHS Components to enhance current investigative analytic tools. (TRL 2-3)

- As investigative analytic concepts for opioid trafficking investigations mature to alpha-level prototypes (TRL 4-5), they are demonstrated and made available to agents and analysts through the HSI Athena Toolbox.
- Through this platform, a feedback loop is initiated, and formal requirements are derived based on end-user feedback for a given investigative analytic capability, integrated through an iterative development cycle, and deployed as a beta-level prototype (TRL 6-7).
- Following this step, investigative analytic tools are matured further to pre-production versions with an emphasis on graphical user interface, user manuals/training documentation, and a plan for formal integration to operational environments (TRL 7).

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
N/A	-	-	-
	FY 2024		
N/A	-	-	-
	FY 2025		
Develop opioid-related investigative and training analytical capabilities.	FY 2025 Q1	FY 2025 Q4	5-6
Identify procurement pathway for new fentanyl and opioid investigative analytical capabilities.	FY 2025 Q1	FY 2025 Q3	2-6
Identify use cases and scenarios to understand the underlying system architecture and decision processes.	FY 2025 Q1	FY 2025 Q4	5-7
Test and validate Value of Target (VoT) analytics software.	FY 2025 Q2	FY 2025 Q4	5-7
Transition VoT analytics software.	FY 2025 Q3	FY 2025 Q4	5-7

Countering Child Sexual Exploitation and Abuse

- **Problem:** Federal, State and Local law enforcement agencies lack the resources and technologies needed to investigate online child sexual abuse material (CSAM). Also, CSAM investigators may experience adverse psychological effects due to the nature of these investigations. Due to technologies offering greater anonymization for both sellers and buyers, darknet criminal marketplaces have become more popular and law enforcement officials require new forensic tools to combat child sexual abuse. Due to the proliferation of CSAM, investigators are facing a staggering increase in the amount of evidence that must be analyzed while lacking state of the art tools to process and analyze data. According to ICE HSI, there are over 350 million child exploitation images in the current HSI database. New child exploitation cases are growing exponentially with seized images often exceeding 900,000 each week.
- **Solution:** The Countering Child Sexual Exploitation and Abuse project, in coordination with DHS and partner agencies, will design, develop, and integrate new technologies that will enable law enforcement to identify child sexual exploitation and human trafficking by quickly sifting through massive amounts of digital evidence and enable investigators to identify criminal actors as well as illegal financial transactions. The project will also develop image, video, and language analysis tools that will quickly identify victims in large volumes of data. This will speed the pace of investigations while at the same time protecting investigators from the trauma the review of the digital evidence causes in these types of cases. The technology will rescue children and trafficking victims while also assisting with the investigation and prosecution of child predators and human traffickers.
- **Justification:** The FY 2025 Budget provides \$6.7M for this project, which is a \$6.7M increase over the FY 2023 Enacted. It is a new project in FY 2025 and will specifically be used on technologies that will combat child sexual exploitation and human trafficking which is a DHS Secretary and Administration priority. S&T will focus on advanced digital forensics and investigative sciences to expeditiously investigate cases and rescue victims. The project will support the highest priority goals of DHS Components as identified by the S&T requirements integrated product teams.
- **Impact:** DHS Components, State, and local law enforcement will have access to these tools which are suited to the unique demands of child exploitation cases and human trafficking. The integration of these tools in the investigative process will allow investigators to address the current massive case backlog, organize large data sets, extract priority evidence, associate evidence with victims and suspects, and share data with law enforcement partners. This program will help law enforcement to parse massive amounts of data in minutes and provide collaboration space and analytics for investigators to find pertinent conversations, associate images, and videos of victims to perpetrators, and generate standardized lead or referral packages for investigators to disseminate world-wide.

Type of Research

Basic, Developmental, Applied

Technical Readiness Level

Varies per activities between TRL-4 and TRL-7. This project’s R&D efforts typically start by understanding DHS law enforcement needs and priorities then performing a market survey of available COTS and GOTS technology that could be adapted for DHS Component use. Research is conducted when needed and then adapted and validated in a relevant environment (TRL-5). Following successful validation, the most promising solution(s) are then prototyped and evaluated first in a relevant environment (TRL-6).

Transition Plans

Language ID Project: Transition the Language ID Project technology to ICE HSI. FY 2024 will focus on R&D; transitions will begin in FY 2025.
 Livestream Project: Transition a livestream warrant data triage tool to ICE HSI and develop and transition an additional search and data analytics capability. FY 2024 will focus on concurrent R&D and transitions will begin in FY 2025.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
N/A	-	-	-
	FY 2024		
N/A	-	-	-
	FY 2025		
Develop five-year strategy in collaboration with DHS Law Enforcement agencies, other Federal agencies, and international partners.	FY 2025 Q1	FY 2025 Q4	4-7
Expand on the capabilities of current tools in collaboration with ICE. This will include biometric identification, speech/language tools, and tools to combat online sexual exploitation.	FY 2025 Q1	FY 2025 Q4	4-7
Deliver SpeechView Language analysis tool	FY 2024 Q4	FY 2025 Q3	5-7
Iteratively deliver software updates to the Livestream capabilities.	FY 2025 Q2	FY 2025 Q4	4-7

Digital Forensics

- **Problem:** Law enforcement officials require updated, current forensic tools to combat criminal activity. Due to technologies offering greater anonymity for both sellers and buyers, darknet criminal marketplaces have become increasingly more popular. In addition, evolving technology allows for evidence distribution among new devices and networks. Law enforcement must have the tools to respond to this evolving criminal activity.
- **Solution:** This project will provide agents with the ability to dramatically speed up the process of initial evidence triage. The tools developed within the project will allow investigators to visualize new data to investigate and use anti-encryption methods against transnational and financial crimes; identify unlawful evasion of US Foreign Investment Screening and Export Controls, and the entire spectrum of criminal activity investigated by DHS and other law enforcement partners related to computer forensics. Additionally, this project will identify new techniques and entities involved in undermining US trade rules, which would inform the DHS's enforcement and intelligence missions.
- **Justification:** The FY 2025 Budget provides \$3.8M for this project, which is consistent with the FY 2023 Enacted. The funding for this project will provide research & development of digital forensics tools to fill high priority gaps for DHS law enforcement operations. Specifically, S&T will focus research on digital analytic automation to provide tools that will drastically reduce the amount of time it takes and analyst to conclude a case. In addition, funds will further develop, assess, and integrate innovative digital forensics tools for forensic law enforcement applications.
- **Impact:** This project will provide agents with the ability to dramatically speed up the process of initial triage. The subsequent necessary forensic deep dive and analysis of evidence will increase an investigators effectiveness. The tools developed within the project will allow investigators to visualize new data to investigate and use anti-encryption methods against transnational and financial crimes; identify unlawful evasion of U.S. Foreign Investment Screening and Export Controls, and the entire spectrum of criminal activity investigated by DHS and other law enforcement partners related to computer forensics. Additionally, this project will identify new techniques and entities involved in undermining U.S. trade rules, which would inform the DHS's enforcement and intelligence missions.

Type of Research

Developmental

Technical Readiness Level

Varies per activities between TRL-4 and TRL-7. This project's R&D efforts typically start by performing a market survey of available COTS and GOTS technology that could be adapted for DHS Component use. Research is conducted when needed and then adapted and validated in a relevant environment (TRL-5). Following successful validation, the most promising solution(s) are then prototyped and evaluated first in a relevant environment (TRL-6).

Transition Plans

S&T plans to transition media tools, anti-encryption, models, technology prototypes, and knowledge products to enhance the ability of DHS Law Enforcement Components to perform their mission.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2023			
Assessed feasibility of expanding livestream capabilities to other social chat applications.	FY 2023 Q1	FY 2023 Q4	4-6
Developed livestream scraping capabilities to increase the automation of historically manual processes.	FY 2023 Q3	FY 2023 Q4	4-6
Researched livestream scraping capabilities to develop these capabilities.	FY 2023 Q1	FY 2023 Q2	4-6
Researched the use of computer vision (Language ID) for livestream capabilities.	FY 2023 Q1	FY 2023 Q4	4-6
FY 2024			
Develop & integrate analytic framework/Applications Program Interface, including the Open Media Processing Framework to perform content detection and extraction on bulk multimedia for LiveStream Forensic Tools	FY 2024 Q1	FY 2024 Q4	5-6
Develop bulk data evaluation capabilities to triage/assess/analyze massive datasets.	FY 2024 Q1	FY 2024 Q4	4-7
Develop use cases for advanced adaptive forensic tools.	FY 2024 Q1	FY 2024 Q2	4-7
Initiate advanced adaptive forensic capabilities to address use cases.	FY 2024 Q2	FY 2024 Q4	4-7
Integrate bulk data evaluation capabilities into operational environment.	FY 2024 Q3	FY 2024 Q4	4-7
Provide Natural Language Processing RDT&E to assess and implement enhanced text processing capabilities focused on (1) Optical Character Recognition and (2) Summarization for the Speech and Language Forensic Tools.	FY 2024 Q1	FY 2024 Q4	4-5
Simplify the process of adding additional language translation capabilities to support the Speech and Language Forensic Tools with back-end coding.	FY 2024 Q2	FY 2024 Q4	5-6
FY 2025			
Develop and integrate software and hardware reverse engineering for Computer Forensics.	FY 2025 Q1	FY 2025 Q4	5-6
Develop solutions to address encryption in digital investigations	FY 2025 Q1	FY 2025 Q4	4-7
Develop Dynamic Scripting Solutions for Computer Forensics.	FY 2025 Q1	FY 2025 Q4	4-7

Illegal Immigration Investigations

- **Problem:** The number of encounters at the southwest border has been steadily increasing and Immigration and Custom Enforcement’s Enforcement and Removal Operations (ICE-ERO) works around the clock to process the flow at the border. ERO is in collaboration with the Departments of Health and Human Services, Justice, and State in a whole-of-government effort to address the current situation at our southwest border and institute longer-term solutions to irregular migration from countries in our hemisphere that are suffering worsening conditions. There are areas within ERO’s mission space that require system modernization and implementation of new technologies and/or methods to provide efficiencies in the ERO processes.
- **Solution.** Continued enhancement of ERO’s integration of the on-demand forecasting model that incorporates policy-driven and external data sets, to inform resource requirements and leadership decision making processes; additional R&D and development will be needed to further enhance ERO’s capability, will be developed and integrated into ERO’s operational environment. This request will support continuous development and implementation of technology that will support analyses and predictive models to answer operational questions at the Component.
- **Justification:** The FY 2025 Budget does not include funding for this project. The work that was being done in this project is realigned under Combatting TCO project beginning in FY 2025.
- **Impact:** ERO is helping to keep the U.S. borders secure, while humanely applying and enforcing immigration laws. Upon successful completion of this project, S&T will have identified systems and/or methods to aid ERO in its implementation of immigration processes, and technology solutions that can further aid in preventing detention.

Type of Research

Developmental

Technical Readiness Level

S&T anticipates the TRL will vary between TRL-5 and TRL-7. Following a FY 2022 market survey of available COTS and GOTS technology that could be adapted for ICE’s use, identified technologies will be adapted and validated in a relevant environment (TRL-5). Upon successful validation, the most promising solution(s) will then be prototyped and evaluated first in a relevant environment (TRL-6) then in an operational environment (TRL-7) prior to transition. Examples that support the R&D milestones detailed below:

- Perform a market survey of technologies that could be adapted for ICE use to be validated in a relevant environment (TRL-5).
- Perform technology demonstrations & evaluations of system prototypes in a relevant environment (TRL-6).
- Apply R&D to bring identified solution paths in line with ICE’s specific requirements.

Transition Plans

S&T plans to transition to ICE the resultant analyses, models, technology prototypes, and knowledge products to enhance the ability of ERO to perform their mission.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Conducted comprehensive analysis to determine scenarios and policies to inform mod/sim tool.	FY 2023 Q2	FY 2023 Q4	6-7
Initiated the development of the modeling and simulation tool for ICE-ERO mission space.	FY 2023 Q3	FY 2023 Q4	6-7
Validated toolset to be utilized to prototype in relevant environment with ICE-ERO.	FY 2023 Q2	FY 2023 Q4	5
	FY 2024		
Finalize the modeling and simulation tool for ICE-ERO mission space.	FY 2024 Q1	FY 2024 Q2	6-7
Integrate the modeling and simulation tool into ICE-ERO mission space.	FY 2024 Q2	FY 2024 Q4	6-7
Transition Modeling and Simulation Modules to ICE-ERO.	FY 2024 Q3	FY 2024 Q4	6-7
	FY 2025		
N/A	-	-	-

Transnational Organized Crime and Counter Networks

- **Problem:** Transnational Organized Crime (TOC) networks and actors operate over wide geographic areas and are only effectively combated by a team approach that is equally diverse, agile, and generally not co-located. DHS Components (I&A, ICE HSI, CBP, and USCG) require a fabric of connected purpose-built data systems and forensic tools that enable an enterprise-wide data sharing capability with a centralized data analytics platform to facilitate and encourage collaboration across DHS. Current forensic tools are standalone tools that do not contain the opportunity to benefit from artificial intelligence and machine learning (AI/ML), which drastically increases the performance of these tools for law enforcement applications.
- **Solution:** The S&T Combatting TCO project partners with DHS operational stakeholders to develop forensic tools and a central unified framework that encourages collaboration and includes using AI/ML technology, providing digital media exploitation capabilities designed to automate and augment current manual processes. The initial target of this work will be crimes involving human trafficking, forced labor, financial crimes, and child sexual exploitation. The TOC work will leverage digital forensic tools and apply AI/ML, which will drastically increase the performance of those tools and move from manual to automated processes for operational end users. S&T will use R&D work from law enforcement partners and the intelligence agencies and apply AI/ML, which will increase tool performance. TOC work will bring the current standalone digital forensics tools to an enterprise level on collaboration platforms including ICE HSI's Repository for Analytics in a Virtualized Environment (RAVEN). New capabilities will include computer vision for object and activity detection, information fusion for entity resolution, automate data schema generation and tagging to move into the classified environment, and place tools in a central platform for interagency tactical collaboration.
- **Justification:** The FY 2025 Budget provides \$10.5M for this project, which is a \$5.5M increase over the FY 2023 Enacted. Based on DHS Law Enforcement high-priority requirements, S&T's strategic approach will significantly bolster DHS Law Enforcement's capabilities, enabling them to effectively dismantle transnational criminal networks that pose threats to national security and public safety. The funding will provide SME to further develop, test, and integrate investigative science technologies including digital forensics, identity resolution, behavioral science, and document and media exploitation; applying AI/ML to increase performance of these technologies for operational end users. This research work focuses on developing tools that use AI and ML to counter TOC, specifically targeting crimes of Human Trafficking, Forced Labor, and Child Sexual Exploitation for the DHS enterprise. S&T SMEs will evaluate operational data and further develop forensics tools that will automate current manual processes, provide data link analysis, and apply analytics and media exploitation saving countless hours of time and provide agents with more leads for TOC investigations that are impossible to otherwise obtain.
- **Impact:** The S&T Combatting TCO project enables DHS to leverage new forensic tools that take advantage of data sharing capabilities that encourage a unified approach to combat global TOC. These new forensic tools and data sharing capabilities will close the operational gap using a central data hosting, analytics, and collaboration platform where agents can access new vital forensic that utilize AI/ML and share discoveries, theories, and analysis.

Type of Research

Developmental

Technical Readiness Level

This project's R&D efforts will start by performing a market survey of available COTS and GOTS technology that could be adapted for DHS Component use. Identified technology will then be adapted and validated in a relevant environment (TRL-5). Following successful validation, the most promising solution(s) will be prototyped and evaluated first in a relevant environment (TRL-6) then in an operational environment (TRL-7) prior to transition.

Transition Plans

- As a 5-year endeavor, this project focuses on R&D with spiral development (iterative phased development process designed to build upon lessons learned and enhancements gleaned from previous iterations) in unison with DHS Components that culminates in DHS Components piloting, testing, and integrating forensic tools and data sharing capabilities. All analyses and prototyped tools and capabilities will be transitioned to the DHS Component.
- Technology transitions that begun in FY 2024 will continue into FY 2025.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Developed and applied AI/ML to new and novel investigative tools to automate current manual processes to counter transnational organized crime.	FY 2023 Q1	FY 2023 Q4	4-5
Developed automated tools to aide in ground truthing data sets.	FY 2023 Q1	FY 2023 Q4	4-5
Tested forensic algorithms against operational data to determine delta in performance.	FY 2023 Q1	FY 2023 Q4	5-6
	FY 2024		
Adjust and enhance software based on ICE HSI feedback, i.e., scalability, user interface enhancements & search algorithm and analytics efficiencies.	FY 2024 Q2	FY 2024 Q4	4-6
Develop and apply AI/ML to new and novel investigative tools to automate current manual processes to counter transnational organized crime.	FY 2024 Q1	FY 2024 Q3	4-6
Test forensic algorithms against operational data to determine delta in performance.	FY 2024 Q1	FY 2024 Q4	4-6
Transition digital forensics tools to HSI Innovation Lab.	FY 2024 Q1	FY 2024 Q4	4-7
	FY 2025		
Implement research and development conducted by intelligence agencies into digital forensics tools and apply AL/ML to increase tool performance.	FY 2025 Q1	FY 2025 Q4	5-7
Integrate and use computer vision for object and activity detection, voice semantic analytics, natural language processing of unstructured text documents, and information fusion for entity resolution.	FY 2025 Q1	FY 2025 Q4	5-7
Integrate AI/ML technology into digital media exploitation capabilities on existing tools.	FY 2025 Q1	FY 2025 Q4	5-7

Immigration Services Program – This program develops technologies for U.S. Citizenship and Immigration Services (USCIS) to meet their goals to provide efficient adjudication of all applications and petitions for immigration benefits, enhance integrity of legal immigration information technology (IT) systems, and provide trusted and timely immigration, employment, and identity information through a culture of efficiency and creativity.

Immigration-Based Technologies

- **Problem:** Immigration focused DHS Components require technology improvements to ensure the accurate and timely distribution of immigration benefits; promote the lawful assimilation of immigrants into American society; and detect, deter, and mitigate human trafficking, smuggling, and threats to the immigration system; and address the root causes of migration. Without these capabilities, the increasing demand on the immigration system will require extensive efforts to properly adjudicate and thoroughly review applicants while leaving the system open to emerging threats.
- **Solution:** This project enhances USCIS’s ability to efficiently resolve applications and petitions for immigration benefits, take timely action on related ancillary applications and other assigned product lines, provide direct customer service, maintain the accuracy and integrity of immigration information, ensure the integrity of the immigration system, and provide timely assistance to applicants, petitioners, and beneficiaries. The project will also assess data through the collection of information from encounters at U.S. borders related to motivators for unauthorized immigration.
- **Justification:** The FY 2025 Budget provides \$1.5M for this project, which is consistent with the FY 2023 Enacted. The program’s goal is to provide technology and knowledge products that enhance the efficiency and integrity of immigration services and activities.
- **Impact:** Automation of current immigration interview and documentation processes will: 1) enhance USCIS’s ability to process immigration benefit applications/petitions, 2) enhance their ability to identify fraudulent immigration applications/petitions, 3) reduce applicant backlogs, 4) improve USCIS staffing efficiency, and 5) improve customer throughput and satisfaction.

Type of Research

Developmental

Technical Readiness Level

TRL varies for specific project activities between TRL-5 and TRL-7. This project's R&D efforts typically start by performing a market survey of available COTS and GOTS technology that could be adapted for DHS Component use. Identified technology is then adapted and validated in a relevant environment (TRL-5). Following successful validation, the most promising solution(s) are then prototyped and evaluated first in a relevant environment (TRL-6) then in an operational environment (TRL-7) prior to transition. Examples from the R&D milestones detailed below:

- Conducted market research to identify areas of R&D investment to enhance the efficiency and integrity of USCIS's execution of its statutory responsibilities (TRL-5).
- Perform system evaluations and test proposed solutions (TRL-6).

Transition Plans

S&T plans to transition to DHS Components analyses, models, technology prototypes, and knowledge products to:

- Enhance the integrity of the immigration system.
- Support efficient adjudication of all applications and petitions for immigration benefits.
- Provide the ability to maintain accuracy and integrity of immigration information; and,
- Ensure timely assistance to applicants, petitioners, and beneficiaries.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Defined Study objectives, documented activities and developed schedule.	FY 2023 Q1	FY 2023 Q1	7
Delivered a technology roadmap that identified USCIS-S&T R&D multi-year engagement plan.	FY 2023 Q3	FY 2023 Q4	6-7
Developed Operational and System Architectures to identify and document Immigration Benefit processing workflow.	FY 2023 Q1	FY 2023 Q4	6-7
Evaluated technology and non-technology solutions to fill capability gaps.	FY 2023 Q2	FY 2023 Q4	6
	FY 2024		
Assess push-pull factors of migration for DHS Office of Policy.	FY 2024 Q2	FY 2024 Q4	5-6
Conduct statistical analysis for visa overstays for DHS Office of Policy.	FY 2024 Q3	FY 2024 Q4	5-6
Develop Cycle Time metrics and goals for USCIS operational workload.	FY 2024 Q1	FY 2024 Q4	5-6
Initiate high priority activities identified in R&D Roadmap.	FY 2024 Q2	FY 2024 Q4	6-7
Recommend activities that will address gaps identified by the R&D roadmap, both as short and long-term development projects.	FY 2024 Q1	FY 2024 Q4	6-7
	FY 2025		
Execute high priority activities identified in the USCIS Technology and Process Roadmap.	FY 2025 Q1	FY 2025 Q4	5-6

Maritime Safety and Security Program – This program develops and transitions technical capabilities that enhance U.S. maritime border security by safeguarding lawful trade and travel, helps to prevent illegal use of the maritime environment to transport illicit goods or people and enhance safety and resilience of the maritime transportation system.

Integrated Multi-Domain Enterprise (IMDE)

- **Problem:** The current DHS IT enterprise suffers from a highly siloed architecture and Component-centric operational environment. In addition to functional limitation, a lack of a common operating language between stakeholders limits their system interoperability. Though DHS Components share some mission responsibilities, information sharing remains a barrier between agencies. A solution is needed that will upgrade existing capabilities into a maritime Information Sharing Environment that integrates a variety of networks to enabling improved information sharing and interoperability across DHS and authorized Federal, State, local, tribal, international, public, and private regional partners (FSLTIPP) to provide:
 - Broader access to common and federated data.
 - Synchronized domain and situational awareness for maritime and operational intersection with air and land.
 - Enhanced ability to share unclassified//For Official Use Only (FOUO)//Law Enforcement Sensitive (LES) data at a national/regional/tactical level and ensure the flow of information to the intelligence community to improve analysis and intelligence products; and
 - Improved ability to connect unclassified operational and intelligence systems, data sources and sensors, and applications-based functionality using common standards and repeatable integration patterns.
- **Solution:** Through the earlier Integrated Multi-Domain Enterprise project, S&T developed, demonstrated, and transitioned an enterprise information-sharing system that works with sensor data and communications. The next steps are to develop capabilities that improves USCG, CBP, and authorized FSLTIPP ability to identify objects and dark vessels in U.S. territorial waters, allowing them to share real time operational information.
- **Justification:** The FY 2025 Budget provides \$0.5M for this project, a \$2.1M decrease from the FY 2023 Enacted. The project will be transitioning to Headquarters Joint Program Office of the Office of the Chief Information Officer (OCIO). The Joint Mission Need Statement for HSE Information Sharing, JRC, sponsored by USCG and CBP, documented the need for an enhanced operational-level capability. This project will develop collaboration tools for FSLTIPP, a partner agency shared tactical exchange, shared services for infrastructure management, and mobile applications for access to Marine Information for Safety and Law Enforcement and recording inspection data.
- **Impact:** Multi Domain Information Sharing will provide stakeholders with the capability to work more efficiently in the field from, for example allowing USCG cutters and CBP operations to coordinate threat information to direct interdiction efforts. The ability to communicate and pass data of additional forms (not just sensor data, but tactical data and collaboration tools) will improve awareness and collaboration with the different maritime partners. Improved data visualization tools will assist law enforcement to analyze and action multiple sources of information. Greater data fidelity will allow for more efficient deployment of maritime assets.

Type of Research

Applied, Developmental

Technical Readiness Level

TRL varies between TRL-4 and TRL-7 depending on activity. This project's R&D efforts started by performing a requirements analysis and solution scoping effort to determine the technical requirements needed for this project. The stakeholder systems will be evaluated for security requirements to allow for cross platform use. When the security requirements have been reconciled across user bases, system interoperability will be evaluated in a virtual test environment (TRL-4/5). To aid interoperability, the project will develop an ontology library which will create a common operating language across stakeholder agencies. Once validated, the stake holder agencies will allow users to access the interoperable system with controlled groups in an operational setting to receive feedback and refine the system's capabilities (TRL-6/7).

Transition Plans

RDT&E in this program is aligned to the needs of the DHS IMDE program office, under the OCIO Chief Data Officer Directorate and with CBP, USCG, and ICE as the program line of business owners. Transition will be executed according to the needs of each stakeholder. This includes providing the Component customer with user guides and operational information to facilitate technical support transition and an ontology library to standardize the language used between systems.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Conducted technology scouting for operational enterprise services, as prioritized.	FY 2023 Q2	FY 2023 Q4	4-6
Developed first set of Integrated Multi-Domain Enterprise IMDE service test fixtures and test data (service TBD as prioritized).	FY 2023 Q2	FY 2023 Q4	6-7
Developed test plan to support initial operational capability.	FY 2023 Q2	FY 2023 Q4	5-7
Implemented IMDE Test Environment.	FY 2023 Q2	FY 2023 Q4	6-7
	FY 2024		
Deliver knowledge product report providing an Analysis of Alternatives of operational data service candidate.	FY 2024 Q1	FY 2024 Q4	4-6
Deliver Test and Evaluation Master Plan knowledge product to Component partner.	FY 2024 Q1	FY 2024 Q4	N/A
Initiate new operational information sharing service R&D activity.	FY 2024 Q1	FY 2024 Q4	4-6
Transition S&T IMDE support to OCIO technical and cyber security teams.	FY 2024 Q2	FY 2024 Q4	N/A
	FY 2025		
Deliver ontology library and support materials to CBP.	FY 2024 Q1	FY 2025 Q1	N/A
Kick off Minerva Visualization and Tasking project.	FY 2025 Q1	FY 2025 Q4	N/A

Port and Coastal Surveillance

- **Problem:** DHS lacks continuous, persistent awareness of maritime surface, subsurface, and low flying objects which may be carrying out unlawful activities in United States territorial waters out to the Economic Enforcement Zone. Maritime surveillance is still largely dependent on air and surface patrols and there is only partial coverage along U.S coastlines. There is a need for updated maritime domain awareness sensors, platforms, algorithms, and other related tools to detect, track, recognize, classify, and identify specific vessels and activities to aide operators in identification of vessels or threats and prioritization of threats for potential interdiction. DHS needs more comprehensive sensor coverage across the maritime environment to reduce manpower requirements, increase efficiency, and lower response times to interdict illicit maritime activities.
- **Solution:** With the Enhanced Maritime Characterization Project, S&T will invest in research & development of sensors, platforms, algorithms, and other solutions to aide classification and Persistent Wide Area Maritime Surveillance (PWAMS) identification of specific vessels, unlawful behaviors, or threats, and provide additional information to assist with prioritization of threats for potential interdiction. These solutions will be leveraged to further Maritime Domain Awareness for compliant and noncompliant vessels and increase our ability to detect, deter, interdict, and investigate illegal maritime activities. The Enhanced Maritime Characterization Project will coordinate closely with DHS Components and maintain market awareness of the latest sensor and processing solutions to identify appropriate RDT&E investments.
- **Justification:** The FY 2025 Budget provides \$1.5M for this project, which is consistent with the FY 2023 Enacted. The funding for this project will support the following areas: Wide Area Maritime Surveillance (including PWAMS) and dark vessel detection; algorithm investments to enhance classification at the Sensor System for imaging sensors across platforms.
- **Impact:** With funding, sensor and surveillance enhancements will increase geographic coverage, enable or enhance subsurface sensing, increase the quality of information to enable vessel and behavior recognition and identification, provide real-time recognition of both compliant and non-compliant vessels, and assist with identifying and prioritizing threats.

Type of Research

Developmental, Applied

Technical Readiness Level

TRL varies between TRL-3 and TRL-7, depending on the activity. Generally, the activities exist either in laboratory or as products intended for another use or in other relevant environments, but with modification can be applied to maritime security uses (e.g., dark vessel detection, multisensory fusion) which would be TRL 6 or 7.

Transition Plans

Candidate Maritime Domain awareness (MDA) enhancing technologies will be identified, acquired, modified, integrated, and assessed according to DHS Components needs and in coordination with their requirements and acquisition offices. Products such as advanced algorithms and sensors may be transitioned to DHS Components directly as prototypes where suitable. In all cases, preliminary requirements, operational concepts, user instructions, employment procedures, assessments, and other relevant documents will be provided to the Component stakeholders to inform acquisition decisions or further modification or assessment.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Assessed one or more Maritime Domain Awareness sensor technologies in the Puget Sound Region.	FY 2023 Q3	FY 2023 Q4	5-7
Assessed one or more sensor technologies in the Southern California region.	FY 2023 Q2	FY 2023 Q4	4-6
Delivered assessments, and technical, test, and demonstration reports on selected technologies to USCG to benefit USCG operations.	FY 2023 Q1	FY 2023 Q4	6-7
Demonstrated one unmanned maritime vehicle sensor system capabilities.	FY 2021 Q1	FY 2023 Q3	6
Developed a Plan of Action and Milestone - A written plan for a study, assessment, laboratory, or field tests of technologies to benefit USCG.	FY 2023 Q1	FY 2023 Q4	5-6
Informed acquisition strategy for USCG Unmanned Systems.	FY 2022 Q3	FY 2023 Q4	3-6
MDA Sensors: Disposed of MDA sensors and/or made available, as appropriate.	FY 2023 Q3	FY 2023 Q4	6-7
Transitioned or disposed of unmanned maritime vessels and payloads.	FY 2023 Q3	FY 2023 Q4	6
	FY 2024		
Initiate enhanced object detection and identification R&D activities.	FY 2024 Q1	FY 2024 Q4	4-7
Initiate new wide area maritime surveillance R&D activities.	FY 2024 Q1	FY 2024 Q4	4-7
	FY 2025		
Acquire and test sensors for PWAMS requirements.	FY 2025 Q1	FY 2025 Q4	4-7
Assess maritime object detection models and algorithms to detect unknown vessels and objects in the water.	FY 2025 Q1	FY 2025 Q4	4-7
Develop and test algorithms to automate classification and identification of Targets of Interest.	FY 2025 Q1	FY 2025 Q4	4-7

Port and Waterway Resiliency

- **Problem:** The modern U.S. Maritime Transportation System (MTS) is rapidly evolving, driven by industry demand and technological innovation. However, the USCG relies on limited, legacy computer-based tools to monitor port and waterway health and aids to navigation (which support the safe navigation of government and commercial ships including autonomous vessels) efficiently and effectively. Due to the rapidly changing technological environment impacting the MTS and evolving commercial activity (the MTS role in the economy has grown to include renewable energy, commercial space launches, and autonomous vessel traffic for example). As the MTS evolves with the growing size and number of vessels, new challenges and threats have emerged requiring greater understanding and visibility of river conditions, aids to navigation, and the cyber infrastructure that supports it. To address the changes occurring in the MTS, the USCG must modernize its regulatory framework, update its concept of operations (CONOPS) and technical capabilities to strengthen cyber security across the MTS which will mitigate risk and improve and improve the safety and security of commercial vessels, such as cruise liners, shipping and cargo vessels, and private and recreational craft. To help ensure safe travel in U.S. territorial waterways, the USCG is also in need of modern, versatile capabilities to aid in mass and ice rescue operations.
- **Solution:** S&T is developing and transitioning port and waterway resiliency analytical visualization tools, data, and technologies to provide USCG waterway managers with more effective and user-friendly capabilities to prepare for, mitigate, respond to, and recover from an incident or disaster affecting the MTS; to investigate existing and emerging technologies to enable remote monitoring and inspection of waterway infrastructure; and to investigate and develop risk mitigation strategies and technical solutions for USCG to consider in ensuring safety and security of the public, commerce, and trade. Further, S&T will develop, test, and research new devices with the objective of amplifying USCG capabilities in the execution of search and rescue operations over extended periods and in extreme weather conditions.
- **Justification:** The FY 2025 Budget provides \$0.5M for this project, which is a \$0.5M increase over the FY 2023 Enacted. This project will conduct research and development into directed energy devices to interdict noncompliant vessels and unmanned systems entering restricted areas or otherwise engaged in illegal activity. Additionally, S&T will develop applications for portable devices to communicate with vessels approaching restricted areas and continuing to develop waterway mapping tools to improve situational awareness for law enforcement and the public.
- **Impact:** Impacts include: 1) enhanced safety and economic security of maritime ports and waterways, 2) improved situational awareness and understanding of waterway criticality, 3) enhance decision-making for more efficient/effective resource allocation to keep ports and waterways open, and 4) improved aids to navigation capabilities allowing for safer and more efficient waterway travel on commercial waterways.

Type of Research

Applied and Developmental

Technical Readiness Level

- TRL varies between TRL-4 and TRL-7 depending on activity. This project’s R&D efforts typically start by performing a market survey of available COTS and GOTS technology that could be adapted for DHS Component use. Identified technology is then adapted and validated in a laboratory or relevant environment (TRL-4/5). Following successful validation, the most promising solution(s) are then prototyped and evaluated first in a relevant environment (TRL-6) then in an operational environment (TRL-7) prior to transition.

Transition Plans

With current funding, S&T will develop a prototype directed energy device. S&T plans to transition a portable directed energy prototype to the Component to support their mission interdicting non-compliant vessels. S&T will also work to develop a commercialization plan to make the device available for local law enforcement which may have jurisdiction along U.S. waterways. Further, there is a market for technologies of this type for ships traversing international shipping and sailing lanes. Pirate and other criminal activity threaten commercial shipping in international waters, but international law prohibit civilian vessels from being armed. As a result, there is a market for non-lethal alternatives to protect civilian vessels. S&T will support the development of a commercialization plan to assess the marketability of this technology for use by civilian commercial vessels.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Designed research plan to test commercial port cyber resiliency and USCG related regulatory authorities.	FY 2023 Q1	FY 2023 Q4	N/A
Designed transition plan for new technology to enhance situational awareness of inland waterway aids to navigation and support USCG Marine Transportation Systems Directorate (CG-5PW) mission including support to safe navigation of autonomous vessels.	FY 2023 Q2	FY 2023 Q4	5-7
	FY 2024		
Complete Maritime Navigational Risk Assessment Product Pitch.	FY 2024 Q1	FY 2024 Q2	N/A
Deliver Waterway Management software and data upgrades integration into U.S. Aids to Navigation Information Management System to USCG.	FY 2024 Q1	FY 2024 Q4	4-6
	FY 2025		
Deliver final navigational risk assessment study report to USCG.	FY 2024 Q3	FY 2025 Q2	N/A
Establish requirements for directed energy stopping device with partner.	FY 2024 Q2	FY 2025 Q2	N/A

Remote Maritime Technologies

- **Problem:** DHS enforcement agencies lack the robust and reliable communications in the Arctic area and remote maritime regions necessary to ensure effective Command and Control (C2) of personnel and response assets. This impacts the delivery of time sensitive Intelligence information which enables the response assets to be placed at the right place and right time for mission success. Legacy systems lack the capability and capacity to leverage the proliferation of commercial and government space and near space-based capabilities that can deliver these mission critical capabilities in those maritime regions devoid of infrastructure. Response to safety and security missions in the Arctic increases as these waters become more accessible for commerce and private use and more contested for strategic purposes. To effectively quantify the risk to U.S. waterways, a quantitative and reliable risk assessment capability is needed.
- **Solution:** Viable solution paths leveraging government and commercial space and near-space based capabilities will be leveraged as solutions or key enablers to other capabilities to address critical capability gaps for communications and Search and Rescue (SAR). These development efforts will provide USCG a Shipboard Interior Communications system the ability to receive, secure, manage, and distribute extremely large data streams available from commercial satellite communications systems for effective Command and Control, access to Intelligence, Surveillance, and Reconnaissance data sources not previously accessible, as well as to enable crew morale networks to improve Recruitment and Retention through increased Sea Duty Attractiveness for USCG personnel. Mature commercial space systems will be evaluated and leveraged to support SAR and other missions in the Arctic to improve safety and security in these areas becoming increasingly accessible and utilized for commercial, military, and private purposes. As well as to review the USCG's current maritime risk assessment framework and identify how greater uniformity and quantitative methodologies can be deployed to create a more effective process.
- **Justification:** The FY 2025 Budget provides \$9.6M, which is consistent with the FY 2023 Enacted. Funding for this project will develop, test, and deliver a robust and reliable Shipboard Interior Communications system capable of exploiting the extremely high data rate commercial satellite communications, satellite-based capabilities to augment the USCG Rescue 21 (R21) system in District 17 (D17) and the Arctic, and complete a Maritime Navigational Risk Assessment study to drive an updated risk process leveraging quantitative methodologies.
- **Impact:** Planned activities within this project will address critical USCG capability gaps for SAR as well as other safety and security missions in the Arctic. Capabilities to be developed will significantly increase the USCG's ability to successfully respond to SAR and effect Command and Control of resources in the Arctic as the need increases with the growing volume of vessel traffic as these waters become increasingly more accessible. Increased effectiveness in these missions will enable the safe flow of commerce, safety of navigation, protection of strategic interests, and saving of lives for those who become imperiled.

Type of Research

Applied and Developmental

Technical Readiness Level

TRL varies between TRL-2 and TRL-7 depending on activity. This project's R&D efforts typically start by performing a market survey of available COTS and GOTS technology that could be adapted for DHS Component use. Identified technology is then adapted and validated in a laboratory or relevant environment (TRL-4/5). Following successful validation, the most promising solution(s) are then prototyped and evaluated first in a relevant environment (TRL-6) then in an operational environment (TRL-7) prior to transition. Examples that support the R&D milestones detailed below:

- Assess technologies against realistic use cases to address maritime safety concerns (TRL-5-7).
- Research and evaluate communications technologies to enhance underway cutter connectivity (TRL-4/5/6).
- Perform feasibility assessment of selected space system to prosecute maritime distress alerts.

Transition Plans

- Inform DHS acquisition and implementation of new Shipboard Interior Communications (SIC) systems.
- Inform DHS acquisition strategies for the deployment of remote maritime/Arctic MDA capabilities to support safety and/or security operations.
- Deliver distress alerting capabilities to USCG via service contract (TRL-7).

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Developed R&D Requirements for SIC.	FY 2022 Q1	FY 2023 Q2	N/A
Identified appropriate space-based platform and payload opportunities capable of performing radio frequency geolocation of distress signals supporting USCG District 17 operations.	FY 2022 Q4	FY 2023 Q4	N/A
	FY 2024		
Deliver payload accommodation study for distress alerting capability to USCG.	FY 2024 Q1	FY 2024 Q2	4
Deliver search and rescue prototypes to USCG for testing.	FY 2022 Q4	FY 2024 Q4	4-6
Deliver sustainment cost estimate to USCG for Rescue 21 Augmentation from Space.	FY 2024 Q1	FY 2024 Q2	4
Develop baseline architecture to be validated through iterative Test & Evaluation (T&E) for USCG SIC.	FY 2024 Q1	FY 2024 Q4	2-4
Develop research plan for maritime navigational risk assessment study for USCG.	FY 2024 Q1	FY 2024 Q3	N/A
Perform assessment of public communications infrastructure to inform development and evaluation of prototype capabilities.	FY 2024 Q2	FY 2024 Q4	N/A
	FY 2025		
Complete design and development of payload software to detect and demodulate Channel 70 Digital Selective Calling messages.	FY 2024 Q2	FY 2025 Q2	4
Complete installation of the USCG SIC Lab.	FY 2024 Q4	FY 2025 Q4	6
Complete laboratory verification testing of payload software using spacecraft payload Engineering Development Unit.	FY 2025 Q1	FY 2025 Q4	6
Complete T&E Plan for the USCG SIC Architecture.	FY 2024 Q2	FY 2025 Q3	N/A
Identify candidate technologies for evaluation in the Arctic.	FY 2025 Q1	FY 2025 Q3	N/A

**Chemical, Biological, and Explosive (CBE) Defense Thrust Area
Research and Development**

Technology Readiness Level Exhibit

(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget
Chemical, Biological, and Explosive Defense Thrust Area	\$21,510	\$21,510	\$17,046

R&D Thrust Area Description

CBE DEFENSE THRUST AREA: R&D investments support prevention and protective strategies, as well as the coordinated surveillance and detection of CBE threats. S&T’s R&D includes prevention of terrorism, reduction of vulnerability of critical infrastructure from terrorist attacks and other hazards, and prevention of the illicit movement and illegal entry or exit of people, weapons, dangerous goods, and contraband by providing technology, methods, and procedures to detect CBE threats.

CHEMICAL, BIOLOGICAL, AND EXPLOSIVE DEFENSE THRUST AREA				
<i>(Dollars in Thousands)</i>				
Program	Project	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President’s Budget
Chem-Bio Detection and Defense		\$9,210	\$9,210	\$8,746
	Chem-Bio Threat Surveillance & Detection (formerly Bio surveillance Systems)	\$4,250	\$4,250	\$3,786
	Food, Agriculture and Veterinary Defense (FAV-D)	\$2,800	\$2,800	\$2,800
	Urban Security Initiative	\$2,160	\$2,160	\$2,160
Detection Canine		\$8,300	\$8,300	\$8,300
	Detection Canine Project	\$8,300	\$8,300	\$8,300
Opioid/Fentanyl Detection		\$4,000	\$4,000	-
	Opioid/Fentanyl Detection Project	\$4,000	\$4,000	-
Total – CBE Defense Thrust		\$21,510	\$21,510	\$17,046

Chem-Bio Detection and Defense Program – This program conducts research to assess, prevent, detect, prepare for, respond to, and recover from incidents involving chemical and biological (CB) threats and hazards. This program supports DHS, its Components, and the HSE with risk-awareness, knowledge products, and technical solutions needed to protect the Nation from incidents involving CB hazards by executing and enhancing a portfolio of capabilities and supporting activities to counter CB threats.

Chem-Bio Threat Surveillance and Detection

- **Problem:** Rapid response to CB events of national concern (e.g., a biological/chemical attack or disease outbreak) is critical to saving American lives, protecting critical infrastructure, and safeguarding the U.S. economy. In a CB event, there is a system of systems of required capabilities needed for prompt detection, defense, coordination, and rapid response actions that must occur amongst Federal, State, local governments, and the private sector. The timely detection of, defense against, and confident response to the release and/or exposure from CB events is a critical challenge to DHS Components CWMD, CBP, ICE, TSA and USSS and other Federal, State, local, tribal, and territorial (FSLTT) partners, including the public health and first responder communities.
- **Solution:** S&T will develop cost-effective systems to rapidly detect, defend against, coordinate, and respond to CB events. This will tie first responders' needs to a broader system of systems, that work together and complement each other in a CB incident and will vastly increase operational effectiveness of CB technologies coupled with significant cost savings. Focusing on the implementation, coordination, and development of interoperable systems instead of independent solutions will enable decision makers to receive information more quickly, make actionable decisions in a timely manner, and improve coordinated actions. This program is pursuing a cost-effective approach to an indoor biothreat system of systems using existing COTS or GOTS solutions. Objectives of this system of systems include a) addressing timeliness to detect the release of a biological agent by developing novel sensor/trigger technologies; b) identifying data and data streams to provide early warning situational awareness; c) integrating analytical tools and applying advanced computational techniques to integrate and analyze real-time data, and d) enabling more real-time sharing of information across FSLTT officials.

Funding is paired with ongoing CWMD investments, including detection capabilities that can support rapid response to emerging biothreats; investments in the S&T Probabilistic Analysis of National Threats, Hazards, and Risks (PANTHR) program for expanding and prioritizing the list of existing biothreats to augment existing capabilities; and additional investments by CWMD in information sharing and analytics that provide value to the broader stakeholder community. Efforts are aligned and synchronized to the greatest extent possible to ensure individual efforts result in enduring chemical & biological defensive capabilities across the HSE.

- **Justification:** The FY 2025 Budget provides \$3.8M for this project, a \$0.5M decrease from the FY 2023 Enacted. The funding for this project will continue the following activities:
 - Evaluate COTS and GOTS for chemical, biological, and radiological (CBR) collective protection (COLPRO), and identify technologies that currently, or with refinement, can meet specific mission needs for temporary and permanent indoor spaces, as well as National Special Security Event sites.

- Support horizon scanning of technologies capable of measurement of any aerosol as a potential bio threat/nonthreat. Review studies informing signatures indicative of the classes of aerosols that may be potential threat/nonthreat.
 - Develop a capability to address potential cyanide exposures, including rapid detection and timely responses (such as mitigation and medical countermeasures). This capability will protect first responders on the scene and at casualty care centers to confirm a toxic cyanide exposure occurrence and ensure the necessary appropriate actions are executed post-exposure.
 - Develop an enhanced capability to screen air, surfaces, and other samples effectively and efficiently for the presence of biological threats while in the field to limit the transportation to fixed-site laboratories for analysis.
 - Conduct a R&D study to identify equipment, methods, and vendor sources to increase both the effectiveness and efficiency of mail screening operations to rapidly and reliably detected Chemical, Biological, Nuclear, Radiological, and Explosive (CBRNE) threats.
- **Impact:** Improved capabilities in indoor/outdoor biothreat technologies and systems, maximize fulfillment of end-users' needs (e.g., first responders, law enforcement, emergency management planners) by translating needs into functional capabilities, building critical capabilities into flexible integrated systems, reductions in redundancies of CB efforts across DHS by tracing end-user requirements through strategic level objectives, and improved effectiveness of DHS CB capabilities at a cost savings. Ultimately, this activity is anticipated to develop capabilities that will reduce the amount of time needed to detect a biological incident, limit the spread of contamination and exposure of the population, and enable more rapid responses that will reduce casualties, morbidity, and mortality resulting from a hazardous biological substance.

Type of Research

Applied and Developmental

Technical Readiness Level

The program began at TRL-3 and will end at TRL-7. Two types of projects are performed under this program: (1) development of knowledge products; and (2) technology development to improve chemical and biological threat preparedness and defense. For knowledge projects, first steps typically involve workshops or interviews with SMEs and applicable end users. Technology R&D projects typically start by performing a market survey of available COTS and GOTS technology that could be adapted for DHS Component use. Identified technology is then adapted and validated in a relevant environment (TRL-5). Following successful validation, the most promising solution(s) are prototyped and evaluated in a relevant environment (TRL-6), then in an operational environment (TRL-7) prior to transition.

Transition Plans

With technology development, preference will be given to technologies that have commercial markets beyond Component needs to ensure the availability of an infrastructure to maintain and improve technologies as needed. To ensure successful development, integration, and ultimate transition of the deliverables under this program, individual system components and integrated system will work in coordination with all DHS Components including CWMD, to ensure synchronization & interoperability of efforts while creating an overall cost-savings to DHS.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2023			
Completed requirements gathered in support of a test bed design that assessed vulnerabilities and mitigated chemical/biological risks in building air and water handling systems, and wastewater systems.	FY 2023 Q2	FY 2023 Q4	N/A
Completed technical assessment that evaluated and recommended CBR collective protection technologies for mobile spaces.	FY 2023 Q2	FY 2023 Q2	6
Delivered indoor aerosolized biological particle detection instrument with expanded operational capabilities to test bed for test and evaluation in an operationally relevant environment.	FY 2023 Q2	FY 2023 Q2	4-5
Delivered Transition Technology Readiness Assessment Report prepared by the Office Science and Engineering’s System Engineering and Standards Division for the digital MALDI prototype as a Knowledge Product to Component stakeholders (e.g., CWMD).	FY 2023 Q2	FY 2023 Q1	N/A
FY 2024			
Deliver final Test Plan for T&E of the recommended COLPRO technologies for temporary spaces.	FY 2024 Q2	FY 2024 Q2	N/A
Deliver Literature-Based Analysis presentation of recommended COLPRO technologies for temporary spaces based on the Market Survey and Technology Assessment.	FY 2024 Q1	FY 2024 Q2	N/A
Design, develop, and conduct laboratory testing of, a prototype second generation indoor aerosolized biological particle detection instrument, leveraging lessons learned from development of a first-generation device, with refined hardware that implements a novel mass spectral detection technique.	FY 2024 Q1	FY 2024 Q4	3-4
Deliver a Business Model(s) for an indoor built environment testbed capability to HSE partners.	FY 2023 Q4	FY 2024 Q1	N/A
Deliver an experimental design and development plan for an indoor built environment testbed capability to HSE partners.	FY 2023 Q4	FY 2024 Q1	N/A
FY 2025			
Conduct a R&D study to identify equipment, methods, and vendor sources to increase both the effectiveness and efficiency of mail screening operations to rapidly and reliably detected CBRNE threats.	FY 2025 Q1 Q2	FY 2025 Q4	N/A
Deliver final technical report on COLPRO technologies in temporary spaces.	FY 2025 Q1	FY 2025 Q1	N/A
Develop a rapid detection capability test to address potential cyanide exposures to be used by first responders and casualty care centers, to assist with timely responses post-exposure (such as mitigation and medical countermeasures).	FY 2025 Q1	FY 2025 Q4	5-7
Develop an enhanced capability to screen air, surfaces, and other samples effectively and efficiently for the presence of biological threats while in the field to limit the transportation to fixed-site laboratories for analysis.	FY 2025 Q3	FY 2025 Q4	5-7

Food, Agriculture and Veterinary Defense (FAV-D)

- **Problem:** The United States' food and agriculture section is at significant risk for disruption due to various chemical and biological threats. An outbreak of high-consequence disease, whether caused by current, new, or emerging pathogens and pests could cost the U.S. economy thousands of jobs and billions of dollars - due to loss of ability to export products, decreased availability of food, and the high costs of responding to an outbreak. Some major concerns for disrupting the food and agriculture sector include infectious diseases affecting livestock, such as Foot-and-Mouth Disease (FMD) and African Swine Fever (ASF), pathogens or pests impacting crops/plants, and intentional adulteration of food.
- **Solution:** This project primarily supports Office of Health Security (OHS) and CBP programs and missions to prevent, protect, mitigate, respond to, and recover from catastrophic events affecting the food and agriculture industry and the health and economic security of the U.S. The S&T FAV-D Project leverages S&T in house capabilities such as the Plum Island Animal Disease Center (PIADC), the Chemical Security Analysis Center (CSAC), and PANTHR, as well as external partners to provide data and tools for DHS Components and stakeholders to inform decision making, and develop technologies to prevent, detect, and respond to chemical or biological disruptions to the food and agriculture sector. The technologies developed through the FAV-D project benefit DHS Components, interagency and industry stakeholders, and ensure that the Sector Responsible Agencies (United States Department of Agriculture (USDA) and Department of Health and Human Services (HHS) Food and Drug Administration (FDA)) State, local and tribal and other first responders in the food and agriculture sector, have the countermeasures needed to effectively identify, respond to, and recover from disruptions. In addition to investing in novel technologies for solution products to rapidly respond to and recover from these threats, this project works with commercial animal health industry partners to ensure completion of U.S. regulatory requirements for countermeasures (master-seed, pre-licensing serials, clinical trials) so that they are readily available in an outbreak situation. This project's funding is in addition to that requested by the DHS Chief Medical Officer in the OHS R&D appropriation.
- **Justification:** The FY 2025 Budget provides \$2.8M for this project, which is consistent with the FY 2023 Enacted. The funding will address threats to the food and agriculture sector, such as the current unprecedented outbreak of Highly Pathogenic Avian Influenza, in commercial poultry and wildlife, where 58 million birds have been depopulated in the U.S., as well as an outbreak of ASF close to CONUS.
 - Accelerate the development of next-generation vaccines and other countermeasures to effectively identify, respond to, and recover from sector disruptions.
 - Continue transition that is currently underway for state-of-the-art countermeasures for the highest-priority transboundary animal diseases such as ASF, FMD, and Rift Valley Fever. This will also include new reports to the National Pork Board (NPB) and Swine Health Information Center (SHIC) on the stability of ASF virus in different matrices.
 - Ensure the execution and transition of final PIADC R&D efforts that are expected to close out soon. After the transition effort, the FAV-D program will ensure the continuity of FAV-D-related efforts, in support of DHS Components and the interagency.
 - Focus areas will specifically include foreign animal disease threats to livestock, and pathogens or pests that can impact food and feed crops.
 - Conduct a technical assessment of current plant pathogen detection capabilities.

- Continue partnerships with the PIADC and DHS University COEs to develop and test vaccines to be transitioned for regulatory licensure and acquisition by the National Animal Vaccine and Veterinary Countermeasures Bank (NAVVCB) and National Animal Health Laboratory Network.
 - Identify depopulation, decontamination, and disposal technologies, tools and methods that can be readily transitioned to farms and industries as part of countermeasure development.
 - Initiate research and development technical assessments on crop protection.
 - Identify solutions for diseases, such as Chagas disease, impacting working canines.
- **Impact:** This project strengthens the defense of the U.S. food and agriculture infrastructure, in support of the OHS’s mission to prevent, protect, mitigate, respond to, and recover from catastrophic events affecting the Food and Agriculture industry, by ensuring that DHS components, USDA, FDA, and SLTT first responders have effective countermeasures to respond to disruptions. The S&T FAV-D project’s ongoing efforts to close knowledge gaps and develop multi-pathogen detection and countermeasures will provide faster and more comprehensive protection to limit the spread and size of an outbreak and therefore accelerate recovery. Data from this project will support DHS Components, interagency partners, and industry stakeholders. Technologies developed through this project will increase the availability of new countermeasures to the NAVVCB in the event of a high-consequence disease outbreak in the United States. Ultimately, this project will generate resources to defend the U.S. economy, and Nation, from intentional or unintentional threats to the food, agriculture, and veterinary sector.

Type of Research

Applied and Developmental

Technical Readiness Level

This project funds the development of tools, techniques, and technologies applicable across defense of the food, agriculture and veterinary system including knowledge products, vaccines, laboratory and field deployable diagnostic assays, molecular detection tools, and disinfection and disposal solutions for disease/pest countermeasures, the vast majority of which start at TRL-3 and end at TRL-7.

Transition Plans

- Transition Foreign Animal Disease Countermeasures to the NAVVCB.
- Approved regulatory development package toward approval of a rapid, pen-side, nucleic acid-based diagnostic to prevent, protect, mitigate, respond, and recover from catastrophic events affecting the Food and Agriculture industry test for ASF virus.
- Approved regulatory development package toward approval of an ASF emergency use vaccine.
- Transition tools and techniques assessment results to DHS Components for further action.
- Transition methodologies, countermeasures, and knowledge products to other DHS Components as for application.
- Transition knowledge products to DHS Components (e.g., CBP) for further planning and preparedness.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2023			
Completed validation studies of a rapid, pen-side nucleic acid-based ASF diagnostic test in direct support of USDA.	FY 2021 Q4	FY 2023 Q2	7
Submitted interim reports to the NPB and SHIC on the stability of ASF virus in (i) fecal slurry including time and temperature decay curves (NPB) and (ii) stored soybean oil cake and organic soybean meal (SHIC).	FY 2023 Q1	FY 2023 Q3	5-6
FY 2024			
Conduct landscape assessment of crops of U.S. economic significance associated pathogens, diseases and pests, environmental impact, and defense strategies.	FY 2024 Q1	FY 2024 Q4	3
Conduct landscape identification and assessment of diagnostic tools and techniques applicable to crops and animals in food and agriculture system.	FY 2024 Q1	FY 2024 Q4	3
Conduct R&D to assess strategies for Chagas diagnosis and countermeasures.	FY 2024 Q1	FY 2024 Q4	3
Improve upon the validation study of a rapid, pen-side nucleic acid-based ASF diagnostic test in direct support of USDA.	FY 2024 Q1	FY 2024 Q4	5-7
FY 2025			
Conduct landscape assessment of high-consequence pathogens, diseases and pests, their environmental impact, and defense strategies. Transition assessments to stakeholders.	FY 2025 Q1	FY 2025 Q4	N/A
Identify and conduct R&D and landscape assessments using the requirements established by the OHS to address threats to the food and agricultural sector.	FY 2025 Q1	FY 2025 Q4	N/A
Prioritize FAV-D risk assessments according to gap analyses done in coordination with Ag-TC, FASRAC, OHS, and/or other counterparts.	FY 2025 Q1	FY 2025 Q4	N/A
Conduct R&D for agricultural Depopulation, Disposal, and Decontamination (3D) tools and technologies.	FY 2024 Q3	FY 2025 Q4	5-7

Urban Security Initiative

- **Problem:** The Urban Security Initiative (USI) supports CWMD, TSA’s Intermodal testbed program, and multiple stakeholders (e.g., FEMA) across the HSE, including the Metropolitan Transportation Authority New York City Transit (MTA NYCT), New York Police Department, Port Authority of New York and New Jersey, New York City (NYC) Department of Health and Mental Hygiene, as well as urban centers with mass transit subway systems. Subway systems that serve large metropolitan areas are attractive targets for potential acts of bioterrorism, particularly with aerosolized biological threat agents. Real-time detection and identification of biological agents is currently not possible, and the underground environment of urban subway systems poses unique challenges for existing technologies. S&T’s field test in the NYC subway simulated a biological agent release and confirmed dispersion model predictions that contamination from an aerosolized biological agent would be rapid, widespread, and lead to a major public health crisis, with indications contamination would not be confined to the underground. Utilization of computer and software tools support response and recovery actions based on plume tracking, optimized sensor placements in densely populated urban centers, and confirmatory identification of biohazards. Comparing field test data with data from various transport and dispersion models for urban environments helps to inform emergency management planners with preparedness for wide-area biological agent events and ensure confidence in model outputs. This all is critically important as access to scientific information and technology becomes more accessible in open sources and is readily exploited by an adversary.
- **Solution:** S&T will partner with the MTA NYCT to establish an enduring testbed, in the NYC subway system, to enable the evaluation of emerging chemical and bio-detection technologies, detection architectures, and mitigation strategies to limit agent transport and public exposure to an aerosolized threat. S&T will leverage a previous 2016 field test simulating a biological agent release in the NYC subway that indicated contamination of the above ground environment will also occur, complicating response and recovery actions and magnifying damage to the regional and the national economy. The outcomes of the FY 2022 field test provide a realistic test of sensors in the subway testbed, and more broadly inform emergency preparedness, response planning and optimized sensor positioning. The analysis of the FY 2022 experimental measurements validates and ultimately, transition to CWMD, integrated airflow and dispersion models and enable evaluation of their utility to estimate locations where the simulated attack had originated. Following the 2016 field test, NYC BioWatch used the results from the dispersion tests to reposition units. In FY 2024, S&T will transition the testbed to NYC stakeholders and outcomes from the testbed operations have transferability to other urban centers with complex mass transit systems. Information sharing with other major urban transit systems is anticipated through briefings of the field tests findings and recommendations.
 - Developing biological city planner resources for emergency management at the Federal, State, Local, and Tribal levels enable preparedness and responses in the event of a biological release.
- **Justification:** The FY 2025 Budget provides \$2.2M for this project, which is consistent with the FY 2023 Enacted. The funding for activities in the USI project will design, construct, install, and test other mitigation systems in the Port Authority of New York and New Jersey (PANYNJ) system to minimize the movement of a bioaerosol through the transit system and decrease the scale of contamination. The Concept of Operations for this program is built on a system-of-systems approach, in an operational setting, that is fully representative of a functional bio surveillance system. The system-of-systems approach includes networked sensors and evidence-based mitigation measures to shrink the potential geographic

footprint of contamination and reduce the zone of the public health crisis. At the completion of the test period, a comprehensive technical report and data package on findings and recommendations to inform emergency preparedness will be delivered to stakeholders and other mass transit systems across the Nation.

- **Impact:** A simulated bioagent attack in the PA-NY-NJ operational mass transit environment will enable assessment of the readiness of commercial and emerging chemical and bio-detection technologies, as well as mitigation measures, thereby evaluating the effectiveness of strategies and countermeasures and delivering a more accurate analysis of aerosol plume movement. The study's goal is to minimize the impact and consequences of a bioterrorism event in the heavy rail rapid-transit system. The study will enable authorities to make informed decisions on technology acquisition and deployment to enhance public safety and rapid situational awareness. The outcomes will be transferrable to other mass transit systems.

Type of Research

Developmental

Technical Readiness Level

The Urban Security Initiative builds upon previous R&D efforts and will focus on performing simulated bioagent releases in a complex urban environment; validate integrated urban dispersion models against environmental sampling data from the release; and evaluate handheld and stationary sensor technologies, networked sensor architectures; and the design and testing of plume mitigation measures in underground transit hubs in order to enable faster detection, response to and situational awareness of a CB event. Technology evaluations began at TRL-4 and will end at TRL-7.

Transition Plans

S&T will transition CB data and technical reports to users across the HSE, including CWMD, TSA, local and State, response organizations, and to appropriate commercial partners via the Hazard Knowledge Center (HKC). CB sensor architectures for mass transit applications will transition to local and State authorities that serve major urban centers (e.g., Chicago, Atlanta, Boston, Los Angeles, San Francisco, and Washington, D.C.).

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Delivered technical report and completed data package on NYC simulated bio-aerosol attack to NYC stakeholders.	FY 2022 Q2	FY 2023 Q4	7
Delivered technical report and completed data package on NYC simulated viral phenomenology experiment to NYC stakeholders and other major urban centers having mass transit systems.	FY 2023 Q2	FY 2023 Q4	7
Presented results from the Urban Threat Dispersion (UTD) final report to additional cities for examination of their respective urban transit systems and centers.	FY 2023 Q3	FY 2023 Q4	7
Transitioned a field-tested technology for mitigation of biological agent aerosols spread in the NYC and other underground subway systems to other major urban centers having mass transit systems.	FY 2023 Q1	FY 2023 Q4	7
Transitioned biological City Planner Resource (bioCPR) tool to FEMA.	FY 2023 Q2	FY 2023 Q4	7
Transitioned the integrated underground, outdoor and indoor airflow, and dispersion models to S&T Chemical Security Analysis Center (CSAC). This includes the rapid plume viewer, source inversion and reach back tool to support estimate locations of a biological agent release, and modeling architecture to evaluate and optimize sensor placements in a bio surveillance architecture and integrated model.	FY 2023 Q1	FY 2023 Q4	7
	FY 2024		
Conduct a series of briefings with mass transit system stakeholders across the Nation, providing findings and recommendations from the 2021 UTD test.	FY 2024 Q1	FY 2023 Q3	N/A
Deliver completed FOUO bioCPR tool and documents, to include a technical and end-user manual, to FEMA Chemical Biological Radiological and Nuclear (CBRN) Support Branch. The bioCPR tool will be used by FEMA Regional Planners to obtain quantitative effects information for a broad range of communities across the United States, to support response and preparedness planning.	FY 2024 Q1	FY 2024 Q4	7
Deliver the bio-CPR tool to host site on FEMA cloud platform.	FY 2024 Q3	FY 2024 Q4	7
	FY 2025		
Deliver CBT Final Report with evaluation of technologies against performance metrics. Identify optimum network architecture; share outcomes with multiple mass transit systems.	FY 2024 Q3	FY 2025 Q2	N/A
Transition CBT testbed in NYC to MTA NYC to improve subway chemical and biodefense for both detection of and mitigative response for terrorist acts involving such materials.	FY 2024 Q2	FY 2025 Q2	7
Assemble project performers; develop test plan; request environmental assessment, Committee of the Use of Humans as Experimental Subjects, and Finding of No Significant Impact approval; and notify legislators, public officials, and public of exercise in PANYNJ system.	FY 2024 Q2	FY 2025 Q2	N/A
Complete preparation; mitigation selection and implementation; simulant production; and execution of bioagent simulant release in PANYNJ system.	FY 2025 Q2	FY 2025 Q4	5

Detection Canine Program – This program conducts research to provide the tools, techniques, and knowledge to inform and improve operational proficiency of the domestic detection canine. The Program’s scope spans the entirety of the HSE, including DHS Components, and SLTT agencies that utilize detection canines across all threats.

Detection Canine Project

- **Problem:** Nationwide, DHS and the HSE have over 16,000 detection canine teams that require a specific Federal program focused on providing critical tools, techniques, and knowledge to improve operational proficiency and better understand, train, and utilize these teams. The decentralized employment of teams requires a Federal core capability to inform the community and decision makers on canine capabilities and concepts of operations. Over the past 20 years, the demand for elite detection canines has increased while domestic supply has not kept pace. This resulted in an increased reliance on foreign sourcing of detection canines and a subsequent reduction in the quality of the canines. Detection canines are called to quickly respond and adapt to new and emerging threats, requiring a Federal focal point of knowledge and expertise to identify/address performance gaps in basic canine operations and emerging threat detection, effective/efficient canine training, and supply, which will improve the HSE canine teams’ ability to better protect the Homeland.
- **Solution:** The Detection Canine Program serves as a trusted Federal focal point for expertise and knowledge sharing, to address partner requirements by understanding emerging threat detection performance; analyzing how threat concealment effects detection; and providing scientifically rigorous/statistically significant R&D and T&E. The program has partnered with DHS partners and industry stakeholders to bring focus to the domestic detection canine supply challenge. The program established a breeding roadmap, which was endorsed by DHS Components and validated by a Breeding Working Group to integrate the best scientific practices in genetics, genomics, breeding, olfaction, behavior, training, physiology, and metrology to improve the mobile canine sensing platform. By FY 2023, the output of this breeding consortium produced over 150 candidate canines. The program has established core capabilities including odor chemistry expertise, breakthrough laboratory analysis capabilities, specialized T&E experts, and canine operations and training expertise to improve operational proficiency of DHS Component and SLTT canine teams throughout the HSE.
- **Justification:** The FY 2025 Budget provides \$8.3M for this project, which is consistent with FY 2023 Enacted. Continued successful positive outcomes from recent R&D efforts has driven demand for the program’s services from our partners base, primarily SLTT law enforcement agencies, TSA, FPS, and CBP. The funding for this project will execute ongoing research efforts into development of training tools that will ensure effective and efficient training of detection canine teams. These tools include, but are not limited to, nonhazardous explosive training aids and training aids reflecting concealed devices. Ongoing research also includes conducting odor generalization studies to reduce training burdens, performing field assessments to validate operational strengths and limits of the mobile canine sensing platform, and continue a pilot breeding consortium effort to improve the supply of domestic working dogs. In addition, funds will expand efforts to continue scientifically validated canine mobile sensing technology for explosives detection, to be developed in collaboration with academia, which integrates best scientific practices in genetics, breeding, olfaction, behavior, training, physiology, and metrology. This includes independent testing and analysis of TSA and LEO teams both inside and outside of the checkpoint.

- **Impact:** The Nation relies on detection canine teams every day, and this program focuses efforts to increase their job capabilities more efficiently and effectively thereby improving mission performance. A dedicated R&D office supports the expansion of domestic detection canine supply and the improved efficiency of production, which substantially reduces dependence on foreign sources over time. As of FY 2023, 100 percent of canines bred through the Domestic Breeding Consortium have been placed in odor detection roles. The program establishes a domestic RDT&E focal point for detection canines which otherwise would not exist. This provides DHS and the HSE with a resource to fill critical gaps in canine training and mission performance, improve detection canine proficiency to effectively train and perform in operational environments, respond to emerging threats including infectious diseases, and address the growing threat and operational concerns of securing soft target venues and large public crowd events. Through the Regional Explosive Detection Dog Initiative, over 524 SLTT agency explosives detection canine handling teams have been observed, tested, and evaluated. Participants receive a tailored prescription of tools and techniques to increase their proficiency and improve capabilities. In 2022, TSA acted on seven recommendations from the program's work on Canine Generalization – four fully implemented recommendations nationwide, with an additional three in progress with continued supporting research. The program continues to provide 8-10 test and evaluation evolutions per year with TSA teams to support these efforts. The program's transition focused research resulted in nine funded studies published in peer-reviewed scientific journals since 2021.

Type of Research

Applied and Developmental

Technical Readiness Level

The program began at TRL-4 and will end at TRL-7. This program's R&D efforts span applied research to technology demonstration. The application of analytical chemistry research to develop novel non-hazardous explosive training aids begin with material development (TRL-4) through developmental test and evaluation (TRL-7) leading to technology transition and commercialization is one specific example. Understanding the need to tie phenotypical traits with genetic markers that improve detection canine breeding, early learning, and selection (TRL-4) are the building blocks of research that will form the base of an expansion of the domestic supply of high-quality detection canines. The program maintains enduring capabilities to respond to emerging threats and assess proficiency of the operationally fielded detection canine teams against these challenges (TRL 6-7).

Transition Plans

- Training Aids and Tools: Complete transfer of electronic test tool to CBP.
- Operational Test and Evaluation (OT&E):
 - Inform TSA Passenger Screening Canine (PSC) CONOPS with odor generalization studies.
 - Deliver PSC test results and recommendations for more efficient and effective operational testing practices in conjunction with the checkpoint system, including best practices in deployment configurations and basic training effectiveness and efficiency for the TSA PSC program.
 - Conduct Regional Explosives Detection Dog Initiative events to inform the HSE with validation of capabilities and areas for further focus for both R&D and operational training.
- Detection Canine Domestic Breeding Consortium Project:
 - Expand domestic detection canine supply infrastructure for the HSE.
 - Transition framework for increasing expanded domestic supply of detection canines.
 - Develop alignment of procurement strategies with projected canine output from the Domestic Breeding Consortium construct.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Completed study establishing best cognitive/behavioral predictors and traits for selection of successful detection canines.	FY 2020 Q1	FY 2023 Q4	4
Completed study that validates training aid signatures, evaluates surrogate training aids to address current/emerging threats, and uses explosives generalization research to reduce operational costs.	FY 2020 Q1	FY 2023 Q4	5
Conducted independent testing and analysis of a minimum 20 TSA-led PSC teams inside the checkpoint.	FY 2023 Q1	FY 2023 Q4	6
Conducted independent testing and analysis of a minimum 50 TSA/National Explosive Detection Canine Program LEO-led Explosive Detection Canine (EDC) (Aviation and Surface) teams.	FY 2023 Q1	FY 2023 Q4	6
Delivered Identification & Generalization in odor training within & across odor classes.	FY 2022 Q3	FY 2023 Q4	5
Expanded the development and deployment of targeted automated tools to conduct randomized test events for detection canine performance during training and operational scenarios.	FY 2021 Q4	FY 2023 Q3	7
	FY 2024		
Conduct independent testing and analysis of LEO-led EDC (Aviation and Surface) teams.	FY 2024 Q1	FY 2024 Q4	6
Conduct independent testing and analysis of TSA-led PSC teams both inside and outside the checkpoint.	FY 2024 Q1	FY 2024 Q4	6
Deliver Identification and Generalization in odor training within and across odor classes to TSA.	FY 2022 Q3	FY 2024 Q1	5
Deliver report on identification and generalization in odor training within and across odor classes to FSLTT law enforcement agencies.	FY 2022 Q3	FY 2024 Q3	1-5
	FY 2025		
Conduct independent testing and analysis of LEO-led EDC (Aviation and Surface) teams.	FY 2025 Q1	FY 2025 Q4	6
Conduct independent testing and analysis of LEO-led PSC teams both inside and outside the checkpoint.	FY 2025 Q1	FY 2025 Q4	6
Delivery of a polydimethylsiloxane "odor capture and release" material composition platform with tunable porosity, requisite thermal stability, and tunable chemical affinity.	FY 2022 Q4	FY 2025 Q3	3-6

Opioid/Fentanyl Detection Program – This program provides DHS Components and law enforcement partners with advanced, operationally effective detection and investigation capabilities to enable confident discovery and interdiction of opioids, and other narcotics, being trafficked across U.S. borders without disrupting the flow of legitimate commerce, as well as aid in the collection and analysis of complex evidence to be used for the prosecution and dismantling of the criminal networks responsible for distribution of illicit drugs.

Opioid/Fentanyl Detection Project

- **Problem:** The final report of the Commission on Combating Drug Addiction and the Opioid Crisis recognized challenges that limit DHS’s ability to disrupt the flow of synthetic opioids, like fentanyl, that cross U.S. land, sea, and air borders, including international mail. The top challenges that DHS face include both the physical detection and interdiction of opioids due to the ability of synthetic opioids to be smuggled in very small or dilute quantities; the low number of available automated detection systems, among others; as well as the discovery and disruption of TCOs/DTOs, criminal networks, and individuals who exploit open source and dark web marketplaces to support illicit manufacturing and smuggling. DHS Components, and law enforcement partners, have identified critical needs for advanced technologies to aid in their missions to target, investigate, and dismantle illicit opioid and other narcotic smuggling into the United States.
- **Solution:** In coordination with DHS Components, S&T will develop a layered set of solutions, including detection hardware, fusion of sensor data and advanced analytics, which can be deployed rapidly within existing operational environments. To enable agile and responsive support to DHS drug detection missions, S&T will pursue an iterative, integrated developmental approach and operational assessments. S&T will first make use of technologies, and then, where technologies do not exist, employ rapid prototyping of capabilities to fill operational needs. S&T will develop analytics to exploit available data (e.g., advanced electronic data, National Targeting Center, dark web commerce) and fuse sensor information with other investigative holdings to discover and target supply chain networks. This program will prioritize development of capabilities to support continuity of the entirety of DHS and HSE counterdrug missions, regardless of changes in trafficking behaviors.
- **Justification:** The FY 2025 Budget provides no funding for this project. The work executed within this program will be realigned to the Countering Fentanyl/Opioid abuse project within the Forensics and Criminal Investigations Program.
- **Impact:** This project will provide DHS Components and law enforcement partners with advanced, operationally effective detection and intelligence capabilities to enable confident discovery and interdiction of opioids, and other narcotics, being smuggled across U.S. borders without disrupting the flow of legitimate commerce.

Type of Research

Developmental

Technical Readiness Level

TRL varies for specific project activities between TRL-2 and TRL-7. This project's R&D efforts typically start by performing a market survey of available COTS and GOTS technology that could be adapted for DHS Component use. Identified technology is then adapted and validated in a laboratory or relevant environment (TRL-4/5). Following successful validation, the most promising solution(s) are then prototyped and evaluated first in a relevant environment (TRL-6) then in an operational environment (TRL-7) prior to transition. Examples from the R&D milestones detailed below:

- Developed advanced analytical tools to increase probability of interdiction (TRL-4).
- Develop opioid-related investigative and training analytical capabilities (TRL-5/6).

Transition Plans

Within the next three years, S&T will:

- Complete and transition technical report on emerging forensics and investigative methods to DHS Components and law enforcement partners.
- Validate and transition capabilities to DHS Components for implementation in operational environments in accordance with roles and responsibilities documented in the transition plan agreement.
- Continue to transition test, evaluation, and assessment reports on identified advanced capabilities to support DHS Counter-drug missions.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Completed a report on the performance assessment of COTS instruments and assays equipped with upgraded fentanyl/Fentanyl analogue reference libraries.	FY 2023 Q4	FY 2023 Q4	7
Completed data engineering of investigative holdings to support forensic intelligence fusion proof of concept demonstration.	FY 2023 Q1	FY 2023 Q4	N/A
Delivered to CBP a report summarizing results characterizing border checkpoint environments to enable trace detection techniques.	FY 2022 Q4	FY 2023 Q1	N/A
Developed VoT prototype analytics application.	FY 2022 Q4	FY 2023 Q3	5-6
	FY 2024		
Completed development of counterdrug capability roadmap to support DHS mission areas.	FY 2023 Q1	FY 2024 Q1	N/A
Deliver a hybrid computed tomography (CT) X-ray/X-ray diffraction (XRD) screening system to a CBP Operational facility for an algorithm development data collection.	FY 2023 Q4	FY 2024 Q4	6
Demonstrate a suite of VoT prototype analytic capabilities for end-users and stakeholders.	FY 2023 Q1	FY 2024 Q3	5-6
Transition Quality of Evidence analytics software application to ICE .	FY 2023 Q1	FY 2024 Q2	7
	FY 2025		
N/A	-	-	-

**Counter Terrorist Thrust Area
Research and Development**

Technology Readiness Level Exhibit
(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget
Counter Terrorist Thrust Area	\$60,983	\$60,983	\$55,114

R&D Thrust Area Description

COUNTER TERRORIST THRUST AREA: S&T invests in the R&D technologies, methods, and procedures to counter terrorists. Efforts include R&D to identify individuals or groups that intend to conduct terrorist attacks and/or illicitly move weapons, dangerous goods, and contraband. It also includes providing threat assessments of high-consequence attack methods such as CBE that terrorists may use to attack the Nation.

COUNTER TERRORIST THRUST AREA <i>(Dollars in Thousands)</i>				
Program	Project	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President’s Budget
Emerging Technologies		\$750	\$750	-
	Emerging Technologies	\$750	\$750	-
Explosives Threat Assessment		\$20,440	\$20,440	\$17,630
	Aircraft Vulnerability	\$3,000	\$3,000	\$1,500
	Explosives Risk Assessment	-	-	\$250
	Homemade Explosives Identification, Detection and Mitigation (HEID&M)	\$6,560	\$6,560	\$5,000
	Technology Explosives Assessment	\$10,880	\$10,880	\$10,880
Probabilistic Analysis of National Threats, Hazards and Risks (PANTHR)		\$39,793	\$39,793	\$37,484
	Agricultural Threat Characterization (AgTC)	\$500	\$500	\$500
	Biological Threat Characterization (BTC)	\$18,650	\$18,650	\$17,691
	Chemical Threat Characterization (CTC)	\$4,393	\$4,393	\$4,393
	Hazard Knowledge Center (HKC) (formerly Biodefense Knowledge Center)	\$400	\$400	\$400
	Tools for Integrated Evaluation of Risk (TIGER)	\$15,850	\$15,850	\$14,500
Total – Counter Terrorist Thrust		\$60,983	\$60,983	\$55,114

Emerging Technologies – Staying ahead of emerging risks and adversarial use of emerging technology, by providing S&T with a process for identifying, contextualizing, and prioritizing emerging risks and technical expertise that helps the Secretary, DHS Components, and S&T identify mitigation, exploitation, and response. Establish a comprehensive, repeatable process for identifying emerging risks and emerging technologies, prioritizing which risks have the highest probability of impact to the Nation, and subsequently informing relevant strategies, policies, or investments. DHS will use this research activity as a driver for conducting emerging risk assessments. DHS Office of Strategy, Policy and Plans (PLCY) and the Components will use products from this R&D activity to drive prioritization of risk and response across critical missions of the Department.

Emerging Technologies

- **Problem:** Staying ahead of emerging risks, including adversarial use of emerging technology, requires DHS have a process for identifying, contextualizing, and prioritizing emerging risks to help safeguard the homeland. The Secretary, DHS Components, and S&T require a scientifically based process to identify these risks and recommend mitigation, exploitation, and response strategies. To position DHS to both, leverage emerging technologies and defend against emerging risks, the trends, risks, and opportunities must be identified as far in advance as possible through partnerships with government, private sector, and partners in the Defense and Intelligence communities. The HSE must proactively identify critical emerging risks and technologies to effectively leverage or defeat them in defense of the homeland.
- **Solution:** This program executes research to establish a comprehensive, repeatable process for identifying emerging risks (including emerging technologies), prioritizing which risks have the highest probability of impact to the Nation, and subsequently informing relevant strategies, policies, or investments in response. It will refine and deliver a process to identify emerging risks.
- **Justification:** The FY 2025 Budget provides no funding for this project. The previous funding for this project was used to augment the emerging risk assessment methodology across the HSE to deliver and implement a process for horizon scanning of emerging risks to identify critical gaps with, and bring focus to, emerging initiatives. This includes initiation of a study to inform DHS Policy on policies, processes, and governance to support enterprise emerging technology risk management.
- **Impact:** DHS will use this research activity as a driver for conducting emerging risk assessments and will be shared with DHS PLCY and Components to drive prioritization of risk and enhance investment and response planning across critical missions of the Department. S&T will use the products of this activity, along with DHS and Component priorities, as a key demand signal for the development of focused research and development programs. Results from this activity will communicate the posture of homeland security emerging risks with the interagency, academic, industry, and international community to drive and focus key relationships that improve DHS leverage of external investments to mitigate risks and appropriately seize future mission opportunities to protect the homeland.

Type of Research

Developmental

Technical Readiness Level

This project produces a repeatable process for DHS to identify emerging risks.

Transition Plans

Deliver up to 10 risk assessments to inform DHS policy development in emerging technologies.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Delivered two or more risk assessments to inform DHS policy development in emerging technologies.	FY 2023 Q1	FY 2023 Q4	2-3
	FY 2024		
Deliver up to ten knowledge products to DHS Office of Policy (The Office of Cyber, Infrastructure, Risk and Resilience Policy) to inform on emerging technologies which may present a risk to DHS.	FY 2022 Q4	FY 2024 Q4	N/A
Produce an analysis/framework of emerging technologies for DHS policy which may present a risk to DHS.	FY 2023 Q4	FY 2024 Q4	N/A
	FY 2025		
N/A	-	-	-

Explosives Threat Assessment Program – This program researches and identifies current and potential explosive threats to understand the risk posed to the U.S., strengthens aviation security by bolstering the international aviation security system, improves security processes and technologies, and encourages partnerships with industry. It encompasses risk-based threat characterization, attribution, strategic planning, prediction of magnitude of explosive disasters, and analytical technologies, strategies, and procedures.

Aircraft Vulnerability

- **Problem:** When designing screening technologies for the detection of explosives, whether on passengers, in checked bags, or in air cargo, it is essential to first determine the effects that different explosive threats can cause to a variety of commercial aircraft. The vulnerability of commercial aircraft to the broad range of conventional and emerging improvised explosive device threat configurations is not thoroughly understood or characterized. This includes the blast effect vulnerability of relatively new composite aircraft structures currently entering the civil transport fleet. The vulnerability assessment data will support TSA in the development and update of explosive detection standards.
- **Solution:** S&T is working to identify the minimum size of the explosives threat that would result in catastrophic aircraft loss. S&T is also developing blast effects measurement testing capability to measure and characterize explosive performance and blast effects and derive aircraft vulnerability based explosive equivalence factors relative to standard explosive. S&T continues to work to develop commercial aircraft blast mitigation technology that will provide protection to commercial aircraft. In addition to live fire explosive testing capability S&T is developing commercial aircraft blast responses modeling, simulation and analysis tools, and capability. S&T is also developing emerging explosive threats rapid response and assessment capability for commercial aircraft. S&T is also designing a central archive to be populated with 35+ years of aircraft live fire explosive test data which is at risk of being lost due to aging of storage media.
- **Justification:** The FY 2025 Budget provides \$1.5M in funding for this project, a \$1.5M decrease from the FY 2023 Enacted. The Budget continues to support the research of live fire explosives test and evaluation to further develop and report commercial aircraft (aluminum and composite fuselage) explosive vulnerability refined assessments, enable/maintain rapid response explosives testing capabilities to new threats, validate/develop high fidelity modeling, simulation, and analysis as well as fast running empirical engineering analysis tools for blast responses of commercial aluminum and composite aircraft, and complete development and maintenance of an aircraft vulnerability explosives tests database housing 35+ years of aircraft vulnerability test data.
- **Impact:** TSA capability gaps would be addressed that inform TSA operations, composite aircraft vulnerability research, modeling and simulation of blast effects and responses of commercial aircraft, support an explosives test database, and support newer explosive blast mitigation efforts. S&T will continue live fire test and evaluation of aviation threats, development of faster scale up times for modelling and simulation capabilities, digitization of legacy media, and procurement of composite material sub/full scale aircraft test items. The long-term benefit of these efforts are potential updates to TSA's explosive detection screening requirements (which will improve passenger safety to threats on newer composite constructed aircraft), continued evaluation of evolving/emerging threats, and retaining critical legacy test data.

Type of Research

Applied and Developmental

Technical Readiness Level

TRL varies for specific project activities. Project develops various knowledge and technology (software and hardware) products starting from TRL-3 – TRL-5 and ending in TRL-6 – TRL-7 before product transition.

Transition Plans

Primarily a knowledge-developing effort, the impact of the aircraft vulnerability project will be reliant on the capacity for transitioning knowledge products, analysis tools, models and database, technology products, and capabilities developed to primary partners, TSA Requirements and Capability Analysis (RCA), S&T Technology Centers Division, stakeholders, and end users.

- Completed sufficient commercial airframe vulnerability testing to update commercial aircraft vulnerability assessment and deliver updated annual vulnerability summary report to TSA by FY 2023 Q4 (Completed), FY 2024 Q4, and FY 2025 FY 2021 Q4.
- Further validated high fidelity modeling, simulation, and analysis capability of blast responses of commercial aluminum and composite aircraft by FY 2023 Q4.
- Developed and delivered prototype version of Commercial Aircraft Vulnerability Mitigation (CAVM) explosives test database by FY 2023 Q4.
- Develop and deliver beta version of fast running empirical engineering analysis tool for blast responses of commercial aluminum and composite aircraft by FY 2023 Q4.
- Deliver recommendations on explosive equivalence (in reference to spherical C-4 baseline threat) approach for explosive damage and vulnerability of commercial aircraft to TSA by FY 2025 Q4.
- Collect sufficient narrow body aircraft cargo hold live fire test data, analyze results, and provide data to TSA by FY 2025 Q4.
- Complete design, development, and fully populate the Aircraft Vulnerability Explosive Database, a central archive of 35+ years of live fire commercial aircraft vulnerability and mitigation data with full access internally and a separate front end for TSA to view high level reports by FY 2025 Q4.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Developed and delivered prototype version of CAVM explosives test database.	FY 2022 Q1	FY 2023 Q4	6
Validated high fidelity modeling, simulation, and analysis capability of blast responses of commercial aluminum and composite aircraft.	FY 2023 Q1	FY 2023 Q4	7
	FY 2024		
N/A	-	-	-
	FY 2025		
Collect sufficient narrow body aircraft cargo hold live fire test data, analyze results, and provide data to TSA.	FY 2023 Q3	FY 2025 Q4	6-7
Complete design, development, and fully populate the Aircraft Vulnerability Explosive Database, a central archive of 35+ years of live fire commercial aircraft vulnerability and mitigation data with full access internally and a separate front end for TSA to view high level reports.	FY 2024 Q1	FY 2025 Q4	6-7

Explosives Risk Assessment

- **Problem:** DHS Components lack the ability to quantitatively assess the risk that explosive threats pose in their specific operational scenarios. Detection programs and DHS Components need defensible means to determine threat prioritization, likelihood of a threat, and analysis of the consequence if the threat occurs. Current models provide an initial prioritization for only two operational areas with limited fidelity. Without the ability to run thousands of scenarios against all the data on available explosives DHS Components cannot obtain effectively assess their risk stature and if current mitigation methodologies are effective.
- **Solution:** This project will develop probabilistic models and integrate consequence analysis tools which deliver a more complete risk description of the operational space. Output will allow detection programs, DHS Components, and local law enforcement and governments to prioritize the threat, distribute resources, develop mitigation plans, and employ detection technologies customized for their operational scenarios.
- **Justification:** The FY 2025 Budget provides \$0.3M for this project, a \$0.3M increase from FY 2023 Enacted. The funding will be executed to perform basic maintenance of the Explosives Risk Assessment (ExRA) tool, previously funded under the CISSR program. Current funding levels will see the delivery of full risk reports to DHS Components begin in FY 2027 or later. Additional funding would expedite integration of the ExRA model with the previously developed Homemade Explosives Consequence Analysis Tool (HEXCAT), Commercial Aircraft Vulnerability Mitigation Model (CAVMM), and Vulnerability Assessment and Protection Option (VAPO). This would result in production of full risk reports earlier than the FY 2027 window currently estimated under existing funding levels.
- **Impact:** This project supplies TSA and USSS specialized tools to address the documented capability gaps for explosives threat risk assessment and facilitates the Explosive Threat Assessment program’s research focus area prioritizations. In addition, this effort provides access to information for other S&T explosives detection related programs, DHS Components, and local law enforcement and governments, allowing informed, data-driven decisions on their security posture. Any decrease in funding would put TSA and USSS at risk of not addressing the explosive threats for their operational space. The currently funded ExRA (Explosives Risk Assessment), in collaboration with the PANTHR program, would not have sufficient funding to complete model development. In addition, new requirements from TSA and USSS, specifically risk assessment for canine training aids, would be delayed in completion.

Type of Research

Applied and Developmental

Technical Readiness Level

- ExRA risk assessment decision trees are TRL 5-6 and will be TRL-7 by FY 2025.
- HEXCAT Community models are at TRL-5 and planned to be at TRL-7 by FY 2026. ExRA with integrated HEXCAT and CAVM will start at TRL-5 in FY 2025 and be brought to TRL-7 before transition.

Transition Plans

- Incremental ExRA decision tree development completed by FY 2024 Q4.
- Release annual Threat Prioritization Reports.
- Provide an FOUO version of the HExCAT to CISA’s Office of Bombing Prevention (OBP) in FY 2025 Q4.
- Enable DHS Component access to full Integrated ExRA reporting products FY 2027

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
N/A	-	-	-
	FY 2024		
Developed FOUO version of HEXCat, perform a demonstration to stakeholders, and transition the product to CISA OBP for deployment.	FY 2022 Q4	FY 2024 Q4	5-7
	FY 2025		
Complete the minimum viable product of integrated ExRA, perform a demonstration to the interested DHS Components, and receive feedback to aide in next phase of development.	FY 2025 Q1	FY 2025 Q4	5

Homemade Explosives Identification, Detection, and Mitigation (HEID&M)

- **Problem:** Over 365 explosive devices were functioning in calendar years 2022 and 2023 (not including interrupted plots, home laboratory discoveries, or cache finds). Reporting provided by CISA OBP TripWire, show that the three explosives are persistent and continuously evolving for DHS Components and interagency government partners. Substantial research has been performed on commercial and homemade explosives, but the explosives classes are rapidly changing. DHS Components, S&T detection programs, and local law enforcement need accurate data to maintain and increase their proactive security posture. This data includes material characterization for detection and mitigation methods, performance data for response and explosive hardening, and hazard testing for safe handling by First Responders.
- **Solution:** The Explosive Threat Characterization (ETC) project coordinates homemade, commercial, and military explosive characterization to fill known research gaps. The project leverages partnerships with CISA OBP and the FBI to lead an intelligence driven, proactive approach to explosives' characterization. The specific areas of focus include:
 - Detection technology data collection on homemade, commercial, and military explosives.
 - Quantifying performance metrics for explosives including detonation velocity, impact pressure, and relative equivalencies (such as TNT equivalent).
 - Detection technology data collection on additional threats as required by the DHS Component including gas forming reaction precursors.
 - Creating tools to simulate an explosive threat for inspection teams, training, and detection technology data collection.
 - Supporting detection standard development for checkpoint, checked baggage, cargo, and canine.
 - Updates to the Explosives Planning and Research Tool (ExPRT) in collaboration with DHS OBP and expansion to other government partners.
- **Justification:** The FY 2025 Budget provides \$5.0M for this project, a \$1.6M decrease from the FY 2023 Enacted. The funding will be executed as follows:
 - Complete explosives Detection Set #2 and initiate Detection Set #3 data collection.
 - Commence explosives Performance Set #2 data collection.
 - Complete Phase 2 of explosives simulant verification and validation. Simulants will provide a safer standardized approach for evaluating system performance and expand the pool of possible partners.
 - The above products are combined as inputs enabling the development of the next iteration of TSA detection standards. These standards set the bar that vendors must meet to be eligible for use by TSA.

In addition, funds will enable the continuity of the explosives, planning and reference tool (ExPRT) a database to include all S&T and government partner funded research reports of the related subjects.

- **Impact:** Previous ETC project results have allowed TSA to field more effective transportation security equipment, provide better training to front line personnel, and validate and monitor continuing and emerging threats. ETC project outputs will continue to inform explosive detection technology standards updates and provide essential tools to TSA field personnel. The ETC project deliverables are also tapped by other S&T projects to provide essential explosives data. This includes but not limited to Explosives Risk Assessment, Vulnerability Mitigation, and Soft Target Security.

Type of Research

Developmental

Technical Readiness Level

TRL varies for specific project activities between TRL-6 and TRL-7. This project's R&D efforts include the collection of data on adapted commercial technology for developmental test and evaluation as well as intelligence-based assessments (TRL-6); piloting prototypical test articles, training, information databases, and procedures (starting at TRL-6 and ending at TRL-7); as well as the transitioning of the Explosives Planning and Reference Tool (ExpPRT) (TRL-7).

Transition Plans

- Transition six characterization reports from Detection Set #1 prioritized list to the TSA to improve security effectiveness and operational efficiency via selection and implementation against highest risk threats by FY 2024 Q3.
- Provide partner access to and maintain continuity of the Explosives Planning and Reference Tool (ExpPRT) by FY 2024 Q4.
- Transition Material Assessment Reports (MAR) from Detection Set #2 by FY 2025 Q3.
- Deliver Material Assessment Reports (MAR) Detection Set #3 by FY 2026 Q4.
- Include performance testing in MAR for Performance Set #2 by FY 2025 Q2.
- Include performance testing in MAR for Performance Set #3 by FY 2026 Q4.
- Transition method for quantitatively analyzing the amount of TATP in a canine standard by FY 2025 Q2.
- Provide characterization data reports to TSA on at least three explosives obtained from foreign countries by FY 2024 Q4.
- Deliver a final report on the threat posed by a prioritized list of gas forming reactions by FY 2025 Q1.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2023			
Conducted two series of multi-day customized Home-Made Explosives (HME) training courses to the TSA end user.	FY 2020 Q3	FY 2023 Q3	6
Delivered a final report to TSA Special Operations Division’s Red Team in support of TSA’s access control testing detailing the results of the indexing study.	FY 2022 Q2	FY 2023 Q1	7
Delivered a prioritized threat list based on the developed Global Detection Standards Analysis and Rating Methodology (DSARM) tool to TSA.	FY 2021 Q3	FY 2023Q1	7
Delivered a prioritized threat list based on the refreshed US DSARM tool to TSA.	FY 2023 Q1	FY 2023 Q4	7
Delivered two characterization reports from the prioritized list and two additional reports to the TSA, USSS, and other Components to improve security effectiveness and operational efficiency.	FY 2020 Q1	FY 2023 Q4	7
FY 2024			
Deliver a standard to the TSA for the production, analysis, and quantitation of Tri acetone Triperoxide (TATP).	FY 2024 Q1	FY 2025Q2	5-7
Deliver report containing detection characterization data on Detection Set #1 in the form of Material Assessment Reports to TSA.	FY 2023 Q2	FY 2024 Q3	6
Deliver performance testing report for two explosives for use in risk assessment tools and consequence analysis tools to TSA.	FY 2023 Q3	FY 2024 Q4	6-7
Deliver three Material Assessment Reports to TSA on explosives and chemicals of interest.	FY 2024 Q1	FY 2024 Q4	6-7
Deliver Characterization Data reports to TSA on at least three explosives obtained from foreign countries.	FY 2023 Q2	FY 2024 Q4	5-7
FY 2025			
Complete minimum viable product of algorithms for commercial microCT use.	FY 2024 Q2	FY 2025 Q3	5
Complete technical reports on Performance set #2 of explosives to be submitted to ExPRT for DHS Component and interagency partner access.	FY 2024 Q3	FY 2025 Q4	7
Deliver final report of Gas Forming Reaction analysis to TSA.	FY 2021 Q2	FY 2025 Q1	7
Deliver Material Assessment Report on Detection Set #2 to TSA.	FY 2024 Q1	FY 2025 Q3	7
Submit data collected on Foreign Explosives Set #2 to TSA for comparison analysis.	FY 2024 Q3	FY 2025 Q4	7

Technology Explosives Assessment

- **Problem:** The Transportation Security Laboratory (TSL) conducts T&E of all explosives and threat detection equipment utilized across the HSE, including systems installed at commercial airports. Explosive threats rapidly evolve, and emergent threats must be quickly and accurately characterized so that screening equipment can be upgraded to reliably detect these new threats. New more cost-effective screening equipment also must be validated against both conventional and emerging threats.
- **Solution:** A network of laboratory capabilities are required to characterize emerging threats quickly and accurately and to develop cost-effective tools and T&E methods appropriate to analyze threats with modern screening technologies. TSL coordinates this capability through the management of its core laboratories:
 - The TSL at the William J. Hughes Technical Center (WJHTC), Atlantic City, NJ characterizes conventional and emerging explosive threats and develops test articles, test methodologies, test tools, and quality control.
 - The Tyndall Reactive Management Group facility on Tyndall AFB, Florida houses the capability to collect specialized data for Home Made Explosives (HME).
 - At the FBI TEDAC Improvised Explosives Detection and Synthesis (TIEDS) Center in Redstone Arsenal, Alabama (AL), S&T integrates the latest explosive characterization to evaluate new threats on transportation security equipment (TSE).
- **Justification:** The FY 2025 Budget provides \$10.9M for this project, which is consistent with the FY 2023 Enacted. This project will develop synthetic image data and their validation methods and test tools for machine learning algorithms; develop drug detection methods and test articles; expand scale up procedures for HME materials; develop new simulants for millimeter wave (MMW) and x-ray technologies; develop testing methodologies and test articles for cargo skid screening systems; and conduct test and evaluation activities in support of the HSE and provides for core laboratory capabilities in support of these applied research areas, as well as support to other functions within the TSL mission.
- **Impact:** These capabilities enable quick, cost-effective, and accurate T&E of TSE to validate conformance with TSA requirements for existing and emerging threats. Furthermore, these capabilities also allow TSL to perform RDT&E that drives innovation and fosters the development of new technologies for the detection of emerging threats and other contraband (e.g., opioids).

Type of Research

Applied

Technical Readiness Level

The Technology Explosives Assessment provides tools and methods for testing and evaluation and can be considered steady state TRL-3.

Transition Plans

The Technology Explosives Assessment capabilities enables and facilitates the production of products through applied research activities, but do not, in general, produce products for external partners. The applied research partners within TSA, Developmental T&E and Independent T&E, work closely with staff to ensure the timely release of testing methods, tools, standards, and quality control procedures necessary to support T&E.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Completed data collection activities for threat materials in support of test and evaluation.	FY 2023 Q1	FY 2023 Q4	4-6
Continued development of new HME simulants for MMW and X-ray technologies.	FY 2023 Q1	FY 2023 Q4	3-5
Continued development of texture measurement tools and simulants with appropriate texture properties for X-ray technologies.	FY 2023 Q1	FY 2023 Q4	3-5
Continued development of validation methods and test tools for machine learning algorithm used in MMW and X-ray technologies.	FY 2023 Q1	FY 2023 Q4	3-5
Expanded scale up procedures for new HMEs for test and evaluation.	FY 2023 Q1	FY 2023 Q4	3-5
	FY 2024		
Collect transfer efficiency data for two trace threats.	FY 2024 Q1	FY 2024 Q4	3
Complete data collection activities for threat materials in support of test and evaluation.	FY 2024 Q1	FY 2024 Q4	4-6
Complete development of stability and shelf-life studies for two trace threats.	FY 2024 Q1	FY 2024 Q4	3
Complete sample production and quality control support of one alarm resolution-based IT&E and (1) DT&E test event (as applicable).	FY 2024 Q1	FY 2024 Q4	5
Continue development of new HME simulants for MMW and X-ray technologies.	FY 2024 Q1	FY 2024 Q4	4
Continue development of synthetic data validation methods and test tools for machine learning algorithm used in MMW and X-ray technologies.	FY 2024 Q1	FY 2024 Q4	4
Continue development of texture measurement tools and simulants with appropriate texture properties for X-ray technologies.	FY 2024 Q1	FY 2024 Q4	4
Continue performing Region of Responsibility and characterization measurements for new HME threats.	FY 2024 Q1	FY 2024 Q4	3
Develop a new testing method and quality control process for one new trace threat.	FY 2024 Q1	FY 2024 Q4	3
Develop quality control criteria for (2) new HME threats.	FY 2024 Q1	FY 2024 Q4	3
Evaluate new methods for mixing fuel oxidizer HME threats for test and evaluation	FY 2024 Q1	FY 2024 Q4	4

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Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
Execute data collection for year 3 of an extended stability data study of sealed trace standards.	FY 2024 Q1	FY 2024 Q4	3
Expand loaded waveguide dielectric measurement to cover the entire range 10 – 40 GHz.	FY 2024 Q1	FY 2024 Q4	3
Improve one (1) testing method for the production and quality control of trace samples.	FY 2024 Q1	FY 2024 Q4	3
Investigate new methods for determining “Go” Vs “No Go” during small scale safety testing	FY 2024 Q1	FY 2024 Q4	3
Perform quality control on all synthesized HME products for T&E.	FY 2024 Q1	FY 2024 Q4	3
Perform small- and large-scale safety testing on (2) new novel HME threats	FY 2024 Q1	FY 2024 Q4	3
	FY 2025		
Add additional metric to the substrate quality control process for trace production.	FY 2025 Q1	FY 2025 Q4	3
Collect extended stability data for two (2) trace solutions.	FY 2025 Q1	FY 2025 Q4	3
Collect transfer efficiency data for two (2) trace threats.	FY 2025 Q1	FY 2025 Q4	3
Complete data collection activities for threat materials in support of test and evaluation.	FY 2025 Q1	FY 2025 Q4	3
Complete development of stability and shelf-life studies for two (2) trace threats.	FY 2025 Q1	FY 2025 Q4	3
Complete sample production and quality control support of one alarm resolution-based (1) IT&E and (1) DT&E test event (as applicable).	FY 2025 Q1	FY 2025 Q4	5
Continue development of new HME simulants for MMW and X-ray technologies.	FY 2025 Q1	FY 2025 Q4	3-5
Continue development of synthetic data validation methods and test tools for machine learning algorithm used in MMW and X-ray technologies.	FY 2025 Q1	FY 2025 Q4	3
Continue development of texture measurement tools and simulants with appropriate texture properties for X-ray technologies.	FY 2025 Q1	FY 2025 Q4	4
Continue performing Region of Responsibility and characterization measurements for new HME threats.	FY 2025 Q1	FY 2025 Q4	3
Develop measurement techniques to support MMW simulant development below 10 GHz.	FY 2025 Q1	FY 2025 Q4	3
Develop quality control criteria for two new HME threats.	FY 2025 Q1	FY 2025 Q4	3
Expand scale up and characterization procedures for new HME threats for test and evaluation.	FY 2025 Q1	FY 2025 Q4	3
Improve one testing method for the production and quality control of trace samples.	FY 2025 Q1	FY 2025 Q4	3
Perform quality control on all synthesized HME products for T&E.	FY 2025 Q1	FY 2025 Q4	3
Perform small- and large-scale safety testing on new novel HME threats.	FY 2025 Q1	FY 2025 Q4	4

Probabilistic Analysis of National Threats, Hazards, and Risks (PANTHR) Program – This program addresses biological, chemical and hazard knowledge gaps to inform defensive strategies that provide accurate, useful, and defensible knowledge and tools to stakeholders in time to enable risk-informed decision-making pertinent for defense against weapons of mass destruction threats to the Homeland. PANTHR supports a full spectrum of knowledge products (e.g., risk platforms, scientific reports/studies, etc.) that are programmatically housed within its Hazard Knowledge Management System (HKMS) in the Hazard Knowledge Center (HKC) which functions as both the internal information archive and single point source for disseminating CBRN hazard information across the HSE. The program will execute CBRN risk analysis capabilities to support national assessments, characterize biological and chemical hazards, to support HSE biological and chemical defense, and coordinate hazard awareness and characterization activities across S&T, DHS Components, and the HSE. The PANTHR program is executed in close coordination with CWMD through a request memorandum for CBRN hazard characterization and risk assessment from CWMD to S&T, as well as Operating Principles to guide mission management. Such program capabilities are accomplished through executing the following PANTHR’s projects; Biological Threat Characterization (BTC), Chemical Threat Characterization (CTC), Agricultural Threat Characterization (AgTC), and Tools for Integrated Evaluation of Risk (TIGER). These programmatic capabilities will deliver operationally relevant impacts by increasing awareness, improving understanding, and enabling more effective decision-making regarding current and future chemical and biological hazards through tailored product, tools, technologies, and information.

Agricultural Threat Characterization (AgTC)

- **Problem:** DHS Components and those defending U.S. food and agriculture require a capability to identify, evaluate, and characterize biological threats and vulnerabilities to the United States food and agricultural sector. Enhanced characterization data and analysis provide decision-makers with the knowledge products necessary to make data-informed assessments of potential risks to U.S. food and agriculture. Decision makers, planners, and responders lack critical data on certain characteristics of many threat agents. Scientific analysis is required to better inform investments that prevent, prepare for, respond to, and recover from potential threat events.
- **Solution:** AgTC activities conduct foundational research on traditional, new, and emerging biological threat agents that are of concern to the food and agricultural sector. The knowledge products (technical reports) and scientific data will support the development and validation of required analytic methods on the fundamental properties of hazardous agents, materials, and related technologies to support hazard awareness and the development of strategies. This advanced laboratory and field research will provide critical empirical data and insight on the properties of the highest risk threats and the hazards they pose to the food and agricultural sector. Knowledge products and scientific data will be made available to DHS Components, those defending U.S. food and agriculture, and the Chem/Biodefense community and will support operational elements in planning for, and responding to, natural and/or intentional events or disease outbreaks to prevent, prepare for, respond to, and recover from incidents.
- **Justification:** The FY 2025 Budget provides \$0.5M for this project, which is consistent with the FY 2023 Enacted. The funding for this project will enable execution of characterization research to fill critical knowledge gaps on agricultural hazards and support sector risk assessments. The FY 2025 Budget will support the generation of scientific data and knowledge products for top threats facing U.S. agriculture. AgTC will improve

the preparedness of the USG for agricultural defense by supporting efforts to characterize traditional, emerging, and advance biological hazards to the U.S. identified by PANTHR's Food and Agricultural Sector Risk Analytic Capability (FASRAC). The scientific data and knowledge products will be provided to stakeholders across the HSE and U.S. interagency to inform threat assessment, hazard modeling, and policy development.

- **Impact:** AgTC activities establish and leverage robust science-based capabilities to provide DHS with data and knowledge products that fill priority data gaps identified in PANTHR risk assessment cycle. The data, analysis, and information generated will improve decisions, planning, policies, and activities designed to prevent, protect, prepare, mitigate, respond, and recover from biological events. AgTC transitioned knowledge products and capabilities are important for effective preparedness and response to current and future agricultural threats and will inform national homeland defense recovery activities to mitigate the impact of an event on U.S. agriculture.

Type of Research

Applied

Technical Readiness Level

AgTC provides tools for testing and evaluation that are TRL 1-3. The AgTC project executes laboratory or field research on agricultural hazards to address critical knowledge gaps and to inform requirements, mission assessments and operational plans. Activities are initiated based on stakeholder (e.g., DHS Components, USDA, HHS, DoD) needs. This research requires appropriately accredited facilities to support agricultural hazard research.

Transition Plans

AgTC will deliver/transition the knowledge and insight produced by literature and laboratory studies through reports delivered to the HKC regularly. These reports are shared with the HSE, including the Intelligence Community and the DoD, through the HKMS and other information portals. AgTC reports and knowledge products provide the essential technical foundation for confidence in both DHS and national consequence and risk assessments, enabling policymakers to establish technically informed and sound policy. The AgTC reports and knowledge products enable decision makers to appropriately prioritize agricultural defense spending on CONOPS, training, research and development, and acquisition programs, potentially affecting hundreds of millions of dollars of government spending.

Project Schedule

<u>Research & Development Description</u>	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Conducted AgTC Projects execution, next year planning, and Year Project (portfolio) Review.	FY 2023 Q1	FY 2023 Q4	3
Developed/executed research studies to fill critical knowledge gaps on agricultural hazards based on priorities identified in risk assessments, collaboration with DHS Components, and PANTHR working group.	FY 2023 Q1	FY 2023 Q4	3
Transitioned at least one knowledge product resulting from agricultural threat studies to DHS Components and the agricultural defense community.	FY 2023 Q1	FY 2023 Q4	3
	FY 2024		
Conduct AgTC Projects execution, next year planning, and Year Project (portfolio) Review.	FY 2024 Q1	FY 2024 Q4	1-3
Deliver research studies to fill critical knowledge gaps on agricultural hazards based on priorities identified in risk assessments, collaboration with DHS Components, and PANTHR working group.	FY 2024 Q1	FY 2024 Q4	1-3
Deliver Agricultural Threat study findings to DHS Components and the agricultural defense community.	FY 2024 Q1	FY 2024 Q4	1-3
	FY 2025		
Conduct AgTC FY 2024 project execution, next year planning, and Year Project (portfolio) Review.	FY 2025 Q1	FY 2025 Q4	1-3
Transition at least one knowledge products resulting from an agricultural threat study to DHS Components and the agricultural defense community.	FY 2025 Q1	FY 2025 Q4	1-3
Deliver the AgTC data and reports into TIGER/FASRAC’s annual risk assessment and gap prioritization cycle.	FY 2025 Q2	FY 2025 Q3	1-3
Meet with internal AgTC team, the TIGER/FASRAC team, subject matter experts, and external stakeholders to discuss priorities and conduct next year planning (for FY 2026).	FY 2025 Q1	FY 2025 Q4	1-3

Biological Threat Characterization (BTC)

- **Problem:** DHS Components, and the biodefense community at large, lack critical data on certain characteristics of many biological threat agents, as well as the impact of technological advances on those characteristics. Improved data on these characteristics enables DHS Components to confidently predict the consequences or risk of a biological attack involving a given agent on the United States. In turn, these analyses allow decision-makers to effectively prioritize biodefense investments to prevent, prepare for, respond to, and recover from such an event. Further, this data is needed to define performance requirements for defensive countermeasures (e.g., detectors, personal protective equipment, and operational protocols) to ensure that the developed solutions mitigate hazards posed by biological threat agents.
- **Solution:** BTC activities provide knowledge products (technical reports) that are generated through conducting foundational research on traditional, new, and emerging biological threat agents, including development and validation of required analytic methods on the fundamental properties of hazardous biological agents, materials, and related technologies in order to support hazard awareness and the development of strategies. These rigorous laboratory experimentations will provide critical empirical data and insight on the properties of highest risk biological threat agents and the hazards that they pose. Knowledge products are made available to DHS Components and the U.S. biodefense community to support operational elements for use in planning for, and responding to, natural and/or intentional disease outbreaks to prevent, prepare for, respond to, and recover from incidents involving their use. BTC activities are executed in coordination and collaboration with the Hazard Awareness and Characterization Technology Center (HAC-TC) and the National Biodefense Analysis and Countermeasure Center (NBACC).
- **Justification:** The FY 2025 Budget provides \$17.7M for this project, a \$0.9M decrease from the FY 2023 Enacted. The funding for this project will enable execution of characterization research at the NBACC, National Laboratories, and industry partners to fill critical knowledge gaps on biological hazards and support enduring biological risk assessments which will directly support the goals and objectives outlined in the 2022 National Biodefense Strategy and Implementation Plan. This scientific data generated from this program is provided to various stakeholders across the HSE to inform an array of activities such as hazard modeling for operational planning, medical countermeasure development, and policy development. BTC will greatly improve the USG biodefense preparedness by supporting efforts to characterize traditional, emerging, enhanced, and advanced biological hazards to the Nation. The project also plans to transition at least four knowledge products resulting from biological threat agent studies to DHS Components and the biodefense community.
- **Impact:** BTC activities establish and leverage innovative science-based capabilities to provide DHS with data and knowledge products which improve pre-event planning, event-specific operational responses, and strategic biodefense preparedness decisions. The data, analysis, and information generated will improve decisions, policies, and activities designed to prevent, protect, prepare, mitigate, and respond, recover from biological events. BTC transitioned knowledge products and capabilities required for effective preparedness and response to current and future biological threats will inform national homeland defense recovery activities to mitigate the impact of a biological attack on the Homeland. BTC activities directly support and provide investment in the Administration's *National Biodefense Strategy and Implementation Plan (NBS IP)*. The BTC project supports Section 1.1.4.I of the NBS IP by leveraging the National Biodefense Analysis and Countermeasures Center (NBACC) laboratory and other strategic contracts across the USG, industry, and academia to execute foundational research rapidly and flexibly on

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traditional, new, and emerging biological threat agents, including development and validation of required analytic methods on the fundamental properties of hazardous biological agents, materials, and related technologies.

Type of Research

Applied

Technical Readiness Level

BTC provides tools for testing and evaluation that range from TRL-1 to TRL-3. The BTC project executes laboratory research on biological hazards to address critical knowledge gaps to inform requirements, mission assessments, and operational plans. Activities are started based on stakeholder (DHS Components, HHS, DoD, etc.) needs. This research requires appropriately accredited facilities to support biological hazard research.

Transition Plans

BTC delivers/transitions the knowledge and insight produced by laboratory studies through reports delivered to the S&T HKC regularly. These reports are shared with the HSE through the HKC's Biodefense Knowledge Management System and other information portals. BTC reports and knowledge products provide the essential technical foundation for confidence in both DHS and national consequence and risk assessments, enabling policymakers to establish technically informed and sound policy. The BTC reports and knowledge products enable decision makers to appropriately prioritize biodefense spending on medical and non-medical countermeasure acquisition programs affecting billions of dollars of Government spending.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Contributed priorities to the NBACC Annual Plan and executed approved plan (aligned with NBACC's contract performance year).	FY 2023 Q1	FY 2023 Q2	3
Delivered the BTC Data for Risk Results to be incorporated into TIGER's annual risk assessment.	FY 2023 Q2	FY 2023 Q3	3
Developed/executed 5 laboratory studies to fill critical knowledge gaps on biological threat agents based on priorities identified in collaboration with DHS Components and performers.	FY 2023 Q1	FY 2023 Q4	3
Developed/executed 5 literature reviews to fill critical knowledge gaps on biological threats agents or emerging technologies identified in collaboration with DHS Components and performers.	FY 2023 Q1	FY 2023 Q4	3
Met with internal BTC team, subject matter experts and external stakeholders to discuss priorities and conduct next year planning (for FY 2024).	FY 2023 Q3	FY 2023 Q4	3
Transitioned at least 6 knowledge products resulting from biological threat agent studies to DHS Components and the biodefense community.	FY 2023 Q1	FY 2023 Q4	3
Uploaded 10 biothreat reports to the Hazard Knowledge Center.	FY 2023 Q1	FY 2023 Q4	3

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Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2024		
Contribute priorities to the NBACC Annual Plan and execute approved plan (aligned with NBACC’s contract performance year).	FY 2024 Q1	FY 2024 Q2	1-3
Deliver the BTC Data for Risk Results to be incorporated into TIGER’s annual risk assessment.	FY 2024 Q2	FY 2024 Q3	3
Develop/execute 6 literature reviews to fill critical knowledge gaps on biological threats agents or emerging technologies identified in collaboration with DHS Components and performers.	FY 2024 Q1	FY 2024 Q4	3
Develop/execute 7 laboratory studies to fill critical knowledge gaps on biological threat agents based on priorities identified in collaboration with DHS Components and performers.	FY 2024 Q1	FY 2024 Q4	3
Meet with internal BTC team, subject matter experts and external stakeholders to discuss priorities and conduct next year planning (for FY 2025).	FY 2024 Q3	FY 2024 Q4	1-3
Deliver to the Homeland Security Enterprise at least seven (7) Biological Threat Agent Studies findings to DHS Components and the biodefence community.	FY 2024 Q1	FY 2024 Q4	1-3
Deliver 10 Biothreat report findings to the Hazard Knowledge Center.	FY 2024 Q1	FY 2024 Q4	3
	FY 2025		
Contribute priorities to the NBACC Annual Plan and execute approved plan (aligned with NBACC’s contract performance year).	FY 2025 Q1	FY 2025 Q2	3
Deliver the BTC Data for Risk Results to be incorporated into TIGER’s annual risk assessment.	FY 2025 Q2	FY 2025 Q3	3
Develop/execute at least 7 laboratory studies to fill critical knowledge gaps on biological threat agents based on priorities identified in collaboration with DHS Components and performers.	FY 2025 Q1	FY 2025 Q4	3
Develop/execute at least 7 literature reviews to fill critical knowledge gaps on biological threats agents or emerging technologies identified in collaboration with DHS Components and performers.	FY 2025 Q1	FY 2025 Q4	3
Meet with internal BTC team, subject matter experts and external stakeholders to discuss priorities and conduct next year planning (for FY 2026).	FY 2025 Q3	FY 2025 Q4	3
Deliver to the Homeland Security Enterprise at least seven (7) Biological Threat Agent Studies findings to DHS Components and the biodefence community.	FY 2025 Q1	FY 2025 Q4	3
Upload at least 10 new knowledge products to the HKC and continue to upload BTC reports to the Hazard Knowledge Center as necessary.	FY 2025 Q1	FY 2025 Q4	3

Chemical Threat Characterization (CTC)

- **Problem:** DHS Components and the chemical defense community have a need for a capability to identify, assess, and characterize chemical threats and vulnerabilities in the United States. Analyses allow decision-makers to effectively prioritize chemical-defense investments to prevent, prepare for, respond to, and recover from such an event. The community lacks critical data on certain characteristics of many chemical threat agents, as well as the impact of technological advances on those characteristics, and it requires analysis capabilities to be able to better inform decision makers and provide defensible recommendations on chemical defense investments to the HSE.
- **Solution:** CTC conducts chemical threat characterization and research and development activities in support of the HSE and chemical defense community. In accordance with the Homeland Security Act of 2002, Section 323, the Chemical Security Analysis Center (CSAC) shall be used to conduct studies, analyses, and research to assess and address domestic chemical security events. As such, the FY 2025 Budget enables CSAC to conduct chemical hazard analysis and characterization as well as chemical surveillance and detection. Additionally, CSAC develops and maintains science-and-technology-based quality assured information capabilities for acquiring, storing, indexing, evaluating, and making strategically available cheminformatic data, technical reports, and other knowledge products. CTC in coordination with the HAC-TC and collaboration with CSAC provides knowledge products (technical reports) that are generated through conducting foundational research on traditional, new, and emerging chemical threat agents. This includes development and validation of required analytic methods on the fundamental properties of hazardous chemical agents, materials, and related technologies to support hazard awareness and the development of chemical defense strategies. Knowledge products are made available to DHS Components and the U.S. chemical defense community and support operational elements nationwide. CTC in collaboration with CSAC provides the critical science and information that decision-makers rely upon to best prevent, prepare for, respond to, and recover from intentional or accidental chemical incidents.
- **Justification:** The FY 2025 Budget provides \$4.4M for this project, which is consistent with the FY 2023 Enacted. The FY 2025 Budget supports CSAC's core capabilities to enable 24/7 response and technical assistance to the HSE, including modeling and simulation, characterization of current and emerging chemical threats, bulletins, threat scenario planning support to Federal and State agencies, chemical threat knowledge tools that support Components as well as the HSE, and chemical security laboratory experimentation for DHS priorities. CSAC also provides a standing capability to rapidly execute high-priority and surge requirements to quickly respond to national emergencies and incidents involving chemical threats. The scientific data generated by CTC is provided to various stakeholders across the HSE to inform an array of activities such as hazard modeling for operational planning, medical countermeasure development, chemical threat detection and interdiction, safety and security of the Nation's food supply, and policy development that will greatly improve the USG's preparedness and chemical defense capabilities by researching and characterizing traditional, emerging, enhanced, and advanced chemical hazards to the Nation. This includes updating and maintaining a toxic chemical data repository to support strategic national risk assessments and other homeland security needs. CSAC develops and maintains chemical hazard characterization analysis capabilities which provides the HSE with information needed to make science-based, defensible decisions regarding Homeland defense and recovery. CSAC updates toxic syndromes, ensuring knowledge products are based on the results of the most recent science and technology advancements.

- **Impact:** CTC activities provide DHS with data and knowledge products which improve pre-event planning, event-specific operational response, and strategic chemical defense preparedness decisions. The data, analysis, and information generated will improve decisions, policies, and activities designed to prevent, protect, prepare for, mitigate, respond to, and recover from chemical events. Careful analyses based on quality data and reasoned assumptions will more efficiently focus homeland security investments. CSAC is the Nation's only Federal studies, analysis, and knowledge management center for assessing the threat or hazard associated with an accidental or intentional large-scale chemical event or chemical terrorism event in the United States. CSAC serves key partners such as CISA, USSS, CWMD, TSA, and I&A within DHS, as well as several interagency partners. CTC coordinate and collaborate with other entities within the USG, industry, and academia to maximize the ability to generate and utilize fundamental studies and analyses. CTC transition knowledge products and capabilities required for effective preparedness and response to current and future chemical threats that will inform national homeland defense recovery activities to mitigate the impact of a chemical attack on the Homeland.

Type of Research

Applied and Developmental

Technical Readiness Level

This project's activities span TRL-1 to TRL-7 and provide capabilities outside of technology development. The CTC project in collaboration with CSAC provides decision analytics support and executes laboratory research (TRL-3) on chemical hazards to address critical knowledge gaps to inform requirements, mission assessments and operational plans. Activities are initiated based on stakeholder (DHS Components, HHS, DoD, etc.) needs. CTC and CSAC products and information tools (TRL-7) inform decision makers on chemical hazards.

Transition Plans

CTC knowledge products and insights produced by laboratory studies such as those performed at CSAC will be delivered via reports, presentations, and tools that are directly transitioned to DHS Components, HSE stakeholders and international partners through the established CSAC processes as well as through the PANTHR Hazard Knowledge Center and other information portals such as HSIN. CSAC knowledge products (e.g., chemical-related tailored assessments) will be developed in accordance with the requirements (scope, content, timeline) of the stakeholder requesting the product.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2023			
Added a minimum of 5 technical or programmatic documents to the NTA Library to keep up to date with the latest published information.	FY 2023 Q1	FY 2023 Q4	N/A
Advanced the presumptive cyanide exposure detection innovation, to include performing laboratory testing and planning field trial testing using a prototype instrument.	FY 2023 Q1	FY 2023 Q4	4
Carried out characterization studies for a minimum of 4 potential threat agents in two matrices to fill critical data gaps that will support and inform planning, preparedness, mitigation activities and the strategic risk assessment.	FY 2023 Q1	FY 2023 Q4	5
Completed CARD v15.0 that will include new high threat chemicals and expanded taxonomy.	FY 2023 Q1	FY 2023 Q4	7
Conducted laboratory experiments to define surface deposition source term to accurately predict hazards associated with anhydrous ammonia spill/leaks.	FY 2023 Q1	FY 2023 Q3	2
Launched the Chemical Threat Knowledge Management Platform V2.0 by adding data from selected projects within S&T CSAC to allow for the coordinated search, recovery, and report formation.	FY 2023 Q1	FY 2023 Q4	3
Updated Non-Traditional Agent (NTA) Library by adding additional data points to advanced technical data matrices pertaining to all classes of NTAs, for the following research areas: toxicology, medical countermeasures, physical properties, detection, decontamination, and personal protective equipment.	FY 2023 Q1	FY 2023 Q4	3
Utilized CSAC’s chemical security laboratory core capability, evaluate emerging wearable sensors to detect chemical exposure for food protection and chemicals sensing in various settings.	FY 2023 Q1	FY 2023 Q4	5
FY 2024			
Deliver Acute Exposure Chronic Effects (AECE) research finding for determining potential long-term effects from acute exposures to toxic chemicals of interest for additional toxidromes to the Homeland Security Enterprise.	FY 2024 Q1	FY 2024 Q4	3
Add 5 technical or programmatic documents to the NTA Library to keep up to date with the latest published information.	FY 2024 Q1	FY 2024 Q4	N/A
Advance the presumptive cyanide exposure detection innovation to laboratory validation and initial field testing using a prototype instrument.	FY 2024 Q1	FY 2024 Q4	5-6
Carry out characterization studies for a minimum of two (2) potential threat agents in two matrices to fill critical data gaps that will support and inform planning, preparedness, mitigation activities and the strategic risk assessment.	FY 2024 Q1	FY 2024 Q4	3
Deliver CARD V18.0 that will enhance search protocols to continue to increase efficiency of the user experience to the Homeland Security Enterprise.	FY 2024 Q3	FY 2024 Q4	1-7

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Counter Terrorist Thrust Area

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
Deliver CARD V17.0 that will include new high threat chemicals and expanded taxonomy to the Homeland Security Enterprise.	FY 2024 Q1	FY 2024 Q2	7
Deliver authoritative information reference on currently available handheld/portable fentanyl detection technologies.	FY 2024 Q1	FY 2024 Q2	3
Deliver a test report that captured Jack Rabbit chamber results on effects of environmental factors on ammonia vapor cloud behavior to DHS CWMD.	FY 2024 Q3	FY 2024 Q4	3
Deliver Mass Balance Characterization report and chemical data of bleach decontamination of Fourth Generation Agents (FGAs) to the Homeland Security Enterprise.	FY 2024 Q1	FY 2024 Q4	4
Deliver updated Non-Traditional Agent (NTA) Library points to advanced technical data matrices pertaining to all classes of NTAs, for the following research areas: toxicology, medical countermeasures, physical properties, detection, decontamination, and personal protective equipment to the Homeland Security Enterprise.	FY 2024 Q1	FY 2024 Q4	3
	FY 2025		
Add 5 technical or programmatic documents to the NTA Library to keep up to date with the latest published information.	FY 2025 Q1	FY 2025 Q4	N/A
Carry out characterization studies for a minimum of two (2) potential threat agents in two matrices to fill critical data gaps that will support and inform planning, preparedness, mitigation activities and the strategic risk assessment.	FY 2025 Q1	FY 2025 Q4	5
Complete CARD V19.0 that will include new high threat chemicals and expanded taxonomy.	FY 2025 Q1	FY 2025 Q2	7
Complete CARD V20.0 that will enhance search protocols to continue to increase efficiency of the user experience.	FY 2025 Q3	FY 2025 Q4	1-7
Deliver final test report that captures Jack Rabbit chamber test results, including the effects of environmental factors on ammonia vapor cloud behavior.	FY 2025 Q1	FY 2025 Q2	3
Update NTA Library by adding more data points to advanced technical data matrices pertaining to all classes of NTAs, for the following research areas: toxicology, medical countermeasures, physical properties, detection, decontamination, and personal protective equipment.	FY 2025 Q1	FY 2025 Q4	3
SME elicitation and data collection to update the countermeasures and efficacy, response and recovery, and symptomology for chemical exposures.	FY 2024 Q2	FY 2025 Q2	3

Hazard Knowledge Center (HKC)

- **Problem:** DHS Component and HSE partners require the ability to access relevant and trusted data to enable them to make risk-informed decisions, yet no single source exists with authoritative and trusted models, tools, and data. To help our partners make decisions to prevent and protect against threats and risks, and to mitigate, respond to, and recover from CBRNE, food and agricultural, and biotechnology and bioeconomy hazards and threats, partners from across the HSE and the interagency need a secure, centralized repository where they may access relevant trusted technical results, information, analysis, and expertise.
- **Solution:** To host the large variety of classified and unclassified data and analyses, technical and analytical reports, and models and tools developed or written by the PANTHR projects, PANTHR has developed the Hazard Knowledge Management System (HKMS). The HKMS will host hazard data, models, tools, and capabilities generated by the AgTC, BTC, and CTC projects; and incorporate models, tools and algorithms generated by the TIGER project so it can support risk assessments generated by the PANTHR program. Leveraging cloud capabilities provided by I&A for its classified systems and by S&T's Office of Chief Information Officer for its FOUO system, the HKMS provides hosting solutions for safe and secure storage of PANTHR data, tools, products, and information, and secure access mechanisms for authorized users. The system will incorporate advancements in AI/ML technology to enable faster and more efficient extraction from the cloud-based database.
- **Justification:** The FY 2025 Budget provides \$0.4M for this project, which is consistent with the FY 2023 Enacted. The funding for this project will fund the HKMS cloud capability across FOUO and Top-Secret classification levels; fund the hosting of the first risk applications from existing PANTHR projects; transition both Chem and Bio data from multiple community sources and Lawrence Livermore National Laboratory (LLNL) Biodefense Knowledge Management System (BKMS) databases; and provide funding to maintain the administrative costs to build, host, and maintain the HKMS environments.
- **Impact:** The HKMS provides a centralized repository of information at multiple levels of classification that helps to increase the awareness and understanding of CBRNE, food and agricultural hazards, and risks across the HSE at multiple levels of classification. The data and tools it contains will inform a spectrum of decisions, ranging from policy, CONOPS, RDT&E, technology acquisitions, and the development and acquisition of medical countermeasures. By developing and deploying the HKMS into a combined knowledge repository for CBRNE and Food and Agricultural hazards and threats, and by leveraging cloud services developed elsewhere within DHS, the HKC will enable access to the required technical information and analysis through a single, cost-effective, and secure portal. This centralized storage and access point facilitates informed decisions so partners can prevent, prepare for, respond to, and recover from incidents involving these WMD hazards.

Type of Research

Applied and Developmental

Technical Readiness Level

This project's activities span TRL-4 to TRL-7 and provides capability outside of technology development. This project leverages technologies in the TRL-4 and above to develop a database structure that can be taken beyond TRL-7 into deployment for operational use and sharing of CBRN information within the HSE.

Transition Plans

Transition for the HKC involves two aspects: providing a long-term, secure hosting location for hazard data, documents, and tools for others in DHS and USG community and transitioning management of long-term responsibility for the FOUO HKMS to the DHS Office of National Labs and classified HKMS through DHS I&A. For the first, through its multi-level security network and individualized, secure-user-access portal, the HKC will continue to be the host for PANTHR risk capabilities and related scientific and threat information to the HSE to enable better informed decisions related to CBRN topics. For the second, long-term maintenance of the HKMS will transition to the Office of National Labs as a cloud-based platform to host the databases and user interface tools. For both aspects, HKC will be a leverage point for PANTHR to reach across DHS and the USG CBRNE hazard communities to transition its products and to broaden its partner base and utility.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Integrated PANTHR tools and capabilities across both FOUO and TS cloud environments.	FY 2023 Q1	FY 2023 Q4	7
Maintained and updated TS secure cloud data, tools, and applications.	FY 2023 Q1	FY 2023 Q4	4-7
Maintained unclassified//FOUO cloud data, tools, and applications.	FY 2023 Q1	FY 2023 Q4	4-7
	FY 2024		
Continue deployment of unclassified//FOUO cloud data, tools, and applications.	FY 2024 Q1	FY 2024 Q4	4-7
Continue development and deployment of TS secure cloud data, tools, and applications.	FY 2024 Q1	FY 2024 Q4	6
Continue development of HKMS portal and applications for HSE access.	FY 2024 Q1	FY 2024 Q4	6
Locate DHS network and funding to host Secret-level HKMS and plan hosting solution.	FY 2024 Q2	FY 2024 Q3	6
	FY 2025		
Conduct outreach across the HSE to five DHS Components and USG departments and agencies to gain users and advertise the capability across both TS and FOUO cloud networks.	FY 2025 Q1	FY 2025 Q4	6-7
Continue deployment of unclassified//FOUO cloud data, tools and applications.	FY 2025 Q1	FY 2025 Q4	6-7
Update and maintain unclassified//FOUO cloud data, tools, and applications.	FY 2025 Q1	FY 2025 Q4	6-7
Update and maintain TS secure cloud data, tools, and applications.	FY 2025 Q1	FY 2025 Q4	6-7

Tools for Integrated Evaluation of Risk (TIGER)

- **Problem:** DHS has the mission to prevent, protect, mitigate, respond, and recover from a range of intentional and unintentional events, including but not limited to CBRNE-based terrorist attacks, pursuant to the Homeland Security Act of 2002, Project Bio shield Act of 2004, Homeland Security Presidential Directive 9 and the Securing of Agriculture and Food Act of 2007. To meet these missions, Homeland Security Presidential Directives (18 and 22) and the National Biodefense Strategy outline the need for the comprehensive risk analysis capabilities of our Nation’s defenses to help inform investments for national strategic defense planning, while identifying key knowledge and capability gaps and evaluating critical vulnerability mitigation strategies. To fulfill this mission, decision-makers require guidance from risk-relevant data that characterizes threats to the Homeland, to effectively manage resources and reduce likelihood and impacts of hazards such as CBRNE incidents. A critical part of providing timely relevant risk informed decisions, is having the ability to execute risk analysis.
- **Solution:** TIGER will leverage hazard data and threat information, and to develop and produce modeling and software tools that are required by HSE to conduct and improve these hazard/risk assessments. The PANTHR projects provide knowledge products (i.e., technical reports) generated through rigorous laboratory experimentation providing critical data and insight on the properties of threat agents and the hazards that they pose.

TIGER knowledge products (i.e., risk assessments and tailored analyses) are made available to DHS Components and the United States CBRNE defense community to support strategic, operational, and tactical elements for use in planning for and responding to both natural and intentional CBRNE incidents. Various mathematical models and tool applications will be improved and developed to provide more informed analysis and decision support. TIGER is enhancing its risk execution system and models to enable the ability to run and produce the risk assessment in the Hazard Knowledge Management System (HKMS) cloud environment. The transition to the cloud environment will improve efficiency and performance through automation.

- **Justification:** The FY 2025 Budget provides \$14.5M for this project, a \$1.4M decrease from the FY 2023 Enacted. The funding for this project will continue to enable execution of the annual CBRN and food and agriculture sector risk analyses and expanding capabilities to address emerging and evolving threats. Additionally, funding will support advancement of risk analysis approaches and capabilities to other mission areas and threats, such as the Food and Agricultural Sector, Biotechnological threats, the U.S. Bioeconomy, and Explosive threats. Funding will also be allocated to enhance current models and risk analysis execution capabilities to enable deployment and running of risk in the cloud environment. The risk and tailored assessment capabilities generated from TIGER are required by, and provided to, various stakeholders (e.g., DHS Components, HHS, DoD) to better enable and inform an array of activities such as operational and response planning, medical countermeasure development and acquisition, research and development, and policy.
- **Impact:** TIGER’s capabilities provide the HSE with tailored analyses that assess risks and enable strategic, operational, and tactical decisions to increase prevention, protection, preparation, mitigation, response, and recovery from hazard events including, intentional and unintentional CBRNE events, threats to the Food and Agricultural Sector and risks to the U.S. Bioeconomy. By improving the ability to assess threats and understand hazards, the data and models will inform the HSE on prioritization of resources based on the highest CBRN risks (National Security

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Counter Terrorist Thrust Area

Strategy, priority action: “improve risk management”) and allow improvement of risk management and an ability to understand and prepare for the greatest risks to Americans. In FY 2023, TIGER leveraged several computational models to provide rapid decision support to DHS Components on a range of topics (e.g., risk-based medical countermeasure investments, workforce health analyses, collective protection systems, and more).

Type of Research

Applied

Technical Readiness Level

The project is TRL-3 and provides capability outside of technology development. TIGER generates a National Level CBRN and Food and Agriculture Sector Risk Assessment and various tailored assessments based on Stakeholder requests as final knowledge products to support decision makers across the HSE, leveraging varying computational models and risk methodology approaches.

Transition Plans

TIGER will regularly transition knowledge products (risk and tailored assessments, computational models, etc.) to the S&T Hazard Knowledge Center. These reports and products will be shared with the HSE, including the Intelligence Community and the DoD, through the HKC’s HKMS and other information portals. TIGER reports and knowledge products will provide the essential national consequence and risk assessments, enabling policymakers to establish risk informed and sound policy. The TIGER reports and knowledge products will enable decision makers to appropriately prioritize CBRN defense spending on medical and non-medical countermeasure acquisition programs affecting Government spending.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Executed development activities to improve and expand risk analysis capabilities.	FY 2023 Q1	FY 2023 Q4	3
Executed development activities to support the agriculture risk assessment framework.	FY 2023 Q1	FY 2023 Q4	3
Executed development activities to support the risk assessment framework for Bioeconomy.	FY 2023 Q1	FY 2023 Q4	3
Executed development activities to support the risk assessment framework to integrate biotechnological threats.	FY 2023 Q1	FY 2023 Q4	3
Generated tailored assessments to address stakeholder needs.	FY 2023 Q1	FY 2023 Q4	N/A
Identified development priorities for modeling and risk analysis capabilities.	FY 2023 Q3	FY 2023 Q4	N/A
Identified priority technical hazard data gaps for BTC, CTC, and AgTC.	FY 2023 Q3	FY 2023 Q4	N/A
Produced updated National CBRN Risk Data image for national assessments and risk tools.	FY 2023 Q1	FY 2023 Q4	3

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Counter Terrorist Thrust Area

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2024		
Execute development activities to improve and expand capabilities to support the food and agriculture risk assessment framework.	FY 2024 Q1	FY 2024 Q4	3
Execute development activities to improve and expand capabilities to support the risk assessment framework to integrate biotechnological threats.	FY 2024 Q1	FY 2024 Q4	3
Execute development activities to improve and expand core computational risk analysis capabilities.	FY 2024 Q1	FY 2024 Q4	3
Generate 10 tailored assessments to address stakeholder needs.	FY 2024 Q1	FY 2024 Q4	3
Identify development priorities for modeling and risk analysis capabilities.	FY 2024 Q3	FY 2024 Q4	N/A
Identify priority technical hazard data gaps for BTC, CTC, and AgTC.	FY 2024 Q3	FY 2024 Q4	N/A
Deliver updated National Risk Data for CBRN, Food and Ag Sector, Bioeconomy and Biotechnology analyses to leverage for national assessments, tailored assessments, and decisions support tools to the Homeland Security Enterprise.	FY 2024 Q1	FY 2024 Q4	3
	FY 2025		
Execute development activities to improve and expand capabilities to support the food and agriculture risk assessment framework.	FY 2025 Q1	FY 2025 Q4	3
Execute development activities to improve and expand capabilities to support the risk assessment framework to integrate biotechnological threats.	FY 2025 Q1	FY 2025 Q4	3
Execute development activities to improve and expand core computational risk analysis capabilities.	FY 2025 Q1	FY 2025 Q4	3
Generate 20 tailored assessments to address stakeholder needs.	FY 2025 Q1	FY 2025 Q4	3
Identify development priorities for modeling and risk analysis capabilities.	FY 2025 Q1	FY 2025 Q4	N/A
Identify priority technical hazard data gaps for BTC, CTC, and AgTC.	FY 2025 Q1	FY 2025 Q4	N/A
Deliver updated National Risk Data for CBRN, Food and Ag Sector, Bioeconomy and Biotechnology analyses to leverage for national assessments, tailored assessments, and decisions support tools to the Homeland Security Enterprise.	FY 2025 Q1	FY 2025 Q4	3

**Cyber Security/Information Analysis R&D Thrust Area
Research and Development**

Technology Readiness Level Exhibit
(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget
Cyber Security / Information Analysis Thrust Area	\$48,567	\$48,567	\$33,550

R&D Thrust Area Description

CYBER SECURITY / INFORMATION ANALYSIS R&D THRUST AREA: Conducts and supports RDT&E and transition of advanced cybersecurity and information assurance technologies which secure the Nation’s current and future cyber and critical infrastructures. These solutions include user identity and data privacy technologies, end system security, law enforcement forensic capabilities, secure protocols, and software assurance.

CYBER SECURITY / INFORMATION ANALYSIS THRUST AREA <i>(Dollars in Thousands)</i>				
Program	Project	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President’s Budget
Cybersecurity Program (formerly Information Analytics)		\$48,567	\$48,567	\$33,550
	Cyber Data Analytics	\$47,067	\$47,067	\$33,000
	Cybersecurity for Law Enforcement	\$1,500	\$1,500	\$550
Total – Cyber Security / Information Analysis Thrust		\$48,567	\$48,567	\$33,550

Cybersecurity Program– This program conducts research, analysis, and development of technologies to strengthen defensive cybersecurity capabilities in a spectrum of strategic technical areas to mitigate risk to the Nation’s critical infrastructure, Federal government, as well as State, local, tribal, and territorial organizations. The increasing reliance on complex data, technology, communication, and interconnectivity has changed and expanded vulnerabilities and increased the potential risk to governmental, citizen services, and critical infrastructure continuity.

Cyber Data Analytics

- **Problem:** Currently, there is no centralized source and capability CISA’s operational units to query and correlate information related to cyber risk analysis, physical and infrastructure risk, and blended cyber-physical risk/threat. To close operational gaps, this research area will enhance the ability of operational units to correlate threat intelligence and risk data. This includes analysis of elements, increasing automated tools, and providing situational awareness of risk factors. This research area develops applied artificial intelligence / machine learning (AI/ML) infrastructure, algorithms, and tools to enable security orchestration, automation, and response (SOAR); behavioral anomaly detection; data reduction; tipping and queuing of analyst workflows; and other user driven mission needs. CISA’s Threat Hunting leads the Federal response by serving as its primary operational arm in the execution of the asset response mission. To support the execution of the asset response mission, operators must be able to streamline the advanced analytics through usage of AI/ML.
- **Solution:** This research area supports the improvement of computational analytics and information sharing to improve homeland security cyber-physical security risk analysis across government, the sixteen Critical Infrastructure Sectors, and fifty-five National Critical Functions. This work is strategic in nature with tactical capability milestones. The work is driven by a vision for next generation CISA architectures, computation, and decision-making capabilities, and establishes the foundation for future AI solutions. Activities will focus on maturing CISA data analytics efforts through the development of representative data sets, stand up of joint computational sandbox capabilities, assessment of emerging analytics tools, experimentation with a variety of analytics use cases, and establishment of strategic research capabilities for the development of secure multi-party computational capabilities. This will be accomplished through the following:

Generative and Robust AI Capabilities; Machine Learning Operations and Risk Reduction: Investigate approaches and develop methodologies for CISA to reduce risk and increase automation with emerging AI capabilities. Develop model resiliency methods to defend against the adversarial use of AI. Leverage generative AI capabilities to automate incident response and monitor models and data for drift. Develop a framework for ML operations to help CISA reduce risk in operationalizing AI/ML capabilities. This area builds upon and leverages outcomes from prior AI/ML research in the CISA Advanced Analytics Platform for Machine Learning (CAP-M) to advance the program and address higher-order AI/ML research and counter-adversarial emerging threats and capabilities.

Software Assurance and Data Protection: Develop and advance cybersecurity tools and analytic techniques to improve the security and privacy of data in four major areas: 1) Data Bill of Materials; 2) Software Bill of Materials; 3) Software Understanding for National Security and Critical Infrastructure, and 4) Privacy Enhancing Technologies. These efforts will enhance CISA’s ability to increase stakeholder trust and willingness to share data, verify trusted data and authoritative data sources, enable enhanced insights into mission data, improve efficiency of data operations, enable operational collaboration opportunities, and improve the protection and usability of sensitive or restricted datasets.

- **Justification:** The FY 2025 Budget provides \$33.0M for this project, a \$14.0M decrease from the FY 2023 Enacted. The reduction reflects S&T’s topline funding needs balanced against the continued assessment of Component partner R&D requirements. Investment in these research areas positions technology innovations for operational use. This program enables exploration of new automation technologies that will

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Cyber Security/Information Analysis R&D Thrust Area

accelerate effective integration of efficient data ML infrastructure to underpin the analytics architecture for CISA. This funding will develop and deliver data analytics and ML technologies to enhance CISA Threat Hunting and Vulnerability Management capabilities in defense of Federal networks and the Nation’s critical infrastructure. This program also plans to transition capabilities using emulation, active data collection, and analysis to gain information about adversaries, improve real-time network defense, and deliver capability advances in risk analysis for assessing and mitigating cybersecurity risks to critical infrastructure.

- **Impact:** The program and related projects will provide CISA with capabilities to respond proactively and reactively to emerging cyber threats, rapidly deploy new AI/ML models, and update existing models with minimal risk. This program additionally supports CISA’s mission execution through verification of data integrity, protection of critical and sensitive data, and enhancement of data operations, discovery, and usability across the agency.

Type of Research

Applied and Developmental

Technical Readiness Level

Project is identifying concepts currently at TRL-2+, and in partnership with the interagency, academia, industry and CISA, developing them into operational capability (TRL-7), to inform planning for full operational implementation.

Transition Plans

- Deliver targeted exploratory, developmental, and operational capabilities directly to CISA for operational use.
- Advance development of a technology platform to accelerate data characterizations, discovery, and innovation directly with CISA partners and to accelerate the assessments of technology and transition of S&T and CISA partner research innovations into operational use.
- Transition architectural concepts to CISA for use in future planning through workshops, white papers, technical assessments, technical reports, data inventories, and joint experiments.
- S&T, in conjunction with CISA, may publish items on open-source GitHub (a code hosting platform for version control and collaboration) and other platforms for general use.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Achieved Federal Information Security Modernization Act (FISMA) compliance (Authorization to Proceed) for multi-cloud sandbox environment.	FY 2023 Q1	FY 2023 Q4	N/A
Completed model integration of the Trustmark open-source tools (e.g., Trust Policy Authoring software, Trustmark Binding Registry software) into enterprise-level single sign-on (SSO) and	FY 2023 Q1	FY 2023 Q3	7

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Cyber Security/Information Analysis R&D Thrust Area

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
multi-factor authentication (MFA) capabilities to achieve improved usability along with greater security and compliance.			
Completed two technical evaluation reports that summarize seedling research and development efforts in areas aligned to CISA technology requirements.	FY 2022 Q4	FY 2023 Q4	2-4
Conducted a pilot site implementation of the chemical analysis device (CAD)-to-CAD (computer-aided dispatch) interoperability specification to demonstrate how standards-based interoperability can be achieved between disparate systems.	FY 2022 Q3	FY 2023 Q2	5
Conducted a technical exchange session with CISA to inform best practices for analytic environments and applications of analytic methods and tools for mission problems.	FY 2023 Q1	FY 2023 Q4	N/A
Delivered a focused 5G security study to CISA which identifies gaps for 5G in the areas of network security, cybersecurity, and supply chain security.	FY 2023 Q1	FY 2023 Q4	N/A
Delivered a knowledge product that uses stateful communication protocols SS7, Diameter and GTP Firewall with security-focused advanced analytics algorithms and a global threat intelligence service to ensure network borders are continually secured.	FY 2023 Q1	FY 2023 Q4	N/A
Delivered a study with recommendations for high-performance, distributed, large-scale analytics for application to CISA use cases.	FY 2022 Q4	FY 2023 Q4	4-7
Delivered analysis of software supply chain protection techniques, software bill of materials validation approaches, and operational software test and evaluation tools.	FY 2022 Q4	FY 2023 Q4	5
Delivered capability advances in risk analysis for assessing cyber risks to critical infrastructure.	FY 2023 Q1	FY 2023 Q4	4-6
Delivered capability advances to CISA on the use of emulation and active data collection/analysis to gain information about adversaries to improve real-time network defense.	FY 2022 Q1	FY 2023 Q4	4-6
Delivered cybersecurity techniques to CISA which advances automated cyber threat prediction, recognition, identification, and mitigation.	FY 2023 Q1	FY 2023 Q4	4-6
Delivered prototype plans for software assurance and integrity approaches utilizing machine learning capabilities and environments.	FY 2022 Q4	FY 2023 Q4	4
Developed a use case to inform the analytic methods and tools for cyber and/or infrastructure missions for the multi-cloud sandbox environment.	FY 2023 Q1	FY 2023 Q4	4
Expanded CISA's advanced analytics environment to support an infrastructure security use case.	FY 2022 Q2	FY 2023 Q4	N/A
Provided a demo of a seamless, multi-cloud sandbox environment for developing rapid analytics for CISA missions.	FY 2023 Q1	FY 2023 Q4	5-6
Transitioned the Deception Orchestration Leveraging Open-Source-Intel effort to CISA.	FY 2023 Q1	FY 2023 Q4	4-6
	FY 2024		
Conduct advanced analytics and machine learning experimentation for two new CISA mission use cases in a multi-cloud environment.	FY 2024 Q1	FY 2024 Q4	6
Deliver capability advances in risk analysis for assessing and mitigating cybersecurity risks to critical infrastructure.	FY 2024 Q1	FY 2024 Q4	4-6

Research, Development, and Innovation – PPA

Cyber Security/Information Analysis R&D Thrust Area

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
Deliver interim analyses of software supply chain protection techniques, software bill of materials validation approaches, and operational software test and evaluation tools.	FY 2024 Q1	FY 2024 Q4	5
Deliver interim studies and prototype plans for software assurance and integrity approaches utilizing machine learning capabilities and environments.	FY 2024 Q1	FY 2024 Q4	4
Demonstrate an application that enables CISA to conduct secure, privacy-protecting collaborative computations in a multi-cloud environment.	FY 2024 Q1	FY 2024 Q4	4-6
Demonstrate novel approaches to mitigate operational risks for collaborating on ML and data science with partners in DHS and external CISA stakeholders (e.g., Federal, academia, industry, etc.).	FY 2024 Q1	FY 2024 Q4	4-6
Develop telemetry analytics using deep learning models to support increased protection of container-based and general cloud computing systems.	FY 2024 Q1	FY 2024 Q4	1-3
Deliver cybersecurity capabilities to CISA to advance automated cyber threat analysis, recognition, identification, and mitigation.	FY 2024 Q1	FY 2024 Q4	3-5
	FY 2025		
Conduct a landscape assessment of Generative AI technologies, capabilities, and risks.	FY 2025 Q1	FY 2025 Q4	2
Conduct a technical exchange workshop on adversarial machine learning.	FY 2025 Q1	FY 2025 Q4	2
Deliver final analyses of software supply chain protection techniques, software bill of materials validation approaches, and operational software test and evaluation tools.	FY 2025 Q1	FY 2025 Q4	5
Deliver final studies and prototype plans for software assurance and integrity approaches utilizing machine learning capabilities and environments.	FY 2025 Q1	FY 2025 Q4	5
Deliver initial models, tools, and techniques to improve the software understanding ability of critical infrastructure stakeholders and increase their resilience to software-based threats.	FY 2025 Q1	FY 2025 Q4	1-3
Deliver targeted models, techniques, and methodologies in risk analysis to enhance CISA's capability to assess and mitigate cybersecurity risks to critical infrastructure.	FY 2025 Q1	FY 2025 Q4	1-3
Provide initial assessment of appropriate privacy-enhancing tools and technologies to support critical infrastructure security.	FY 2025 Q1	FY 2025 Q4	1-3
Provide results of initial landscape study on software bill of materials and data bill of materials capabilities and gaps.	FY 2025 Q1	FY 2025 Q4	1-2
Transition deep learning, telemetry analytics models, techniques, and capabilities to support increased protection of container-based and general cloud computing systems.	FY 2025 Q1	FY 2025 Q4	1-4
Transition software vulnerability-focused tools and techniques to enhance CISA's cyber threat analysis, recognition, identification, and mitigation capabilities.	FY 2025 Q1	FY 2025 Q4	1-5

Cybersecurity for Law Enforcement

- **Problem:** A significant barrier for DHS Components with a law enforcement mission is adapting to constantly evolving technologies used in criminal enterprise tactics, as well as technologies and tools used to counter or investigate those activities.

New technologies, modalities, and training are required to equip and enable law enforcement to counter these evolving threats. Some of the threats being encountered include cyber-physical attacks of fleet vehicle vulnerabilities, Internet of Things (IoT) vulnerabilities, and cyber-attacks against critical infrastructure.

- **Solution:** This project supports the research, analysis and development of new technologies, capabilities, and standards to assist law enforcement in training, prevention against cyber-attacks, cyber-crime investigations, and the forensic analysis of technologies used in criminal activity. These solutions will be delivered through the following:
 - Fleet Vehicle Cybersecurity Analysis and Mitigation: Develops a “defense-in-depth”, privacy-compliant strategy to enhance capabilities to mitigate current and expected cyber-physical threats against vehicles used in DHS Component law enforcement protective missions. Provides material and non-material solutions to diagnose and prevent cybersecurity vulnerabilities in Component vehicle fleets, specifically addressing vulnerabilities in vehicle attack surfaces, (i.e., electronic control units (ECUs) and Controller Area Network (CAN) buses.)
- **Justification:** The FY 2025 Budget provides \$0.6M for this project, a \$0.9M decrease from the FY 2023 Enacted. The funding for this project will evaluate current technologies to be targeted for development, modification, and integration to fit within the law enforcement operational mission space and develop low to no cost exportable cyber forensics tools and process training. In FY 2025, procedural designs and practices will be developed and tested to provide options for secure open-source software supply chain validation and acquisition guidance.
- **Impact:** These technologies, capabilities, and standards will reduce the amount of time needed to analyze technology used in illicit activity, reduce the cost of acquisition for law enforcement agencies, and narrow the technology capability gap between criminals and law enforcement.

Type of Research

Applied and Developmental

Technical Readiness Level

TRL varies for specific project activities between TRL-3 and TRL-7. This project’s R&D efforts typically start by performing a market survey of available COTS and GOTS technology that could be adapted for DHS Component use. Identified technology is then adapted and validated in a laboratory or relevant environment (TRL-4/5). Following successful validation, the most promising solution(s) are then prototyped and evaluated first in a relevant environment (TRL-6) then in an operational environment (TRL-7) prior to transition.

Transition Plans

End-users and partners, including DHS Law Enforcement Components, test developed tools and technologies, and at times, the project provides limited hardware/software licenses to support transition. Otherwise, tools and technologies are transitioned into commercially available tools or integrated into law enforcement field deployment.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2023			
Delivered to the Federal Law Enforcement Training Center (FLETC) a landscape assessment of current and next-generation Internet of Things devices to support development of training for law enforcement entities.	FY 2023 Q2	FY 2023 Q4	3
FY 2024			
Complete research to inform a cyber-physical threat assessment identifying threat actors, objectives, and capabilities impacting law enforcement fleet vehicles, supporting recommendations to improve the security of Component vehicle fleets.	FY 2024 Q1	FY 2024 Q4	1
Select, in coordination with the FLETC, a sample of COTS and GOTS mitigation devices for research and analysis on use cases and operational scenarios of relevance to law enforcement and Federal agencies with law enforcement missions.	FY 2024 Q1	FY 2024 Q4	N/A
FY 2025			
Deliver results of research and analysis on threats, vulnerabilities, applicable policies, and sustainment infrastructure recommendations to improve the cybersecurity and resiliency of Component vehicle fleets.	FY 2024 Q1	FY 2025 Q2	1-3
Provide tested procedural designs and practices for secure open-source software supply chain validation and acquisition guidance.	FY 2025 Q1	FY 2025 Q4	3
Select, in coordination with the FLETC, tools, algorithms, and techniques for conducting open-source research for data and evidence collection to support development of new forensic solutions.	FY 2024 Q1	FY 2025 Q4	1-4

**First Responder/Disaster Resilience Thrust Area
Research and Development**

Technology Readiness Level Exhibit

(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget
First Responder / Disaster Resilience Thrust Area	\$55,950	\$55,950	\$24,950

R&D Thrust Area Description

FIRST RESPONDER / DISASTER RESILIENCE THRUST AREA: Work includes reducing vulnerability of critical infrastructure to terrorist attacks and other hazards; working with State, Local, Tribal, and Territorial (SLTT) governments to secure their information systems; working with local and regional partners to identify hazards, assess vulnerabilities, and develop strategies to manage risks associated with all hazards; increasing the level of preparedness of SLTT partners, as well as nongovernmental organizations, the private sector, and the general public; advancing and improving disaster emergency and interoperable communications capabilities; and improving capabilities of DHS and its Components to lead in emergency management.

FIRST RESPONDER / DISASTER RESILIENCE THRUST AREA				
<i>(Dollars in Thousands)</i>				
Program	Project	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 CJ Submission
Community and Infrastructure Resilience		\$40,550	\$40,550	\$9,550
	Climate Adaptation and Resilience	\$20,000	\$20,000	-
	Community Resilience Testbeds	\$3,200	\$3,200	\$2,500
	Critical Infrastructure Resilience	\$4,000	\$4,000	-
	Disaster Recovery	\$4,200	\$4,200	\$1,950
	Flood	\$6,000	\$6,000	\$3,600
	Next Generation Disaster Proofing	\$3,150	\$3,150	\$1,500
First Responder Capability		\$15,400	\$15,400	\$15,400
	Explosives & Radiological/Nuclear Resiliency	\$1,500	\$1,500	\$1,500
	First Responder Technologies	\$5,000	\$5,000	\$4,700
	Personal Protective Equipment (formerly Compact Personal Protective Equipment)	\$1,500	\$1,500	\$2,500
	Public Safety Communications	\$1,500	\$1,500	\$1,000
	Response and Defeat Operations Support (REDOPS)	\$3,000	\$3,000	\$3,300
	Stakeholder Engagement and Requirements (First Responder Requirements Group & International)	\$500	\$500	-
	Training and Optimization Performance	\$2,400	\$2,400	\$2,400
Total –First Responder / Disaster Resiliency Thrust		\$55,590	\$55,590	\$24,950

Community and Infrastructure Resilience Program (C&IR) – This Program conducts research in new and emerging technologies for streamlining and optimizing FEMA disaster resilience investments in insurance, mitigation, and recovery operations, and assistance programs, along with enabling SLTT and private sector involvement. Additionally, the C&IR Program conducts R&D in support of CISA and the development of standards and best practices to improve and enhance information-sharing capabilities.

Climate Adaptation and Resilience

- **Problem:** Climate change directly affects the Homeland Security missions of DHS, FEMA and CISA and requires access to the latest science and technology to address the risks and impacts of climate change. Climate change is driving sea level rise and changing weather patterns, resulting in increased droughts, floods, hurricanes, and wildfires. Additionally, changing weather patterns are directly impacting the Nation’s agricultural sector. The Nation faces increased loss of lives, damage to critical infrastructure and increased economic impacts due to natural disasters caused by climate change resulting in forced migration and population relocation. These increases affect the ability of the Federal government to financially support disaster recovery and maintain a sound financial framework for FEMA’s Federal Insurance and Mitigation Program and other programs. The impact of climate change extends beyond the United States, instability, and displacement in one country have ripple effects which can be felt throughout regions across the world. Meeting this challenge requires mobilizing science at an unprecedented scale to address the long-term effects and the near-term impacts to Homeland Security and public safety. New technologies and sciences are needed to respond to climate change, and create opportunity for specialized jobs, strong economies, and a more secure world.
- **Solution:** DHS will support State and local governments to meet the Administration’s climate change and resiliency goals through Departmental programs. These programs aim to set policies, guidelines and standards, and administer grants. S&T performs the research, development, innovation, and operational experimentation needed to evolve climate science research. S&T is applying research addressing the long-term changes in risk from multiple compounding hazards, such as flooding and hurricanes. S&T will lead coordination of research needs and requirements for climate change to the HSE, in collaboration with DOE for new insurance and economic risk sharing solutions, and develop smart materials for more resilient buildings and infrastructure, use of alternative energy vehicles for disaster response, and carbon sequestration technologies for debris removal and risk reduction, such as forest undergrowth thinning, early warning sensors and disaster resilience, adaptation, and sustainability modeling. S&T will accomplish this by tapping into the imagination, talent, and grit of America’s innovators, scientists, and workers. S&T will fund this research in climate adaptation and resilience in collaboration with the interagency. This collaborative model of high-risk, accelerated research is uniquely meant to conduct R&D that, if successful, results in transformational technology advancements.
- **Justification:** The FY 2025 Budget does not include funding for this project as current activities are fully funded.
- **Impact:** Continuing this research allows DHS Components to reduce disruptions and mitigate risks to critical infrastructure, improve social and environmental equity in climate resilience, improve the resilience of critical information and communication technology, and promote solutions for strengthening climate resilience and reducing carbon emissions.

Type of Research

Applied and Developmental

Technical Readiness Level

TRL varies for specific project activities between TRL-3 and TRL-7. This project's R&D efforts will begin by conducting a requirements analysis and gap analysis including performing a market survey of available COTS and GOTS technology that could be adapted for DHS Component use. Active research and development will be initiated to prove feasibility (TRL-3). A system concept utilizing the identified technologies is then developed and validated in a relevant environment (TRL-5). Following successful validation, the most promising solution(s) are then prototyped and evaluated first in a relevant environment (TRL-6) then in an operational environment (TRL-7) prior to transition and end user adoption.

Transition Plans

The intended pathway for the transition of the Climate Adaptation and Resilience technologies, materials, and knowledge products are to submit the final prototypes and findings to FEMA and CISA at the end of the period of performance for each activity. Success will be determined by FEMA's and CISA's ability to implement climate change mitigation practices and work with SLTT governments to enforce these practices to better protect their communities. The intended end users are community officials and individuals that use novel materials to affordable and environmentally friendly solutions for strengthening climate resilience. A successful transition will be able to be implemented in communities that are the most impacted by climate change and will provide greater social and environmental equity and climate resilience.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2023			
Conducted Climate Resilience Innovation prize competition for wildfires.	FY 2023 Q1	FY 2023 Q4	3-7
Conducted demonstration of hydrogen fuel powered vehicle for disaster response and recovery to foster the use of alternative energy equipment.	FY 2023 Q1	FY 2023 Q2	3-7
Identified scientifically sound sources of data on social equity related to disaster resilience and public action plans to improve disaster resilience outcomes.	FY 2023 Q3	FY 2023 Q4	3-5
Researched and identified initial use cases for technologies to enable sensors with on-board analytics for automated alerting.	FY 2023 Q1	FY 2023 Q3	3-7
Researched new insurance and economic sharing solutions to identify critical data and capability gaps to conduct policy incubation experiments to increase climate resilience.	FY 2023 Q1	FY 2023 Q3	3-5
FY 2024			
Assess Clean Power for Hours (Behind the Meter Storage) Submission Review.	FY 2024 Q2	FY 2024 Q3	6-7
Complete a parametric study on the effects of geometry and materials using US Army Engineer Research and Development Center’s (ERDC) Centrifuge Research Complex.	FY 2024 Q2	FY 2024 Q4	4
Develop capability to model cascading dam failures to enhance the accuracy of dam and levee failure simulations.	FY 2024 Q1	FY 2024 Q4	4
FY 2025			
Complete artifact documentation following the 6th EMPOWER exercise.	FY 2025 Q1	FY 2025 Q4	4-7
Deliver final Remote Sensing for Geohazards Resilience Report to FEMA and North Atlantic Treaty Organization (NATO) / Science for Peace and Security (SPS).	FY 2025 Q1	FY 2025 Q3	4-7
Finalize the Mesonet weather Hotspot Integration and Prototype Revision within the Exploiting Mesonets for Emergency Preparedness and Response to Weather Extremes (EMPOWER) solution.	FY 2025 Q1	FY 2025 Q4	4-7
Finalize training material and complete stakeholder training on the Geohazard Resilience activity.	FY 2025 Q1	FY 2025 Q3	4-7
Initiate large scale tests conducted to study anchorage of thick FRP laminates.	FY 2025 Q1	FY 2025 Q3	4-7
Construct, train and validate deep learning architectures and provide a comprehensive summary and ranking of their performances in detecting concrete dam damage.	FY 2025 Q1	FY 2025 Q3	4-7
Integration of artificial neural network (ANN) based simulation models and centrifuge modeling results into a graphic user interface which will allow a user to input levee material and geometric properties and predict, with high degree of confidence, the anticipated type of failures and their associated probabilities of failure.	FY 2025 Q1	FY 2025 Q3	4-7

Community Resilience Testbeds

- **Problem:** The consequences of manmade and natural disasters continue to rise on an annual basis. FEMA, State, and local communities need access to new and emerging innovative technologies to strengthen critical infrastructure lifelines, mitigate hazard vulnerabilities, and strengthen residential housing and commercial structures to reduce disaster risks and allow for a timelier recovery period.
- **Solution:** This R&D will pursue emerging technologies for streamlining/optimizing FEMA disaster resilience investments in insurance, mitigation, and recovery operations/assistance programs, and enable State, local, and private sectors. This will include setting up testbeds with local communities and the private sector to assess, evaluate, and innovate new approaches and technologies. The project also serves as proving grounds for enhancing cooperation between Federal, State, local, and private sector to spur innovation and ensure new technologies and approaches work and are implementable.
- **Justification:** The FY 2025 Budget provides \$2.5M for this project, which is a \$0.7M decrease from the FY 2023 Enacted. Funding is necessary to experiment, evaluate, validate, and support the transition of future R&D outputs to FEMA and its external stakeholders including high risk areas and assisting FEMA with updating related policy, doctrine, operations, and training plans. In addition, funds will support ready to implement R&D projects for Civic Innovation that address the requirements of DHS, FEMA, and its stakeholders in building community resilience. Further, funding will support community-level testing and evaluation of the Compound Flood modeling toolset.
- **Impact:** In support of FEMA, this project will evaluate and validate new solutions to reduce fatalities and property losses, keep pace with the Nation's evolving disaster risks, expand State and local capacities, and prioritize and optimize its pre- and post- disaster grants programs.

Type of Research

Developmental

Technical Readiness Level

The project efforts will range between TRL-5 and TRL-7. This project's R&D efforts include Performing a market survey of available COTS and GOTS technology that could be adapted for FEMA use. A system concept utilizing the identified technologies is then developed and validated in a relevant environment (TRL-5). Following successful validation, the most promising solution(s) are then prototyped and evaluated first in a relevant environment (TRL-6) then in an operational environment (TRL-7) prior to transition.

Transition Plans

The intended transition pathway is to transfer operational tools and knowledge products to FEMA at the end of the period of performance for each activity. Success will be determined by FEMA’s ability to implement community resilient technologies and best practices in selected communities. The intended end users are State, local, and tribal governments in those communities heavily impacted by natural disasters. The desired end state is to implement new solutions, grant programs, and investments in technology and disaster planning. Transition measures of success for this effort will be demonstrated by a reduction in the number of fatalities and property losses following a natural disaster.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Conducted field-level testing and evaluation of FY 2022 natural disaster innovations from the community and infrastructure resilience R&D investments within S&T community resilience testbeds.	FY 2023 Q1	FY 2023 Q4	3-7
Launched stage two of the national resilience Civic Innovation Challenge that connects researchers, community partners, and industry to solve key resilience challenges through new approaches, solutions, and technologies.	FY 2023 Q2	FY 2023 Q4	3-7
	FY 2024		
Conduct community-level testing and evaluation of the Compound Flood modeling toolset.	FY 2024 Q1	FY 2024 Q3	4-7
	FY 2025		
Deliver a publicly available FloodAdapt application for all emergency managers to utilize for the modeling of compound flooding.	FY 2025 Q1	FY 2025 Q1	7

Critical Infrastructure Resilience

- **Problem:** Critical infrastructure resilience is vital to the national economic security, and national public health and safety. The Nation’s critical infrastructure is dependent on physical and electronic-based systems for many applications to maintain operations, which are at risk from man-made and natural events. In addition to the use of GPS for position and navigation, timing is an essential element for many critical infrastructures, such as the electric grid, telecommunications, transportation, and emergency services. Other electronic capabilities within critical infrastructure ecosystems are susceptible to intentional attack or natural occurrence of electromagnetic pulses (EMP) and geomagnetic disturbances (GMD). Currently, critical infrastructure owners and operators lack solid, data-driven information on the Positioning, Navigation, and Timing (PNT) and EMP threats, and the impacts to their sectors. This research fills that knowledge gap and provides CISA and infrastructure stakeholders with actionable information.
- **Solution:** The research from this effort will inform best practices and provide tools to critical infrastructure owner and operators on how best to prepare for and protect PNT capabilities and protect electronic systems against an EMP or GMD event. Activities focus on testing, evaluating, validating the impacts on select, prioritized critical infrastructure, including 5G infrastructure, to provide industry with actionable, timely information on how to protect their systems before widespread buildouts of new infrastructure occur. This research will enhance security and resilience of both government and private sector critical infrastructure from disruption, corruption, and dysfunction of infrastructure systems by addressing sector risks, mitigation options, and opportunities for industry to innovate novel solutions. This will be accomplished through the following:
 - Positioning, Navigation, and Timing (PNT): This research supports the CISA mission to enhance security and resilience of both government and private sector PNT disruption, corruption, and dysfunction of critical infrastructure by addressing sector risks, mitigation options, and opportunities for industry to innovate and participate with S&T.
 - Electromagnetic Pulse (EMP) Resiliency: This work builds knowledge and expands the understanding of the effects of EMP events on critical infrastructure. This work builds knowledge and expands our understanding of the impacts and effects of EMP events on critical infrastructure. The objective is focused on providing useful information and products to inform strategy, policy, and most importantly, critical infrastructure owners and operators (CI O&O). The research from this effort will inform best practices and provide tools to critical infrastructure owner and operators on how best to prepare for and protect against an EMP or GMD event.
- **Justification:** The FY 2025 Budget does not provide funding for this project as current activities are fully funded.
- **Impact:** This project will improve risk strategies and provide mitigation solutions to address new threats to PNT systems and the impacts of an EMP/GMD events through the enhancement of risk analysis and mitigation approaches to the first order effects on critical infrastructure and secondary economic and societal impacts.

Type of Research

Applied and Developmental

Technical Readiness Level

Project is identifying concepts currently at TRL-2+, and in partnership with the interagency, academia, industry and CISA, developing them into operational transition (TRL5+), to inform planning for full operational implementation.

Transition Plans

The intended transition pathway is to transfer operational tools and knowledge products to CISA at the end of the period of performance. Success will be determined by CISA’s ability to implement critical infrastructure technologies and best practices in selected communities. The intended end users are critical infrastructure owners and operators, of which the new technology would provide solutions that address threats against PNT. The desired end state is to provide risk analysis and mitigation approaches that would lessen or eliminate the impact of an EMP/GMD event. Transition measures of success for this effort can be measured by its societal and economic impacts of persistent and reliable PNT.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2023			
Delivered to CISA reports of assessments of tools, techniques and procedures addressing impacts to critical infrastructure systems from position, navigation, and timing (PNT) disruptions.	FY 2023 Q1	FY 2023 Q4	4
Developed framework to enhance modeling capabilities tailored to critical infrastructure owners and operator’s business and technical roles, to enhance the ability to analyze the impact of employing electromagnetic pulses (EMP) mitigations on their infrastructure.	FY 2023 Q2	FY 2023 Q4	5
Developed planning and logistics for assessments, testing, and validation of electromagnetic pulses (EMP) vulnerabilities related to 5G infrastructure.	FY 2023 Q2	FY 2023 Q4	4
FY 2024			
Develop a report based on conducted power station vulnerability assessments coupled with assessments of commercially available electromagnetic pulses (EMP) mitigation technology.	FY 2023 Q4	FY 2024 Q3	4
Develop plan to conduct GPS Equipment Testing for Critical Infrastructure (GET-CI)-series test event in Fiscal Year 2025 for real world equipment evaluation and to promote end-user vulnerability awareness.	FY 2024 Q1	FY 2024 Q4	5
FY 2025			
Conduct GPS Equipment Testing for Critical Infrastructure (GET-CI) live-sky event, and transition results as appropriate.	FY 2025 Q1	FY 2025 Q4	N/A
Publish to CISA Suggested Guidelines for Mitigating Against an Early High-Altitude Electromagnetic Pulse event on 5G Networks and Devices.	FY 2025 Q1	FY 2025 Q4	4-7
Publish to CISA Suggested Guidelines for Mitigating Against an Intentional Electromagnetic Interference Attack on 5G Networks and Devices.	FY 2025 Q1	FY 2025 Q4	4-7

Disaster Recovery

- **Problem:** Natural disasters are a leading cause of fatalities and economic loss in the United States. Recovery is the most expensive and time-consuming phase of disaster management. Local communities need access to new and emerging technologies to streamline and optimize FEMA’s disaster recovery operations and assistance programs. Communities need to speed up the process and reduce the time necessary to return to normal, restore critical functions and community lifelines, and help survivors get back to their daily lives.
- **Solution:** This project will develop new processes, products, and standards to improve operations and outcomes in FEMA, including promoting national preparedness and protective measures, preparing for catastrophic disasters, and reducing the complexity of FEMA’s recovery programs. It will improve FEMA, State, local, and private sector abilities to track and monitor post-disaster resilience investments, rebuild efforts and restoration functions through improved damage assessment and decision making, expediting recovery operations to restore critical functions and community lifelines.
- **Justification:** The FY 2025 Budget provides \$1.9M for this project, a \$2.3M decrease from the FY 2023 Enacted. The funding for this project will support R&D requirements aligned to FEMA strategic plan objectives, including providing support for FEMA operational functions such as housing inspections, National Flood Insurance Program (NFIP) claims processing, implementation of FEMA disaster programs, Disaster Recovery grant programs for Individual and Public Assistance, and FEMA grant programs such as emergency management, firefighter assistance and safety, and hazard mitigation grants to reduce disaster recovery costs and losses. Funding will support demonstrations of Mutual Aid tools for the advancement of tactical National Urban Search & Rescue Response System (US&R) management, efforts to increase capabilities for incident-based mutual aid, the advancement of risk assessment tools supporting disaster resilience planning.
- **Impact:** In direct support to FEMA, this project will speed up recovery aid to affected communities; streamline individual and household assistance efforts using new technology; improve, rebuild, and restoration functions through improved damage assessments; reduce assistance complexities for communities and disaster survivors; and enable expedited government decision-making.

Type of Research

Applied and Developmental

Technical Readiness Level

The project efforts will range between TRL-3 and TRL-7. This project’s R&D efforts include:

- Develop new science, technology, and methods for improving accuracy and performance of hazard modeling and analytics that would support key decision points (TRL-3).
- Validate the technologies in a relevant environment (TRL-5).
- Evaluate prototype technologies in a relevant environment (TRL-6).
- Transition to FEMA at TRL-7.

Transition Plans

The intended pathway for transition of this knowledge product is to submit the results to FEMA at the end of the period of performance, and to share the outputs of this foundational research and analysis with SLTT governments to identify actionable items and strategies with the goal of helping to improve individual and community preparedness. The desired end-state is to fully understand when Federal assistance helps or hinders the recovery processes or outcomes. This will be accomplished by systemically examining disaster recovery efforts in context when Federal disaster assistance is not requested or is denied. Transition measures of success for this project will be determined by the handoff to FEMA and the dissemination of the final study results to SLTT governments.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2023			
Conducted a capability demonstration focused on WUI-related (wildland urban interface) technology integrations with the FEMA Integrated Public Alert Warning System; to include potential technologies such as in-vehicle alerting, mapping and navigation applications, alert originator systems, unattended sensor networks, or other relevant capabilities.	FY 2023 Q1	FY 2023 Q4	6
Enhanced tools for incorporation into disaster recovery planning and community recovery efforts.	FY 2023 Q3	FY 2023 Q4	3-7
Enhanced tools to provide access to information on useable, actionable guidance, helping communities and private institutions build resilience into disaster recovery.	FY 2023 Q3	FY 2023 Q4	3-7
FY 2024			
Demonstrate Mutual Aid tools for the advancement of tactical National Urban Search & Rescue Response (US&R) System.	FY 2024 Q1	FY 2024 Q4	3-7
FY 2025			
Complete final transition of a Connected Life Safety Service (CLSS) to Central United States Earthquake Consortium (CUSEC) production environment.	FY 2025 Q1	FY 2025 Q4	4-7
Complete the final technical report outlining the WiFire fire modeling efforts.	FY 2025 Q1	FY 2025 Q4	3-7
Conduct Multi-State Testing of CLSS Modules and integration of CLSS into CUSEC Regional Information Sharing Platform RISP.	FY 2025 Q1	FY 2025 Q3	4-7
Deploy the final version of Search and Rescue Common Operating Platform and conduct final project briefing to FEMA Urban Search & Rescue.	FY 2025 Q2	FY 2025 Q4	3-7

Flood

- **Problem:** Flooding is a leading cause of fatalities and economic losses in the United States from natural disasters. Communities need new and emerging technologies to increase their resilience to flood disasters and provide flood predictive analytic tools to FEMA and to State and local governments to reduce future flood fatalities and economic damages.
- **Solution:** This project will develop new processes, products, and standards to improve operational objectives and related outcomes with FEMA (including the Flood Insurance and Mitigation Administration, flood assistance programs, and dam safety programs), other Federal agencies and the insurance industry. These innovations will also assist Federal, State, local, tribal, territorial, and other stakeholder groups in making planning, disaster response and recovery, and investment decisions related to floods. Specifically, S&T will develop the following:
 - New flood sensors and alerting: Develop and test an integrated flood warning system incorporating inexpensive, deployable flood sensors; information integration and modeling software; and an automated smartphone-based, geo-targeted alert system. Create flood alert models, tuned to local terrain that can provide longer lead-times and more accurate geo-targeting. Investigate the potential of adapting these technologies to dam/levee integrity monitoring.
 - Smarter remote sensing and situational awareness: Utilize a cross-section of imaging technologies (e.g., aerial Laser Imaging Detection and Ranging (LiDAR), high-resolution satellite based synthetic aperture radar) and emerging technologies (e.g., UAS) to improve the image base, exploit historical satellite imagery, and exploit emerging digital elevation modeling technologies to improve the definition and accuracy of flood hazard areas, including flood hazards in areas not included in FEMA Special Flood Hazard Areas (SFHAs).
 - Realigned economic incentives and risk analysis: Support more cost-effective investment decisions improving the resiliency of residential properties, business continuity, and public/private infrastructure resilience. This will be achieved by improving the mitigation decision-making tools available, including integrated analytics, and the use of low-cost historical satellite imagery to identify flood prone areas outside of those mapped to date by FEMA.
 - Enhance community resilience: Promote faster and more complete recovery from flood disasters by identifying quantitative indicators of resilience that have practical use in guiding and mitigating investment decisions and by developing standard operating procedures, planning methodologies, and quantitative methods to integrate resilience analysis into local and State flood planning, response, and mitigation activities.
 - Improve flood data quality and access: Provide decision-makers with access to the data they need and when they need it through developing a roadmap of the best available flood decision data for all data categories. As well as, developing new types of flood sensors that are cheap enough to be widely distributed and easily moved, developing technologies to create, maintain, and share elevation and structure footprint data, and developing new technical methods for filling decision data gaps.
 - Improve predictive models and analytical services: Provide decision-makers with access to better models for all phases of flood management. Review all available flood models and forecasting tools with multiple uses and users in mind; create flood alert models, tuned to local terrain, which can provide longer lead-times and more accurate geo-targeting; provide better coverage of inland and flash flooding, accounting for increased impervious surfaces and the availability of fine-grained elevation data from new technology, and expand the coverage of models to better forecast the aftermath of floods.

- **Justification:** The FY 2025 Budget provides \$3.6M for this project, which is a \$2.4M decrease from the FY 2023 Enacted. Funding will support the continued research and development for the needs of FEMA and the flood risk management community for the national flood insurance program. Funding will also support Component-level testing and evaluation of the Community Lifeline System toolset.
- **Impact:** This project supports FEMA in the enhancement of whole community collaboration around disaster risk reduction, leveraging existing data sources to create multi-dimensional representations of community functions using an integrated system-of-systems approach, and empowering communities with decision support capabilities to enable both pre-event scenario-based risk planning and adaptive recovery in the post-event environment.

Type of Research

Applied and Developmental

Technical Readiness Level

The efforts from this project will range between TRL-4 and TRL-7. This project's R&D efforts include:

- Perform market surveys and assessments of remote sensor technologies that could be suitable for use in multi-hazard, multi-environment operational missions. Initial studies also involve mission assessments, workshops, and interviews with end users and SMEs to determine system requirements. The outputs of these efforts will be used to define the system concept for subsequent development.
- Validate technologies in a relevant environment (TRL-5).
- Evaluate prototype technologies in a relevant environment (TRL-6).
- Transition to FEMA at TRL-7.

Transition Plans

The intended transition pathway is to transfer operational tools and knowledge products to FEMA. Success will be determined by FEMA's ability to implement flood hazard modeling and impact assessment tools in selected communities initially. The intended end users are first responders and the communities where flood hazard modeling and impact assessment support processes would benefit most. The desired end state is to build a culture of preparedness across the United States therefore reducing flood related fatalities and property losses. Transition success for this effort will be measured by emergency managers' ability to leverage data sources and modeling programs to create pre- and post-event risk planning to enable faster decision making.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2023			
Completed community requirements documentation for the decision support tool for compound flooding.	FY 2023 Q1	FY 2023 Q2	4-7
Conducted research into new market innovations, incentives, and policy options related to parametric insurance services and micro-financing to improve risk reduction outcomes and advance social and environmental equity.	FY 2023 Q2	FY 2023 Q4	4-7
Conducted research, testing, and evaluation of Fiber Reinforced Polymers for concrete dams and water infrastructure.	FY 2023 Q1	FY 2023 Q4	4-7
Developed Decision Support System for Water Infrastructure Security (DSS-Wise) next generation enhancements in support of the National Levee and National Dam Safety Communities.	FY 2023 Q1	FY 2023 Q4	4-7
FY 2024			
Conduct Component-level testing and evaluation of the Community Lifeline System toolset.	FY 2024 Q2	FY 2024 Q4	4-7
Further advance DSS-Wise in support of FEMA and the National Levee and National Dam Safety Communities.	FY 2024 Q1	FY 2024 Q4	4-7
FY 2025			
Complete Multi-State Testing of Community Lifeline Status System Modules.	FY 2025 Q1	FY 2025 Q3	4-7
Complete Regional Next Generation Incident Command System (NICS) Advancement Regional Transition.	FY 2025 Q1	FY 2025 Q3	4-7
Conduct Test and Evaluation of Community Lifeline Status System modules.	FY 2025 Q1	FY 2025 Q3	4-7

Next Generation Disaster Proofing

- **Problem:** The costs of manmade and natural disasters continue to rise on an annual basis in the United States. FEMA, State, and local communities need access to new and emerging technologies and innovations that reduce risk, improve protective measures, optimize mitigation investments, and decrease the damages, disruption, and ultimate costs of disasters.
- **Solution:** This research and development will pursue new/emerging technologies and standards for streamlining/optimizing FEMA disaster resilience investments in insurance, mitigation, and recovery operations/assistance programs and enable the States, local communities, and the private sector. Other examples of targeted research and development outcomes are developing new approaches to optimizing resilience investment to reduce disaster risk and losses, measure community resilience and monitor effectiveness over time, and new technologies to reduce damages to residential structures, public assets, and critical infrastructure.
- **Justification:** The FY 2025 Budget provides \$1.5M for this project, a \$1.7M decrease from the FY 2023 Enacted. The funding for this project will support R&D projects that pursue new/emerging technologies that reduce damages to structures, public assets, and infrastructure, and enhance FEMA mitigation program effectiveness. In FY 2025, the project plans to collaborate with FEMA to determine next-level Prize Competitions for natural disaster proofing solutions, conduct research and development efforts supporting Wireless Emergency Alerting specific to wildfires, and identify novel material solutions supporting structural protection for future disaster events.
- **Impact:** This project supports FEMA’s pre- and post- disaster assistance programs, 20,000 communities participating in the NFIP and numerous State/local partners and critical infrastructure operators. These R&D investments allow FEMA to keep pace with the Nation's evolving flood risk, enable State and local capacity, and reduce fatalities and property losses.

Type of Research

Developmental

Technical Readiness Level

TRL varies for specific project activities between TRL-5 and TRL-7. This project’s R&D efforts will begin by performing a market survey of available COTS and GOTS technology that could be adapted for FEMA use. A system concept using the identified technologies is then developed and validated in a relevant environment (TRL-5). Following successful validation, the most promising solution(s) are then prototyped and evaluated first in a relevant environment (TRL-6) then in an operational environment (TRL-7) prior to transition.

Transition Plans

The intended transition pathway is to transfer disaster assistance projects to FEMA at the end of the period of performance for each activity. Success will be determined by FEMA’s ability to implement new standards and best practices in selected communities. The intended end users are SLTT government partners that manage community recovery operations following a natural disaster. The desired end state is to increase the number of people that benefit from disaster resilience research efforts in insurance and more rapid and efficient recovery operations. Successful transition for this effort will be measured by a reduction in lives lost following a natural disaster.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Initiated the development of performance standards and best practices for disaster proofing Innovations.	FY 2023 Q3	FY 2023 Q4	5-7
Launched Disaster Proofing Innovations Prize Competitions for natural disasters.	FY 2023 Q3	FY 2023 Q4	5-7
	FY 2024		
Collaborate with FEMA to determine next-level Prize Competitions for natural disasters.	FY 2024 Q1	FY 2024 Q2	5-6
	FY 2025		
Conduct Advanced Communications Exercise (ACE) with Canada Defense Research and Development Canada (DRDC).	FY 2025 Q1	FY 2025 Q4	4-7

First Responder Capability Program – This program develops technologies, information, procedures, and CONOPS to aid first responders, emergency managers, and incident commanders as they respond to hazardous situations. It assists emergency response communities to establish requirements and tests and assesses technologies for usability to help make them available across all first responder communities.

Explosives & Radiological/Nuclear Resiliency

- **Problem:** A Radiological Dispersal Device Detonation or Nuclear Detonation are high consequence incidents and pose tremendous challenges to the first responder community and HSE in preparing for, responding to, and recovering from these events.
- **Solution:** S&T utilizes the National Urban Security Technology Laboratory (NUSTL) to improve responder preparedness for the complexity of a radiological/nuclear incident response and recovery operations. By working with partner agencies, Federal interagency working groups, and first responders, S&T will identify impactful opportunities that address technology and research needs in the areas of radiological/nuclear response management, incident characterization, initial response capabilities, medical care/triage, casualty/evacuee care, impacted area stabilization/control, and site cleanup/decontamination.
- **Justification:** The FY 2025 Budget provides \$1.5M, which is consistent with the FY 2023 Enacted. This project continues research and development on advanced fast running urban dispersion modeling capabilities that will expand and improve the modeling products provided through the Interagency Modeling and Atmospheric Assessment Center (IMAAC) to FSLTT jurisdictions; build interactive tools to automate radiological data management and data validation and verification (V&V) processes; continue exploration of virtual reality (VR) solutions to expand responder access to immersive radiological/nuclear field response trainings; and conduct laboratory and field testing on radiological resuspension in representative urban environments.
- **Impact:** The project will result in improved radiological/nuclear response capabilities at the national, State, local, tribal, and territorial level through strategic investment in projects focused on increasing agency preparedness, improving government understanding of impacts and risks, and finding technological solutions to radiological and nuclear capability gaps and mission needs.

Type of Research

Developmental

Technical Readiness Level

TRL varies for specific project activities between TRL-3/4 and TRL-7. This project's R&D efforts typically start by performing market research of available COTS and GOTS technology as well as evaluation of existing research and interagency capabilities in modeling, analysis, and other expertise that can be leveraged for first responder capability needs. Identified solutions are adapted, enhanced, tested, and piloted for planning, preparedness, and response operations to meet first responders and SLTT needs (TRL-6/7). Examples that support the R&D milestones are below:

Research, Development, and Innovation – PPA

First Responder/Disaster Resilience Thrust Area

- Completing research to document future R&D needs based on lessons learned from the COVID-19 response. This research may result in a range of technologies, knowledge products, and R&D initiatives to explore at various levels of technical readiness levels (TRL 5-7).
- Expanding assessment calculations and analysis capabilities in an existing DOE tool, Turbo Federal Radiological Monitoring and Assessment Center (TurboFRMAC) for use by FSLTT organizations for monitoring and assessment for radiological/nuclear incidents (TRL-7).
- Enhancing modeling capabilities available through the FEMA-led IMAAC for radiological/nuclear incidents that support FSLTT decision-making on protective actions and response and recovery activities (TRL 5-7).

Transition Plans

S&T will leverage existing radiological modeling, training, and preparedness organizations to include FEMA, DOE National Nuclear Security Administration (NNSA) and the Environmental Protection Agency (EPA) in transitioning and transferring for distribution and integration of the developed technology and knowledge products into SLTT radiological and nuclear preparedness and response activities. Typically, publications of knowledge products are shared through existing government websites or repositories of information. Technology investments are typically made into existing systems that are owned, operated, and maintained by the partners listed above.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Completed development of practical assessment course for the Radiological Operations Support Specialist (ROSS) position.	FY 2019 Q4	FY 2023 Q3	N/A
Completed report on the use of Virtual Reality (VR) for radiological field training for the public's consumption.	FY 2021 Q4	FY 2023 Q4	N/A
Completed research on resuspension in the urban environment to support SLTT radiological/nuclear response and recovery planning, readying for publication.	FY 2021 Q4	FY 2023 Q2	N/A
Completed updates on key radiological response guidance used by SLTT planners, readying for publication.	FY 2021 Q4	FY 2023 Q3	N/A
Created a toolkit for SLTT jurisdictions to conduct scientific wide area environmental radiation background surveys for response and recovery.	FY 2021 Q4	FY 2023 Q4	N/A
Delivered advanced fast running urban dispersion model to improve modeling capability available to FSLTT organizations.	FY 2021 Q4	FY 2023 Q4	7
Delivered decision-support guide and checklists for stormwater runoff and subsequent contaminant movement during radiological/nuclear response and recovery for FSLTT organizations.	FY 2021 Q4	FY 2023 Q3	N/A
Delivered instrumentation testing report to update FEMA's Radiological Emergency Preparedness Program guidance.	FY 2023 Q1	FY 2023 Q3	4
Delivered waste management case studies report for various radiological/nuclear scenarios to support emergency preparedness and planning.	FY 2021 Q4	FY 2023 Q4	N/A

Research, Development, and Innovation – PPA

First Responder/Disaster Resilience Thrust Area

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
Developed Data Quality Assessment (DQA) Toolkit for FSLTT organizations in conducting radiological data V&V following a radiological/nuclear incident.	FY 2021 Q4	FY 2023 Q2	N/A
Developed nuclear detonation visualizations on nuclear effects and response tactics to support planning, training, and exercises.	FY 2021 Q4	FY 2023 Q4	N/A
Studied strategies for improving fast running urban dispersion modeling capabilities for larger geographic areas and more complex scenarios.	FY 2021 Q4	FY 2023 Q3	4
Wrote requirements document for interactive, automated DQA Tool.	FY 2023 Q1	FY 2023 Q4	6-7
	FY 2024		
Build dataset of nuclear test data to develop factors for ground truth inclusion in predictive modeling.	FY 2023 Q2	FY 2024 Q4	4
Conduct literature review of scientific material and public guidance on building airflow recommendations following a radiological or nuclear release.	FY 2023 Q2	FY 2024 Q2	N/A
Conduct research and engagement on SLTT decision-makers information needs following a radiological or nuclear incident and what data products meet these needs, resulting in a validated product list.	FY 2023 Q4	FY 2024 Q4	N/A
Conduct scoping study on particle size distribution and activity size distribution factors for urban modeling.	FY 2023 Q2	FY 2024 Q4	4
Initiate experimentation for understanding resuspension of radioactive materials in the urban environment following a radiological or nuclear incident using representative environments.	FY 2023 Q4	FY 2024 Q4	3-4
	FY 2025		
Complete design-phase for development of an interactive and automated Data Quality Assessment tool.	FY 2024 Q2	FY 2025 Q3	N/A
Complete enhancements to modeling capabilities and briefing product outputs for an existing computational fluid dynamics urban dispersion model.	FY 2024 Q1	FY 2025 Q4	7
Conduct analysis of use-cases for unmanned systems for radiological emergency response.	FY 2024 Q2	FY 2025 Q4	N/A
Conduct deep-dive analysis of Federal data management priorities for radiological/nuclear emergencies.	FY 2024 Q2	FY 2025 Q2	4
Develop knowledge products that document the findings from modeling and analysis on the optimal placement of fixed-position radiation environmental monitoring systems in a variety of environments.	FY 2023 Q4	FY 2025 Q1	7
Provide recommendations for updated guidance for managing HVAC systems during and after a radiation emergency.	FY 2024 Q2	FY 2025 Q2	7

First Responder Technologies

- **Problem:** The response environment that our Nation’s first responders operate in on a day-to-day basis is constantly changing and requires an ongoing evaluation of needs, required capabilities, and potential investments and/or innovations to allow them to conduct their missions more safely, effectively, and efficiently. Commercializing technology that fully meet these challenges is typically a lengthy process. Developing near-term, innovative technologies that address high priority capability gaps identified by FSLTT first responders is critical to ensure their safety and ability to serve and protect their communities.
- **Solution:** S&T will identify high priority needs, develop prototype solutions, and conduct operational field assessments and experimentation of next generation technologies to address gaps identified by first responders with the goal of rapidly developing (12 to 18 months) and transitioning (an additional 12 months) technologies that meet 80 percent or more of the operational requirement. Individual R&D activities pursued will vary in response to current operational demands, new and emergent threats and hazards, new environmental conditions, and recent technology advancements. S&T is focusing on solutions/technologies including, but not limited to:
 - Wildland Fire Suppression: Research and develop options for firefighters to deploy when access to water is limited. Research and development will focus on ways to increase water availability and/or develop materials that suppress wildfires without water.
 - Arrest Reporting System: Develop tool that will enable Law Enforcement arresting officers to record their arresting report quickly, accurately, and securely into a shareable database that other officers can access and further process the individual(s) arrested. Such a tool will reduce lost arrests due to incomplete and/or inaccurate arrest report information and allow the arresting officer to return to the frontline quickly.
 - Safe Operations: Capabilities that aid and protect law enforcement and response communities in carrying out their duties. Such as an aerial communication platform to disperse large crowds, safe apprehension tools and/or a safe vehicle stoppage tool.
 - Responder Vehicle Operating Environment: Make improvements to vehicle micro-operating environments that increase officer/occupant safety and/or lead to greater operational effectiveness. These include adding negative pressure capabilities to patient treatment vehicles and improving how law enforcement officers’ interface with both vehicle controls and information systems, whether on the move or in a parked position.
- **Justification:** The FY 2025 Budget provides \$4.7M for this project, a \$0.3M decrease from the FY 2023 Enacted. This project will identify high priority needs, develop prototype solutions, and conduct operational field assessments of next generation technologies to strengthen the response community’s ability to protect the homeland, respond to disasters, and save lives. Funding will support completion of prototypes for two new first responder technology development activities that lead to commercialization efforts and two or more design reviews in collaboration with end-users.
- **Impact:** These technologies will strengthen the response community’s ability to protect the homeland and critical infrastructure, respond to and minimize impact of disasters, and save lives through the increased availability and reliability of technology for first responders.

Type of Research

Applied and Developmental

Technical Readiness Level

Projects executed under the First Responder Technology Program begin at TRL-3, where a proof of concept has already been developed and demonstrated, and end when the technology is ready for transition and commercialization (TRL-7). R&D includes validating the technology in a laboratory environment (TRL-4), validating the technology in a relevant environment (TRL-5), producing prototypes that can be tested in a relevant environment (TRL-6), and developing harden prototypes that can be tested in an operational environment (TRL-7). Before contract award, a technology scouting initiative is executed to ensure the requirement driving the R&D is not readily available through an existing commercial offering. If it is, there is no R&D investment made, and responders are made aware of the existing commercial offerings.

Transition Plans

The primary stakeholders for First Responder technology are SLTT first responders who historically do not make bulk purchases or enter into transition agreements due to the limited funds first responders receive at the State level. To ensure a smooth and successful transition occurs, S&T works with the performer from the onset of a project to develop a transition and commercialization plan that identifies the performer's manufacturing capabilities, partners who will assist with manufacturing, and potential domestic and global reach. The plan also looks at market size, sales projections for years 1 through 3 and target costing for low and high-volume production runs. The plan is delivered to the S&T Program Manager and transition office liaison for review prior to the R&D effort coming to conclusion.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Conducted Operational Field Assessment (OFA) for two new first responder technology development efforts.	FY 2023 Q1	FY 2023 Q4	6-7
Conducted two or more design reviews in collaboration with end-users.	FY 2023 Q1	FY 2023 Q4	3-6
Conducted two or more Market Landscape Studies for first responder technology development efforts.	FY 2023 Q1	FY 2023 Q4	3-6
Transitioned two or more first responder technologies to the commercial marketplace.	FY 2023 Q1	FY 2023 Q4	6-7
	FY 2024		
Conduct, assess and incorporate one or more Market Landscape Studies into first responder technology development efforts.	FY 2024 Q1	FY 2024 Q4	3-6
Conduct, assess and incorporate two or more design reviews across first responder technology development efforts in collaboration with end-users.	FY 2024 Q1	FY 2024 Q4	3-6
Conduct, assess and incorporate two or more OFAs into first responder technology development efforts.	FY 2024 Q1	FY 2024 Q4	6-7
Transition two or more first responder technologies to the commercial marketplace.	FY 2024 Q1	FY 2024 Q4	6-7
	FY 2025		
Conduct, assess and incorporate one or more design reviews across first responder technology development efforts in collaboration with end-users.	FY 2025 Q1	FY 2025 Q4	3-6
Conduct, assess and incorporate one or more Market Landscape Studies into first responder technology development efforts.	FY 2025 Q1	FY 2025 Q4	3-6
Conduct, assess and incorporate one or more OFAs into first responder technology development efforts.	FY 2025 Q1	FY 2025 Q4	6-7
Transition one or more first responder technologies to the commercial marketplace.	FY 2025 Q1	FY 2025 Q4	6-7

Personal Protective Equipment (formerly Compact Personal Protective Equipment)

- **Problem:** First responders require Personal Protective Equipment (PPE) to defend and mitigate the health risk associated with exposure to chemical, radiological, physical, electrical, or biological elements within their operational environment. Without sustained PPE availability, FSLTT first responders are left vulnerable to serious injuries which may lead to illness or even death. While no single combination of PPE offers protection against every hazard a first responder may face, the risk of potential harm to the first responder is significantly reduced when using specialized PPE.
- **Solution:** S&T engages with DHS Components, FSLTT and first responders to ensure understanding of the end-user needs, identify actionable requirements to address those needs, and effectively deliver solutions addressing identified PPE capability gaps. S&T will identify Project Performers to develop technology to strengthen the first responders' capabilities and enhance effective emergency responses in active threat incidents, contagious environments, unusual occurrences, and hazardous situations. S&T will engage with the respective Project Performer to develop prototypes at the Technology Readiness Level (TRL) 6/7 and pursue pathways to commercialization to make solutions widely available for procurement.
 - Responder PPE for Unusual Occurrences: FSLTT require PPE for use in crowd control or developing riotous situations. This includes all disciplines to ensure basic safety and protection during evolving incidents, to reduce injuries that may pose a direct threat to responders' lives.
 - Protection in Contagious Environments: FSLTT require PPE when responding to incidents where there is potential for exposure to an actively infected individual(s). This includes events occurring during an outbreak or active pandemic, and unintentional or deliberate chemical, radiological, or biological release.
 - PPE for Active Threats: FSLTT require PPE for in progress or on-going incidents which may include wildland fires, active shooter, natural disasters allowing for a continuation of assigned duties throughout the incident.
- **Justification:** The FY 2025 Budget provides \$2.5M for this project, which is a \$1.0M increase above the FY 2023 Enacted. The funding for this project will develop critical PPE to address those capability gaps identified by first responders addressing the areas of: Responder PPE for Unusual Occurrences, Protection in Contagious Environments, and PPE for Active Threats. FSLTT will partake in an operational field assessment (OFA) to ensure the prototype meets the identified capabilities of the FSLTT.
- **Impact:** S&T will work with contracted Project Performers to ensure the supported partner base is provided a viable PPE solution that provides protection and mitigates the risk of serious injuries, illnesses, or even death, associated with the lack of collaboration and response incidence platforms, exposure to hazards, active threats, complex environments, or civil disturbances in the operational setting.

Type of Research

Applied and Developmental

Technical Readiness Level

TRL of delivered technology varies between an initial start of TRL-3 and a completion of TRL-7. OFAs, as applicable, will be conducted to assess the completion TRL.

Transition Plans

S&T develops a Transition Plan Agreement (TPA) in coordination with the Project Performer and S&T matrix partner to ensure a smooth transition of technology into the commercial marketplace. Additionally, the Project Performer is required to compose a Transition and Commercialization document which is incorporated into the TPA.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2023			
Completed the development of Transition Plan Agreements for identified new start projects.	FY 2023 Q1	FY 2023 Q4	5-7
Conducted OFA for technology developed within the personal protective equipment portfolio.	FY 2023 Q1	FY 2023 Q3	6-7
Conducted technology assessment (i.e., preliminary design review, critical design review, voice of the partner, and/or technology readiness assessment) of personal protective equipment for first responders.	FY 2023 Q2	FY 2023 Q4	5-7
Delivered prototype technologies to first responder community (First Responders Resource Group).	FY 2023 Q2	FY 2023 Q4	6-7
FY 2024			
Conduct OFA(s) or Technology Readiness Assessment(s) for mission adaptive technologies within the PPE Portfolio.	FY 2024 Q4	FY 2024 Q4	6-7
Develop PPE for first responder's use in operational environments during situations involving; active threats, rioting control, crowd control, wildland fires, wildland fire shelters, or active shooter incidents.	FY 2023 Q4	FY 2024 Q4	6-7
Develop Transition Plan Agreement(s) for mission adaptive technologies within the PPE Portfolio.	FY 2024 Q1	FY 2024 Q2	N/A
FY 2025			
Conduct OFA(s) or Technology Readiness Assessment(s) for mission adaptive technologies within the PPE Portfolio.	FY 2025 Q2	FY 2025 Q4	5-7
Develop one or more Transition Plan Agreement(s) for mission adaptive technologies within the PPE Portfolio.	FY 2025 Q2	FY 2025 Q4	N/A
Develop PPE for first responder's use in operational environments during situations involving; active threats, rioting control, crowd control, wildland fires, wildland fire shelters, or active shooter incidents.	FY 2025 Q1	FY 2025 Q4	6-7

Public Safety Communications

- **Problem:** With the constant evolution of modern terrorism and other threats to the security of the homeland, it is critical that first responders have the technology to rapidly respond to emergent events. DHS Components need to have access to mission-critical communications solutions that are highly available and resilient, and innovative technology solutions capable of facilitating information sharing between public and private sector entities during emergency response operations. The introduction of broadband networks and new emerging standards has increased capability for the inclusion of voice, video, and data resulting in a more complex environment where responders need to be ensured of interoperability and compatibility across networks and ability to maintain interoperability with legacy solutions (Project 25). In the past, stove-piped, proprietary systems have resulted in fractured, non-interoperable, and expensive solutions. The evolution of new technologies and standards, such as the emergence of 5G/XG, Smart Cities, IoT, Next Generation 911 systems, AI, and advanced computing, has given rise to new opportunities for advanced capabilities that can be leveraged by DHS Components and first responders alike. However, these opportunities also result in numerous challenges for ensuring highly reliable, available, interoperable, and secure communications.
- **Solution:** Through the RDT&E of technologies, S&T will develop, tailor, and pilot applications and services that leverage emerging communications and networking technologies and standards to address technology gaps to meet mission needs and user requirements. Solutions will focus on achieving efficiencies, interoperability, compatibility, and effective use of applications and services while addressing threats and challenges (spectrum, utilization, network resiliency, cyber and physical attacks). Additionally, S&T will conduct detailed assessments of commercial technologies to ensure that end-solutions are interoperable, compatible, and standards-based ensuring the end solutions present best value and minimal risk to users. S&T will also conduct targeted exercises to improve the resilience and minimize impacts to systems.

Information Sharing and Certification: S&T RDT&E will secure public safety messaging and collaboration – facilitating interoperability across disciplines, geographies, and organizations. Act as a collaboration platform for public safety that will utilize information from disparate systems and provide expedient access to eligible users.

- **Justification:** The FY 2025 Budget provides \$1.0M for this project, which is a \$0.5M decrease from the FY 2023 Enacted. This project will develop and deliver technology solutions, including knowledge products, to DHS Components as well as the broader first responder community to meet legislative requirements for interoperability and compatibility. In the area of 5G/XG and advanced communications, S&T will work to support the DHS mission needs for advanced computing and communications needs. This effort will closely align to National Strategy to Secure 5G Implementation Plan leveraging efforts across the Federal enterprise (e.g., NIST, National Telecommunications and Information Administration (NTIA), DoD, National Science Foundation (NSF), and Department of Commerce (FirstNet)).
- **Impact:** This project supports highly available and resilient critical communications and information sharing capabilities for DHS Components, including first responders using emerging technologies and communications networks. S&T will conduct testing and evaluation of solutions to improve the resilience and availability of public safety networks. in the presence of jamming (unintentional or intentional). This effort will also ensure that radio systems procured by Federal, State, and local public safety users are interoperable and standards based.

Type of Research

Applied and Developmental

Technical Readiness Level

TRL varies for specific project efforts between TRL-3 and TRL-7. Project identifies and documents unique Federal, State, tribal, and local public safety requirements in voice, video, and data communications. First, technologies and capabilities are validated in a lab environment (TRL-4).

Following successful laboratory validation, technologies will be further tested in a relevant DHS Component environment (TRL-5). S&T will test COTS technologies in a technical demonstration environment (TRL-6). Subsequently, updates to the technology will be made, tested, and evaluated in an operational environment (TRL-7) prior to transition. Finally, the project will also include conducting interoperability and compatibility testing of products for compliance with P25 standards (TRL-7). Approved systems will be identified on Project 25 Compliance Assessment Program (P25 CAP) website for transition and acquisition to DHS Components and responders nationwide.

Transition Plans

This effort will transition technology solutions to partners after rigorous laboratory, field, and operational testing. Solutions will be standards-based, non-proprietary in nature to allow plug-and-play adaptability for first responders. Forward-leaning first responder agencies will be identified to serve as early adopters and evangelists for the technology solutions. Knowledge product development (e.g., lessons learned, best practices, pilot reports, and test evaluations) will also be a key component of transition. Publicly available knowledge products can be disseminated more broadly and have great reach with end users. These knowledge products can also serve to promote best practices and help agencies learn from those who have come before them.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Conducted performance, conformance, and interoperability testing for P25 radios, consoles, and gateways systems as part of P25 CAP.	FY 2023 Q1	FY 2023 Q4	7
Developed testing scope to ensure interoperability between P25 and other communications networks (e.g., broadband, analog, and non-P25 systems).	FY 2023 Q1	FY 2023 Q4	5
	FY 2024		
Develop collaboration platform that remains network and device agnostic.	FY 2024 Q1	FY 2024 Q4	5
Provide seamless information sharing/interoperability across disparate systems.	FY 2024 Q1	FY 2024 Q4	5
	FY 2025		
Standardize Certification for NG911 Interoperability.	FY 2025 Q1	FY 2025 Q4	3-4

Response and Defeat Operations Support (REDOPS)

- **Problem:** The response environment that our Nation’s responders operate in on a day-to-day basis is constantly changing and requires an ongoing evaluation of needs, required capabilities, and potential investments and/or innovations, to allow them to conduct their missions more safely, effectively, and efficiently. Public Safety Bomb Squads and Special Weapons and Tactics (SWAT) Teams are on the forefront of addressing emerging threats such as active shooter, complex coordinated attacks, and improvised explosive devices (IEDs). While significant investments are made on explosive detection, there are limited investments being made across government to ensure bomb technicians have the capabilities to preserve life and/or property once an IED has been discovered. There is even less investments reflected towards the tactical community.
- **Solution:** S&T will support short, medium, and long-term focused efforts that ensure regular delivery of new capabilities to supported first responders. The Agency will identify user-developed innovations through direct and regular interaction with user community to identify user developed innovations that with additional development can be quickly transitioned. S&T will also identify high priority requirements and capability gaps, develop solutions, and conduct operational assessments of next generation technologies that address identified gaps, with a goal of rapidly developing and transitioning new capabilities. Furthermore, S&T will perform operational assessments of emerging technologies that assess new capabilities with immediate field applications and identify new research and development requirements. Finally, the Agency will develop IED disablement tools and/or techniques through a combination of rigorous scientific testing and cutting-edge engineering practices. Specifically, S&T is focusing on the following:
 - Micro Research and Development: Identify user developed innovations that can quickly transition to community-wide use. Validate performance of the innovation and develop required designs and specification for immediate operational use. Validate knowledge products with State and local agencies. Developed capabilities transition in less than 12 months.
 - Operational Assessments and Response Experimentation: Perform user-driven operational assessments of emerging technologies with immediate field applications to identify capabilities and limitations of equipment and systems, new technology development requirements, and lessons learned/best practices in high threat operational responses. Knowledge products transition within 12-18 months.
 - RAPID: Research and Prototyping for IED Defeat develops cutting edge counter-IED defeat capabilities with focused R&D on emerging threat devices. RAPID uses a hard science approach, both in the lab and in the field, to find the best possible methods for safety disabling bombs. Developed capabilities a transition to operational use within 12-24 months. RAPID performs in partnership with the FBI Critical Incident Response Group who transitions all REDOPS technologies to the State and local community.
 - RAPTOR: Research and Prototyping for Tactical Operations applies the REDOPS model to the tactical community with focused operational assessments, response experimentation, and micro-R&D in direct support the Federal, State, local, tribal, and territorial SWAT community.

- **Justification:** The FY 2025 Budget provides \$3.3M, a \$0.3M increase over the FY 2023 Enacted. Funding supports assessing Counter Improvised Explosive Devices (C-IED) technologies; development of new tools and/or tactics, techniques, and procedures to counter evolving threats; and transition of work products to bomb technicians across the country. IEDs remain one of the most accessible weapons available to terrorists and criminals, and the tactics used in IED attacks continue to evolve as our adversaries seek to overcome countermeasures. This project closes associated capability gaps to preserve life and/or property. In FY 2025, REDOPS plans to publish two Special Technician Bulletins, conduct five testbed assessments, publish four micro-R&D tools, deliver four Advanced Disablement Engineering and Transition Seminars, and develop and test two IED render safe technologies.
- **Impact:** Developed solutions will strengthen the front-line public safety response capabilities to the highest priority threats and increase our Nation’s ability to protect the homeland and respond to terrorist and criminal activities while saving lives and protecting property.

Type of Research

Applied and Developmental

Technical Readiness Level

TRL varies for specific project activities between TRL-4 and TRL-7. Some efforts begin as an idea identified by field users, which are then are designed and characterized in a lab environment prior to being published as a knowledge product (TRL-4). Some efforts assess existing technologies and tactics, techniques, and procedures which are validated and published as a knowledge product (TRL-6). The goal is to transition technology at TRL-7 or a knowledge product (TRL-6) within 12-24 months.

Transition Plans

The program partners with the National Bomb Squad Commanders Advisory Board, International Association of Bomb Technicians and Investigators, United States Bomb Technicians Association, National Tactical Officers Association, DOJ, and DoD, who are directly involved with the activities associated with this project from initiation to transition. In addition, the program partners with the FBI who serves as the National Program Manager for C-IED activities and is responsible for the Hazardous Device School which trains all Public Safety Bomb Technicians within the United States. Products are evaluated and/or characterized before being transitioned directly into the Hazardous Device School and/or through the FBI’s Law Enforcement Enterprise Portal. This ensures that applicable work products reach the bomb technician community in its entirety.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Conducted four C-IED test events in support of the development of tools and/or tactics, techniques, and procedures.	FY 2023 Q1	FY 2023 Q4	4
Delivered four Advanced Disablement Engineering and Transition Seminars.	FY 2023 Q1	FY 2023 Q4	7
Developed two RAPID IED Technologies and/or knowledge products.	FY 2023 Q1	FY 2023 Q4	6
Executed five test bed assessments for both REDOPS and RAPTOR (tactical).	FY 2023 Q1	FY 2023 Q4	6
Performed four RAPID-X Operational Exercises for bomb squad community.	FY 2023 Q1	FY 2023 Q4	6
Validated and produced REDOPS knowledge products for four micro technologies.	FY 2023 Q1	FY 2023 Q4	6
	FY 2024		
Conduct four C-IED test events in support of the development of tools and/or tactics, techniques, and procedures.	FY 2024 Q1	FY 2024 Q4	4
Deliver four Advanced Disablement Engineering and Transition Seminars.	FY 2024 Q1	FY 2024 Q4	7
Deliver to First Responders two Improvised Explosive Device (IED) Disablement Technologies.	FY 2024 Q1	FY 2024 Q4	6
Deliver five test bed assessments results for both REDOPS and RAPTOR (tactical) to First Responders.	FY 2024 Q1	FY 2024 Q4	6
Deliver four micro technologies reports for REDOPS to First Responders.	FY 2024 Q1	FY 2024 Q4	6
	FY 2025		
Conduct four C-IED test events in support of the development of tools and/or tactics, techniques, and procedures.	FY 2025 Q1	FY 2025 Q4	4
Deliver four Advanced Disablement Engineering and Transition Seminars.	FY 2025 Q1	FY 2025 Q4	7
Develop two IED Technologies and/or knowledge products.	FY 2025 Q1	FY 2025 Q4	6
Deliver five test bed assessments results for both REDOPS and RAPTOR (tactical) to First Responders.	FY 2025 Q1	FY 2025 Q4	6
Deliver four micro technologies reports for REDOPS to First Responders.	FY 2025 Q1	FY 2025 Q4	6

Stakeholder Engagement and Requirements (First Responders Resource Group and International)

- **Problem:** First Responders across the Nation have no advocates, or avenues, to relay their highest capability needs and requirements for R&D to help improve their personal safety and increase the safety of our State, Local, Tribal and Territorial communities.
- **Solution:** S&T provides the only multi-discipline engagement forum serving our Nation’s SLTT First Responder Community and responder-based DHS Components, as well as collaboration with our international partners, with a proven and successful forum to relay and advocate the responder’s highest capability needs for research and development solution. This engagement in the form of an annual conference provides coordination on current and future needs of the SLTT First Responder Community surrounding Personal Health, Protection and Resiliency, Situational Awareness, Communications and Unified Command & Response and bringing subject matter experts to State Local Law Enforcement Tribal Territorial mission spaces in order to evaluate operational challenges to acquire requirements for solutions developed specifically to address responder needs.
- **Justification:** The FY 2025 Budget does not include funding for this project, however S&T will continue to engage with the First Responder Community to stay abreast of their needs and connect them with high quality solutions.
- **Impact:** The forum provided research and development requirements on capability needs that led to the development of life safety technologies making our SLTT responders safer, more efficient, and effective serving our communities. To date, the First Responder Disaster Resiliency Portfolio has successfully transitioned 22 technologies to the commercial marketplace, for first responder to purchase and 70 published knowledge products to SLTT Bomb Technicians on mitigating Improvised Explosive Devices.

Type of Research

Developmental

Technical Readiness Level

The Technical Readiness Level line does not apply to the Stakeholder Engagement as it focusses on the active solicitation of SLTT capability needs, and the necessary requirements for the solution. The period of performance is normally 3 to 12 months for engagements and solution assessment and reviews.

Transition Plans

S&T coordinates closely with the S&T Transition Office early in the needs identification, and throughout the development process, assisting private industry developers to a successful commercialization of their solutions. Transition Plans for commercialization are varied to support the specific solution for the responders.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2023			
Held annual conference to identify 5 – 8 new technology requirements for DHS Components and our Nation’s law enforcement, fire, and emergency medical service first responders.	FY 2023 Q1	FY 2023 Q3	N/A
FY 2024			
N/A	-	-	-
FY 2025			
N/A	-	-	-

Training and Performance Optimization

- **Problem:** The efficiency, effectiveness, and resilience of DHS’s law enforcement, security officers, and emergency management officials supporting the front lines of national security is directly related to the preparedness and robustness, capacity for recovery, and adaptability achieved in training. DHS Components and first responders require modern training techniques and technologies, including secure IT network that delivers ubiquitous training wherever the consumer is located, that maximize proficiency, effectiveness, efficiency, safety, and build officer confidence and resilience. This capability and capacity are required to support the DHS’ missions and respond to local, national, or international disasters or emergencies.
- **Solution:** S&T works with DHS Components and the first responder community to identify common training mission and operational capability gaps that can be addressed through improved training methods and technology solutions that optimize training task transfer and retention. An informed strategy and capability that fully meets the current and anticipated future demand for remote learning, student throughput, scenarios repetition, replicable and simulated environments, and training space are required. Improved training in areas such as the underlying components of critical decision-making (e.g., perceptual skills, critical thinking, alternate option weighing) is imperative when operating in uncertain, stressful, time-constrained, or hazardous environments. Improving the delivery and retention of training and performance optimization tools includes maximizing human performance, effective human-machine integration, and enabling informed decision making. The collective synergy of a research-based approach to training and performance optimization will improve operational efficiency, effectiveness, and overall national security.
- **Justification:** The FY 2025 Budget continues to provide \$2.4M, which is consistent with the FY 2023 Enacted. The funding for this project will develop, assess, and transition immersive training and operations methods and tools for the FLETC, DHS Training Academies, and Component Training Offices in support of personnel on the front line of homeland security. DHS Components need modern training and immersive technologies that maximize skill sustainment and operational performance. A recent JRC Strategic Review Risk Areas report identified training for both proficiency and expertise as a need that may be accomplished in an online or distributed environment. The environment in which Components work, student needs, professional development opportunities, and significant workplace training trends are advancing rapidly. Modern training approaches, such as immersive technologies, artificial intelligence, and game-based learning, developed with this funding, when designed correctly and in a pedagogically consistent manner, have the potential to support and expand curriculum while enhancing learning outcomes in ways which have not been previously possible, affordable, or scalable. Funds will also support research and studies, in support of FLETC’s Training Environment of the Future, on emerging homeland security threats, methods, and tools for law enforcement.
- **Impact:** Mission success and resilience of our homeland security workforce is never assured. Providing DHS and broader homeland security enterprise end users with improved training methods, technologies, and tools will result in operational performance increases in those individuals and an increase in national security. More effective and efficient training measurably improves performance and is directly correlated to increased preparedness, safety, robustness, and capacity for rapid recovery and adaptability.

Type of Research

Applied and Developmental

Technical Readiness Level

This project's R&D efforts typically start by performing a market survey of available COTS and GOTS technology that could be adapted for DHS use. Identified technology is then adapted and validated in a laboratory or relevant environment (TRL-4/5). Following successful validation, the most promising solution(s) are then prototyped and evaluated first in a relevant environment (TRL-6) then in an operational environment (TRL-7). Project efforts will transition at TRL-6 or TRL-7. The period of performance for most activities is 12-18 months.

Transition Plans

- Provide recommendations for improved FLETC basic training course curriculum with enhanced training methods and technologies.
- Developing a Capability Roadmap for training technology development and assessment that will aid DHS Components in coordinating the acquisition of training technology, implement performance assessment processes, and identify training gaps and subsequent capability requirements.
- Study report of FLETC's Law Enforcement and Criminal Investigator training programs to understand and identify shortfalls in the Center's basic training programs while ensuring that they meet the entry-level job requirements and skills required of today's Federal law enforcement professionals.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Delivered a report describing the Classroom of the Future to FLETC.	FY 2023 Q1	FY 2023 Q2	N/A
Initiated study to identify required skills, knowledge, and abilities for new law enforcement officers and gaps in current training.	FY 2023 Q2	FY 2023 Q4	5
Transitioned an immersive 4th amendment training simulation.	FY 2023 Q1	FY 2023 Q3	6
	FY 2024		
Develop study for FLETC aimed at better understanding the training needs of new law enforcement officers in the first 18 months of their jobs.	FY 2024 Q1	FY 2024 Q4	4-7
Deliver to FLETC a final Training Technology Roadmap report to assist with ensuring technology acquisition(s) align with training needs.	FY 2023 Q2	FY 2024 Q2	5-6
	FY 2025		
Complete the study to aid FLETC in better understanding the trainings needs of new law enforcement officers in the first 18 months of their jobs.	FY 2024 Q4	FY 2025 Q1	4-7
Initiate an Immersive Training Technologies and Technology Implementation Roadmap Study.	FY 2025 Q1	FY 2025 Q2	2-5
Provide a review and analysis report to FLETC of their Continuous Validation Process.	FY 2024 Q4	FY 2025 Q4	4-7

Innovative Research and Foundational Tools Thrust Area

Research and Development

Technology Readiness Level Exhibit

(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget
Innovation Research and Foundational Tools Thrust Area	\$95,106	\$95,106	\$84,106

R&D Thrust Area Description

INNOVATIVE RESEARCH AND FOUNDATIONAL TOOLS THRUST AREA: S&T aims to understand the high-priority, homeland security capability needs and gaps, and identify optimal approaches for providing solutions and knowledge that address those needs. R&D investments enable gathering gaps/needs through analysis and requirements prioritization with focus on identifying and analyzing potential solutions and working with partners to select the best approach to delivering solutions, including knowledge and advice.

INNOVATIVE RESEARCH AND FOUNDATIONAL TOOLS THRUST AREA <i>(Dollars in Thousands)</i>				
Program	Project	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President’s Budget
Foundational Tools		\$15,006	\$15,006	\$15,006
	Aligning Departmental R&D with DHS Goals (Integrated Product Teams)	\$3,000	\$3,000	\$3,000
	First Responder Technologies-System Assessment and Validation for Emergency Responders (SAVER)	\$1,980	\$1,980	\$1,980
	Technology Clearinghouse	\$1,250	\$1,250	\$1,250
	Technology Scouting	\$4,796	\$4,796	\$4,796
	Technology Transition	\$3,980	\$3,980	\$3,980
Partnerships		\$18,675	\$18,675	\$15,675
	Commercialization Accelerator Program	\$3,000	\$3,000	-
	Coordination, Engagement, and Outreach	\$2,000	\$2,000	\$2,000
	Small Business Innovation Research (SBIR) Management	\$2,175	\$2,175	\$2,175
	Silicon Valley Innovation Program (SVIP)	\$9,000	\$9,000	\$9,000
	Technology Transfer and Commercialization	\$2,500	\$2,500	\$2,500
Technology Centers		\$61,425	\$61,425	\$53,425
	Advanced Computing Technology Centers	\$17,557	\$17,557	\$17,557
	Enduring Sciences Technology Centers	\$30,368	\$30,368	\$25,368
	Innovative Systems Technology Centers	\$13,500	\$13,500	\$10,500
Total – Innovative Research and Foundational Tools Thrust		\$95,106	\$95,106	\$84,106

Foundational Tools Program – A critical part of S&T’s mission as science advisor to the DHS Secretary is to ensure that R&D receives the proper requirements analysis and due diligence that will support homeland security operations. There are critical elements of the R&D lifecycle that are required for all programs and projects to undergo from the point of concept through the transition of a capability or knowledge product. S&T is responsible for collecting, identifying, and prioritizing DHS-wide R&D capability gaps/needs, minimizing or eliminating the duplication of efforts, as well as identifying cost effective solutions for Component operations and process inefficiencies. S&T also utilizes its scientific, technical, and mission expertise to conduct technology scouting analysis and transfer the information to DHS Components and stakeholders to support the

identification, development, and transition of solutions that address high priority capability needs and gaps. In support of these activities, S&T aims to expand the associated functions of OpEx events (to serve as centralized demonstrations of potential technology options) and the Technology Clearinghouse (to be a common knowledge management and communication portal for homeland security technology research and solutions).

Aligning Departmental R&D with DHS Goals

- **Problem:** S&T receives many requests each year from DHS Components for R&D work to include DHS Operational and Support Components, and SLTT First Responder entities. With a limited budget, S&T needs to understand the relative priority of each of these requests and their significance to the partner's mission and DHS strategic goals. S&T also needs to ensure all R&D programs, projects, and activities across DHS are coordinated to avoid duplication of efforts and to enable enterprise solutions.
- **Solution:** S&T implemented the Integrated Product Team (IPT) process as a mechanism to identify, collect, and prioritize Components' R&D needs and priorities throughout the fiscal year. The IPT process will continue to serve as S&T's primary mechanism for identifying and prioritizing Component R&D-related capability gaps as existing and emerging threats are identified, to support S&T decision-making on internal R&D activities and resource allocation. The IPTs are also used to report on the status of all ongoing S&T R&D programs, projects, and activities to ensure partner alignment throughout the R&D lifecycle.

S&T also established the Department-wide Innovation, Research, and Development Coordination (IRDC) process as an enterprise-wide approach to achieving a more unified, coordinated approach for conducting innovation and R&D against DHS's needs. IRDC will continue to deliver visibility, transparency, and traceability of the comprehensive set of DHS innovation and R&D investments, to inform resource decisions and ensure alignment to high priority mission needs. The IRDC also reports on DHS's overall innovation and R&D status. In addition, the IRDC aligns with S&T's IPT process ensuring that activities contribute to Department-wide coordination while allowing S&T the flexibility to manage them according to internal business processes.

- **Justification:** The FY 2025 Budget provides \$3.0M for this project, consistent with the FY 2023 Enacted. The funding will allow S&T to perform strategic planning and portfolio management to serve DHS partners. The combined implementation of the IPT and IRDC processes will provide transparency and traceability of S&T and DHS innovation and R&D activities, respectively, from capability gap/need identification to solution delivery. The improved processes ensure direct alignment of innovation and R&D resources to Component/HSE mission needs and DHS strategic priorities. S&T will also improve alignment of the IPT and IRDC processes with the DHS budget formulation process, in addition to improving the coordination and prioritization of R&D innovation with Component acquisitions.
- **Impact:** Through the IPT process, S&T ensures that R&D efforts will address validated and prioritized R&D needs of DHS operational and support Components and partners. This will in turn enable S&T to successfully deliver effective and impactful solutions that meet partner needs to help them fulfill their missions. Through the IRDC process, S&T ensures DHS innovation and R&D current activities, and long-term strategies are coordinated and aligned to optimize the use of limited innovation and R&D resources.

Type of Research

Developmental

Technical Readiness Level

This is part of the R&D lifecycle development and deployment for all programs and projects to ensure Component alignment, priority, and enterprise-wide collaboration. The majority of S&T R&D is between TRL-4 and TRL-7.

Transition Plans

The IPT and R&D Coordination processes facilitates, and track support provided to partners. Transition plans are unique to each R&D project and are addressed in each part of this document. Stakeholder participation in the IPT process informs transitions plans and encourages industry and other stakeholders to identify and develop solutions.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Chartered the new R&D Coordination Council to govern the R&D Coordination process.	FY 2023 Q1	FY 2023 Q4	N/A
Conducted outreach to identify R&D capability gaps/needs for SLTT first responders.	FY 2023 Q1	FY 2023 Q4	N/A
Conducted the FY 2023 IPT process to identify and prioritize R&D capability gaps/needs.	FY 2023 Q1	FY 2023 Q4	N/A
Conducted the FY 2023-2024 R&D Coordination process to report on DHS’s overall R&D status and strategic alignment.	FY 2023 Q1	FY 2023 Q4	N/A
Defined DHS-wide strategic priority research areas that represent cross-cutting assemblies of enduring scientific efforts which provide a means for addressing priority needs across multiple homeland security enterprise mission areas.	FY 2023 Q1	FY 2023 Q4	N/A
Delivered R&D Coordination Implementation Guidance that defines alignment across DHS R&D, requirements, and acquisition processes, enabling an enterprise-wide approach for coordinated use of R&D and technology resources to address DHS’s priority needs.	FY 2023 Q1	FY 2023 Q4	N/A
	FY 2024		
Conduct FY 2024 IPT process to identify and prioritize R&D capability gaps/needs.	FY 2024 Q1	FY 2024 Q4	N/A
Conduct the FY 2024 Innovation, Research, and Development Coordination process to report on DHS overall innovation and R&D status and strategic alignment.	FY 2024 Q1	FY 2024 Q4	N/A
Enhance S&T prioritization and alignment of long-term innovation and R&D with the DHS Strategic Plan and the DHS Innovation, Research, and Development Strategic Plan.	FY 2024 Q1	FY 2024 Q4	N/A
Establish IPT Charters: review and update IPT Charters with existing partners as needed and establish IPT Charters or agreements with new partners as appropriate.	FY 2024 Q1	FY 2024 Q4	N/A
Identify new technology requirements for our Nation’s SLTT first responders.	FY 2024 Q1	FY 2024 Q4	N/A
	FY 2025		
Conduct FY 2025 IPT process to identify and prioritize R&D capability gaps/needs.	FY 2025 Q1	FY 2025 Q4	N/A
Conduct the FY 2025 Innovation, Research, and Development Coordination process to report on DHS overall innovation and R&D status and strategic alignment.	FY 2025 Q1	FY 2025 Q4	N/A
Enhance S&T prioritization and alignment of long-term innovation and R&D with the DHS Strategic Plan and the DHS Innovation, Research, and Development Strategic Plan.	FY 2025 Q1	FY 2025 Q4	N/A
Establish IPT Charters: review and update IPT Charters with existing partners as needed and establish IPT Charters or agreements with new partners as appropriate.	FY 2025 Q1	FY 2025 Q4	N/A
Identify new technology requirements for our Nation’s SLTT first responders.	FY 2025 Q1	FY 2025 Q4	N/A

First Responder Technologies-System Assessment and Validation for Emergency Responders (SAVER)

- **Problem:** Technology/equipment that first responder agencies need to purchase is increasingly complex and rapidly evolving. Additionally, these agencies frequently lack in-house specialized and technical expertise to make informed technology purchasing decisions.
- **Solution:** S&T utilizes the NUSTL SAVER knowledge products that serve as a valuable guide for informing first responder agencies' technology and equipment purchasing decisions by reporting what technologies are available in the marketplace, and how they perform in realistic conditions. This information can reduce agencies' risks of buying technology/equipment that does not meet their operational needs, enabling smart use of State and local, as well as DHS funds and grants. FEMA has provided billions of dollars in funding for emergency responder equipment through the Homeland Security Preparedness Grant Programs. Core FEMA Preparedness Grants totaled more than \$3.0B and its subset of security focused grants intended for First Responders totaled more than \$1.6B in FY 2022. The SAVER program was designed to make sure that this funding among First Responders is spent judiciously. The breadth of SAVER spans over 700 distinct types of technology and equipment that fall into the 21 FEMA Authorized Equipment List (AEL) categories associated with those preparedness grants. Without funding, NUSTL cannot conduct evaluations of commercially available first responder technologies nor provide knowledge products that support the responder equipment purchases across the Nation.
- **Justification:** The FY 2025 Budget provides \$2.0M for this project, consistent with the FY 2023 Enacted. This project will assist First Responders of all disciplines (Fire, Emergency Medical Service, Law Enforcement) to better select, procure, use, and maintain emergency equipment. SAVER activities include the development of: Tech Notes, a two-page product summary that explains in basic terms what a technology does, what it is used for, and how it works; and market survey reports which provide a snapshot of the commercial market for a particular type of equipment. SAVER activities also include facilitating focus groups with first responders to gather and analyze technology requirements and evaluation criteria; and conducting comparative technology assessments with first responders using the equipment in real-world conditions. In addition, SAVER will document results from assessment events, conduct survey, analysis, and planning for FY 2026 and identify current market availability of technologies.
- **Impact:** First responder organizations rely on SAVER knowledge products to make sure their agencies have the right tools and technologies to effectively support their missions. If these tools do not perform as required, the lives of first responders and the people they protect are at risk. NUSTL's SAVER program recently looked at ballistic resistant body armor for women in law enforcement, recognizing that women-users have unique needs that must be met to ensure the effectiveness of their body armor. SAVER assessments are driven by first responders, focusing on the responders' experience with the equipment – the operational features, and how it works for the end-user in realistic operational conditions. These considerations are not captured in product spec sheets, or even known by the technology vendor in many instances. NUSTL utilizes its own expertise and partners with external subject matter experts, for example labs and organizations that have expertise in explosive detection, tactical equipment, and chemical detection to evaluate these tools with responders. For these reasons, responder agencies rely on SAVER as their first stop for researching technology and equipment solutions before making a purchase. Over 1,000 SAVER knowledge products are available to the national first responder community, which includes approximately 18,000 police agencies and 30,000 fire departments in the United States.

Type of Research

Applied

Technical Readiness Level

N/A: All tools and technologies under evaluation are COTS products that are available for purchase by first responder agencies.

Transition Plans

Publish assessment reports and other knowledge products on S&T's public facing website. FOUO products are provided directly to specific entities securely, as needed.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Conducted survey, analysis, and planning for FY 2024 SAVER.	FY 2023 Q1	FY 2023 Q4	N/A
Documented responder operational requirements and equipment evaluation criteria for usability, maintainability, capability, affordability, and deplorability resulting from focus groups to determine the assessment criteria weights for products for law enforcement and rescue personnel equipment.	FY 2023 Q4	FY 2023 Q4	N/A
Documented results from assessment events comparing equipment and tools for law enforcement, fire, and emergency medical services.	FY 2023 Q2	FY 2023 Q3	N/A
Identified current market availability of technologies to help inform procurement agents of options for law enforcement, emergency medical services personnel, and radiation response personnel.	FY 2023 Q1	FY 2023 Q4	N/A
	FY 2024		
Conduct survey, analysis, and planning for FY 2025 SAVER projects.	FY 2024 Q3	FY 2024 Q4	N/A
Developed document explaining call center triage systems using artificial intelligence to inform response agency procurement.	FY 2023 Q1	FY 2024 Q1	N/A
Identify current market availability of virtual reality systems that support immersive first responder training.	FY 2023 Q2	FY 2024 Q2	N/A
Plan and conduct assessment event comparing unmanned aerial systems products for search and rescue.	FY 2024 Q1	FY 2024 Q4	N/A
Plan and conduct assessment event comparing weapon screening devices for large-scale events and public transportation settings.	FY 2023 Q4	FY 2024 Q4	N/A
Publish market survey report that provides a snapshot of commercially available non-detonable explosive substances for training law enforcement canines in detection.	FY 2023 Q4	FY 2024 Q3	N/A
	FY 2025		
Deliver knowledge product reports on a comparative assessment of equipment and tools for law enforcement, fire, and emergency medical services.	FY 2025 Q1	FY 2025 Q4	N/A
Identify current market availability of technologies to help inform procurement agents of options for law enforcement, emergency medical services personnel, and radiation response personnel.	FY 2025 Q1	FY 2025 Q4	N/A
Obtain and document responder operational requirements and equipment evaluation criteria for usability, maintainability, capability, and affordability resulting from focus groups to determine the assessment criteria weights for products for law enforcement and rescue personnel equipment.	FY 2024 Q4	FY 2025 Q4	N/A
Plan and conduct assessment events comparing equipment and tools for law enforcement, fire, and emergency medical services.	FY 2025 Q1	FY 2025 Q4	N/A

Technology Clearinghouse

- **Problem:** DHS R&D solutions and other complementary investments in R&D to solve the broad range of homeland security requirements are not easily discoverable. Organizations who have similar mission needs are not discovering existing R&D efforts already funded by DHS resulting in unnecessary investments to replicate work already done. To solve this problem, S&T must maintain a collaborative information sharing capability for DHS Components, first responders, emergency preparedness, and response communities and the private sector. This information sharing platform enables the search, discovery, and access to information for its programs and to keep those communities informed about the technologies and knowledge products that could be applied to similar needs. Additionally, DHS needs a single, intuitive knowledge sharing resource to find, collect, curate, and disseminate relevant information to partners, stakeholders, academia, and the private sector (e.g., R&D and innovation communities), regarding homeland security technologies, innovative solutions, resources, and capabilities. Having a readily searchable inventory of DHS R&D products with the capability to access already funded research saves the government time and money and allows for re-use or adaptability of solutions. The Technology Clearinghouse was designated as a DHS platform to ensure compliance with the Executive Office of the President, Office of Science and Technology Policy directive to make DHS Federally funded research available for public consumption.
- **Solution:** The DHS Technology Clearinghouse provides the capability to streamline information sharing and support better decision making through a centralized search and discovery tool of final RDT&E results. This content is then widely discoverable, helping inform research, procurement, and implementation decisions. These collaboration opportunities among homeland security personnel, industry, academia, and other stakeholders' aids in the development of innovative technology solutions for homeland security. The DHS Technology Clearinghouse shares curated information and general resources that assist the R&D, industry, and manufacturing community in collaborating with DHS and the broader first responder community to protect the Homeland. This curated information defines authoritative homeland security requirements and gaps, research and development investment and business opportunities, licensing opportunities, operational testing and evaluation activities, standards development, and other partnership initiatives.
- **Justification:** The FY 2025 Budget provides \$1.3M for this project, consistent with the FY 2023 Enacted. The funding supports a Technology Clearinghouse refresh to ensure that governance practices, ongoing technical development considerations, and content remain relevant while continuing to meet the requirements of the Homeland Security Act of 2002. Explore low-cost technical solutions for expanding login access to sensitive Technology Clearinghouse content to the broader homeland security community in accordance with S&T policy for safeguarding sensitive information. Expand stakeholder engagement with DHS Components to ensure the use of the Technology Clearinghouse as the primary resource for innovative homeland security solutions. Provide technical input and recommendations for the DHS Public Access Plan.
- **Impact:** The DHS Technology Clearinghouse facilitates enhanced government decision making through the sharing of RDT&E activities to support the development, acquisition, and deployment of innovative solutions across the HSE.

Type of Research

Developmental

Technical Readiness Level

This is part of the R&D life cycle development and deployment for all programs and projects to ensure Component alignment, priority, and enterprise-wide collaboration. The majority of S&T R&D is between TRL-4 and TRL-7.

Transition Plans

N/A. Development and operation of the Technology Clearinghouse by S&T is mandated by the Homeland Security Act of 2002, Section 313.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2023			
Gathered, documented, and prioritized new technical requirements to inform planning of capability upgrades in FY 2024.	FY 2023 Q1	FY 2023 Q4	N/A
Identified the technical requirements and potential solutions for integrating the Technology Clearinghouse with at least one knowledge repository that will result in an increased amount of discoverable content in the Clearinghouse for partners to access.	FY 2023 Q1	FY 2023 Q4	N/A
Maintained the capability for DHS Components to store and access S&T Transition knowledge products.	FY 2023 Q1	FY 2023 Q4	N/A
FY 2024			
Identify low-cost methods for incorporating science and technology content from other authoritative sources to allow for discovery of content from outside S&T into a single search query in the Clearinghouse expanding discovery and reuse of R&D artifacts.	FY 2024 Q1	FY 2024 Q4	N/A
Identify options for low-cost technical solutions to expand login access to sensitive Technology Clearinghouse content to the increase R&D artifact access and reuse of science and technology solutions for the broader homeland security community in accordance with S&T policy for safeguarding sensitive information.	FY 2024 Q1	FY 2024 Q4	N/A
Maintain the capability for S&T and other DHS Components to share and access knowledge products and innovative technology solutions.	FY 2024 Q1	FY 2024 Q4	N/A
FY 2025			
Identify the technical requirements and solutions for expanding appropriate access to restricted content in the Clearinghouse to the broader Federal community.	FY 2025 Q1	FY 2025 Q4	N/A
Maintain the capability for S&T and other DHS Components to share and access knowledge products and innovative technology solutions.	FY 2025 Q1	FY 2025 Q4	N/A

Technology Scouting

- **Problem:** DHS technology needs are increasingly complex and available solutions and markets are rapidly evolving. Identifying and determining, in a timely fashion, if relevant technology solutions are, or will soon be, available prior to deciding to conduct R&D is needed. This is essential and is a part of program or project solution analyses. A centralized source using repeatable and transparent processes to provide information on existing commercial solution or relevant ongoing R&D work needs to be available to users or R&D funds could be used for inappropriate procurements or duplicative R&D efforts.
- **Solution:** By conducting research for existing technologies and solutions that are available commercially, through another Federal agency or supported research organization, technology scouting provides input to assist in the make versus buy decision. Technology scouting will provide detailed research and analysis of viable solutions and alternatives to improve program planning and R&D decision-making, as well as to inform a customer’s decision on determining the most appropriate existing, adaptable, or new R&D solution(s). Technology scouting serves as a critical step in the S&T process to determine R&D solution approaches, can identify existing or adaptable solutions to save or eliminate the need to invest R&D dollars into solutions already available and is used directly by Components to quickly identify, down select, test, and move to acquisition in a much shorter timeframe.
- **Justification:** The FY 2025 Budget provides \$4.8M for this project, consistent with the FY 2023 Enacted. The funding will provide technology scouting services to inform the “R&D investment, buy” decision for, S&T Portfolio and Program Managers, and Component partners as well as to identify ways to improve the research and analysis regarding the impact of the program. Tech Scouting is a critical step in determining the best approach for conducting R&D and identifying partner opportunities to eliminate unnecessary investments in duplicative R&D and when available expedites the delivery and operational use of existing or adaptable solutions.
- **Impact:** Leveraging these capabilities allows for faster solution development, increases partnership opportunities and resourcing to assist in the development of current or future homeland security systems and needs, and eliminates unnecessary R&D expenditures and helps planners anticipate changes required by emerging technologies. Tech Scouting supports the initiation of acquisitions for priority requirements through rapid tech scouting efforts. Research outputs enable staff and other DHS leaders to identify suitable acquisition targets in the existing market to address urgent capability gaps. Tech Scouting enables R&D resource efficiencies and savings. Analysis of key trends and market conditions in priority tech sectors equips DHS leadership with information to make better policy and strategy decisions.

Type of Research

Developmental

Technical Readiness Level

This is part of the R&D life cycle development and deployment for all programs and projects to gauge the state of the market and to ensure S&T leverages academia, industry, and other Federal entities before making R&D investments. The majority of S&T R&D is between TRL-4 and TRL-7.

Transition Plans

N/A

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2023			
Analyzed impacts of four tech scouting engagements to determine areas for improving services to partners.	FY 2023 Q1	FY 2023 Q4	N/A
Conducted 47 tech scouting engagements to provide partners information on the viability of potential solutions.	FY 2023 Q1	FY 2023 Q4	N/A
FY 2024			
Conduct 47 tech scouting engagements to provide partners information on relevant potential commercial, government, academia, or international technology solutions to inform R&D decision making and eliminate redundant expenditures.	FY 2024 Q1	FY 2024 Q4	N/A
Conduct 5 rapid tech scouting engagements to provide partners information on readily available commercial or government off-the-shelf solutions to avoid needless expenditures on R&D.	FY 2024 Q1	FY 2024 Q4	N/A
FY 2025			
Conduct 4 rapid tech scouting engagements to provide partners information on readily available commercial or government off-the-shelf solutions to allow for faster technology adoption and reducing risk for unnecessary research and development expenditures.	FY 2025 Q1	FY 2025 Q4	N/A
Conduct 40 tech scouting engagements to provide partners information on relevant potential commercial, government, academia, or international technology solutions to inform research and development decision making and reduce risk for unnecessary expenditures.	FY 2025 Q1	FY 2025 Q4	N/A

Technology Transition

- **Problem:** The transition of new technologies and capabilities to DHS Components and other end users is a challenge for all USG agencies. The purpose of Technology Transition is to ensure, to the maximum extent practicable, that S&T transition management and execution is integrated into S&T's R&D program management lifecycle process, and then managed to ensure greater success in the adoption and tracking of solutions funded by DHS and developed for national homeland security purposes. Without centralized guidance, training, tools and metrics, the ability to manage transitions consistently, provide best practices and lessons learned and capture and report on overall performance is not possible. The transition office also coordinates with all other necessary partners to include transfer, commercialization, IP management and the end user to ensure at the beginning of solution agreement and development all parties understand their responsibility and commit to supporting the necessary actions to provide the best chance for the R&D investment to be put into practice and used in an operational environment. This can be a very complex process and requires continuous monitoring, risk management and support to project managers and end partners to coordinate and support all necessary preparations to maximize ROI and usefulness of R&D efforts.
- **Solution:** S&T will provide transition management services and tools that will assist Program Managers, key decision-makers and DHS Component stakeholders in project planning and execution. As part of the R&D lifecycle, all programs and projects will require transitioning planning. These services focus on critical transition areas identified by S&T including selection and implementation of transition tools and strategies; identification, measurement, and mitigation of transition issues and risks; engagement and communication between the Program Manager and the customer; and assurance that the user is ready and resourced to employ S&T-developed products. Enhancements to transition management services will be based on a formal independent evaluation, analysis, and recommendations for the incremental build of a transition management service capability that can support the evolving needs of S&T and its partners.
- **Justification:** The FY 2025 Budget provides \$4.0M for this project, consistent with the FY 2023 Enacted. The funding provides R&D transition planning and management service capability to DHS Program Managers; offer tools and services to track S&T's and DHS's project transitions; collect and analyze post-transition data for the purpose of reporting on the impact of DHS sponsored R&D; share guidance to standardize collection and reporting of R&D indicators of success by S&T and DHS in support of the FY 2017 National Defense Authorization Act (NDAA) R&D annual report; provide R&D program managers and staff technology transition education and coaching; and improve strategic communication channels to enhance transition coordination, management, and reporting.
- **Impact:** Providing S&T a transition management service capability for its R&D programs, projects, and activities will expedite the transition of technologies and knowledge to DHS partners and other government agencies; improve the probability of successful project outcomes; and provide a systematic approach to determine potential failure points associated with the transition of a solution so that resources can be quickly allocated to address issues or reallocated to priority projects. Separately, S&T will track and report on DHS R&D transitions and focus on post-transition evaluations of R&D activities for three years in accordance with the FY 2017 NDAA.

Type of Research

Developmental

Technical Readiness Level

This is part of the R&D life cycle development and deployment for all programs and projects to ensure successful transition of R&D capabilities to Component partners.

Transition Plans

N/A

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2023			
Developed initial Risk Framework to improve transition risk assessments.	FY 2023 Q1	FY 2023 Q4	N/A
Implemented guidance to standardize the collection and reporting of R&D indicators of success by S&T and DHS Components in support of the 2017 NDAA and other data sharing requirements.	FY 2023 Q1	FY 2023 Q4	N/A
Provided transition planning and management capability services for up to 20 new S&T sponsored R&D efforts.	FY 2023 Q1	FY 2023 Q4	N/A
FY 2024			
Deliver the annual FY 2023 DHS R&D Congressional Report as required in the 2017 NDAA.	FY 2024 Q1	FY 2024 Q4	N/A
Deliver transition management services for transition planning and reporting of indicators of success for up to 30 new R&D activities in FY 2024.	FY 2024 Q1	FY 2024 Q4	N/A
Provide technology transition job aids and guidance to promulgate and enhance transition planning and the development of transition-specific metrics reported.	FY 2024 Q1	FY 2024 Q4	N/A
FY 2025			
Deliver the annual FY 2024 DHS R&D Congressional Report as required in the 2017 NDAA.	FY 2025 Q2	FY 2025 Q4	N/A
Deliver transition job aids, training material and guidance to support transition planning and reporting by the end of the fiscal year.	FY 2025 Q1	FY 2025 Q4	N/A
Deliver transition management services for transition planning and reporting of indicators of success for up to 30 new R&D activities.	FY 2025 Q1	FY 2025 Q4	N/A

Partnerships Program – S&T Partnerships build and sustain relationships with industry to advance the development and delivery of innovative technology solutions to homeland security operators. Funding supports two primary focus areas of innovative technology development and solution delivery.

Commercialization Accelerator Program (CAP)

- **Problem:** Only a small fraction of the research performed using Federal funding reaches the marketplace where it can have an impact and ensure the most meaningful return on investment. This is due to limited resources to identify the right technology, mature it for transfer, ensure it meets operational needs, and create partnerships with communities in the private sector that can facilitate commercialization.
- **Solution:** The CAP supports S&T in delivering innovative technology solutions to DHS Partners by focusing on accelerating the commercialization process and addressing roadblocks to transfer federally funded R&D. The program will increase market readiness of technologies and collaborate with operational users, start-up companies, small businesses, the R&D community, manufacturing and supply chain partners, and development partners to accelerate commercialization and HSE adoption of innovations through partnerships.
- **Justification:** The FY 2025 Budget does not include funding for this project.
- **Impact:** The completion of existing CAP projects will provide the transfer of technology and knowledge to DHS and other government agencies and continuously improve future CAP project outcomes, reduce inefficiencies, and provide commercially available products and services to enhance public safety and improve homeland security.

Type of Research

Developmental

Technical Readiness Level

N/A

Transition Plans

N/A

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2023			
Executed the development of DHS research projects in partnership with the CAP cohort of performing laboratories by collaborating with non-profit and private sector partners focused on transfer of technologies to the HSE.	FY 2023 Q1	FY 2023 Q4	3-7
Released call for proposals covering broad DHS needs to leverage federally funded innovations that will develop and strengthen homeland security enterprise technology capabilities and enable commercialization to the marketplace.	FY 2023 Q1	FY 2023 Q4	N/A
Transferred outcomes of CAP cohorts by collaborating with non-profit and private sector partners to execute a robust commercialization assistance process in cooperation with federally funded lab performers interested in performing impactful research projects that will advance homeland security related innovations into the marketplace for utilization across the government.	FY 2023 Q1	FY 2023 Q4	N/A
FY 2024			
N/A	-	-	-
FY 2025			
N/A	-	-	-

Coordination, Engagement and Outreach

- **Problem:** Traditional methods of engaging and contracting require innovation to ensure that S&T is reaching the broader groups of industry who are poised to deliver significant solutions to DHS Components in an appropriate, condensed timeline. Focused engagement to new potential partners is necessary to develop and maintain mechanisms for engaging industry to meet Components' technology needs.
- **Solution:** S&T will utilize a series of innovation programs and platforms designed to engage a range of community stakeholders on homeland security missions, technology, and innovative solutions
- **Justification:** The FY 2025 Budget provides \$2.0M for this project, consistent with the FY 2023 Enacted. The funding supports outreach and training events to educate stakeholders on the activities and technology needs of DHS Components. In addition, funds support coordination engagement efforts with the private sector which will allow S&T to forge connections with technology developers and operational end users, enabling joint R&D and energizing a diverse group of research communities to address Homeland Security challenges.
- **Impact:** The program will ensure S&T is able to deliver the best technology solutions to DHS's end-users and operators building and sustaining relationships with industry and innovation communities.

Type of Research

Developmental

Technical Readiness Level

This is part of the R&D life cycle development and deployment for all programs and projects to gauge the state of the market and to ensure S&T leverages academia, industry, and other Federal entities before making R&D investments. The majority of S&T R&D is between TRL-6 and TRL-7.

Transition Plans

This will be determined at later date and developed based on event observations and feedback.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Facilitated 10 events to educate stakeholders on the activities of DHS Components, current technology capabilities, and technology needs.	FY 2023 Q1	FY 2023 Q2	6-7
Facilitated 10 events to educate stakeholders on the activities of DHS Components, current technology capabilities, and technology needs.	FY 2023 Q2	FY 2023 Q3	6-7
Facilitated 10 events to educate stakeholders on the activities of DHS Components, current technology capabilities, and technology needs.	FY 2023 Q3	FY 2023 Q4	6-7
	FY 2024		
Facilitate 15 events to educate stakeholders on the activities of DHS Components, current technology capabilities, and technology needs.	FY 2024 Q1	FY 2024 Q2	6-7
Facilitate 15 events to educate stakeholders on the activities of DHS Components, current technology capabilities, and technology needs.	FY 2024 Q2	FY 2024 Q3	6-7
Facilitate 15 events to educate stakeholders on the activities of DHS Components, current technology capabilities, and technology needs.	FY 2024 Q3	FY 2024 Q4	6-7
	FY 2025		
Facilitate 20 events to educate stakeholders on the activities of DHS Components, current technology capabilities, and technology needs.	FY 2025 Q3	FY 2025 Q4	4-6
Facilitate 20 events to educate stakeholders on the activities of DHS Components, current technology capabilities, and technology needs.	FY 2025 Q2	FY 2025 Q3	4-6
Facilitate 20 events to educate stakeholders on the activities of DHS Components, current technology capabilities, and technology needs.	FY 2025 Q1	FY 2025 Q2	4-6

Small Business Innovation Research (SBIR) Management

- **Problem:** There are administrative costs to running the SBIR Program, most notably the program requires a portal for industry to understand and submit proposals for solicitations. The current portal, which was developed using technology from a previous SBIR, is now outdated technology. A new portal needs to be developed that can better produce required information for the congressionally mandated annual report submission to Small Business Administration (SBA) and to comply with current security standards.

Additionally, the SBIR Policy Directive requires agencies to conduct targeted outreach to specific disadvantaged small business concerns. Conducting outreach that engages disadvantaged small business concerns and provides a beneficial impact to participation in the SBIR program requires research and addressing of knowledge gaps in the DHS processes and missions.

- **Solution:** Funding is utilized to develop and maintain easy to navigate tools (portal) which, along with additional outreach, will improve industry response to solicitations. The tool also facilitates tracking, tasker response, and mandated SBIR reporting.

Develop a strategic plan to ensure that outreach efforts are accessible and engaging for disadvantage small business concerns. The plan will incorporate existing programs and resources as well as developing elements to address additional knowledge gaps.

- **Justification:** The FY 2025 Budget provides \$2.2M for this project, consistent with the FY 2023 Enacted. Funding supports maintenance and advancement of the portal to facilitate congressionally mandated data reporting for the SBIR program and facilitate proposal submission to reduce submission errors which lead to unresponsive proposals. This portal will support multiple programs including: SBIR, Silicon Valley Innovation Program (SVIP), and Broad Agency Announcements (BAA) (including the Long-Range Broad Agency Announcement (LRBAA)). In addition, funds will be used to ensure the outreach efforts are being done most effectively and can ultimately have a beneficial impact on the disadvantaged small business community.
- **Impact:** This funding will administer the IT, management, and overhead costs of the SBIR program to successfully interface with Small Businesses so that they can efficiently respond to solicitations. The IT will also be able to be leveraged for other S&T programs to facilitate their pursuit of technology innovation. The funding will also decrease the knowledge gap for small and disadvantaged business concerns to increase successful participation in the SBIR program.

Type of Research

Applied and Developmental

Technical Readiness Level

This is part of the R&D life cycle to ensure S&T leverages academia, industry, and other Federal entities. Project focuses on the development and commercialization of technologies between TRL-4 and TRL-7.

Transition Plans

In FY 2023 Q1, the new portal will fully support SVIP and continue supporting the SBIR program and BAAs.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Conducted five engagement events to support SBIR program execution with emphasis on underserved communities.	FY 2023 Q1	FY 2023 Q4	N/A
Continued refinement and security updates for SBIR Portal.	FY 2023 Q1	FY 2023 Q4	N/A
Deployed expanded Office of Industry Partnerships portal capability to include support for Silicon Valley Innovation Program leveraging existing functionality.	FY 2021 Q4	FY 2023 Q1	N/A
	FY 2024		
Conduct five engagement events to support SBIR program execution with emphasis on underserved communities.	FY 2023 Q1	FY 2024 Q4	N/A
Identify and develop improvements to the portal for refinement of the proposal submission and security updates to support the SBIR, SVIP, and BAA (LRBAA) programs.	FY 2022 Q1	FY 2024 Q4	N/A
	FY 2025		
Conduct five engagement events to support SBIR program execution with emphasis on underserved communities.	FY 2025 Q1	FY 2025 Q4	N/A
Continue refinement and security updates for SBIR Portal.	FY 2025 Q1	FY 2025 Q4	N/A
Update for Due Diligence Legislative Requirement.	FY 2025 Q1	FY 2025 Q4	N/A

Silicon Valley Innovation Program (SVIP)

- **Problem:** As the needs and technology gaps of DHS operational agencies and critical infrastructure partners continue to evolve, DHS needs to pursue multiple paths to innovative solutions for these needs. Lengthy procurement processes have created barriers for entry for innovative, high-tech, commercial, non-traditional, small businesses thus limiting the Government’s access to relevant and timely solutions to meet these evolving needs.
- **Solution:** The SVIP reaches out to innovation communities across the Nation and around the world to harness the commercial R&D ecosystem for government applications, co-invest in ideas, and accelerate transition-to-market. The SVIP also involves DHS Components, end users and HSE stakeholders throughout each project, thereby increasing the likelihood of successful transitions that meet operational needs. SVIP solutions allow DHS Components to directly acquire and deploy innovative commercial technologies and gain visibility across the Federal government enabling broader adoption of security-driven capabilities.
- **Justification:** The FY 2025 Budget provides \$9.0M for this project, consistent with the FY 2023 Enacted. This project will complete phased funding of existing projects, including transitioning capabilities to DHS Components and other stakeholders, such as soft target security capabilities, software supply chain visibility tools, flood data analytics, and privacy enhancing capabilities. In addition, funds will also enable SVIP to generate one to two new topics to address Component innovation requirements. New topics supporting Component innovation interests include agent safety and machine learning technologies.
- **Impact:** The SVIP provides accelerated and novel solutions for Component and HSE requirements that can be used in operations in as little as 12-24 months. The program attracts new companies that may not have previously engaged with the Government. These new companies address long-standing issues, as well as emerging needs, such as public health, security, and supply chain vulnerabilities, in a rapid fashion, increasing avenues by which DHS and its partners can obtain and leverage innovative technology and solutions. For a more detailed look at SVIP’s inventive selection process, a list of current SVIP-funded startups, and video demonstrations of technologies aimed at solving complex DHS problem sets through the power of the innovation community, please visit the website: <https://www.dhs.gov/science-and-technology/svip>. Highlights include innovations in offline language translation where cellular and Internet connections are not available, K9 and human wearables to monitor and detect environmental stressors to agents in the field, and computer vision to facilitate passenger self-screening at airport checkpoints.

Type of Research

Applied and Developmental

Technical Readiness Level

Specific company solutions are expected to begin Phase I at a minimum TRL-6, and solutions that successfully progress through Phase IV should finish at a TRL-7.

Transition Plans

The SVIP coordinates directly with DHS Components to enable the transition of SVIP-funded startup solutions by ensuring those technologies meet the requirements to address DHS operational mission needs, are ready for deployment, and are commercialized and thus available for direct acquisition.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2023			
Conducted end-to-end technical demonstration of supply chain digitization with paperless transactions and digital certificates into CBP Dev IT environment to streamline the entry of imports into the U.S. working with CBP Office of Trade and Trade Partners.	FY 2023 Q1	FY 2023 Q3	6-7
Conducted technical demonstration of the issuance of secure and privacy respecting digital immigration credentials with U.S. Citizenship and Immigration Services.	FY 2023 Q1	FY 2023 Q4	6-7
Performed test and evaluation including operational and airborne drop tests for the Silicon Valley Innovation Program’s Maritime Object Tracking Technology buoys at a USCG Facility.	FY 2023 Q1	FY 2023 Q3	6-7
Released new solicitation calls in one to three specific areas covering broad DHS and critical infrastructure needs and requirements as identified through S&T requirement sourcing activities.	FY 2023 Q1	FY 2023 Q4	N/A
Transitioned completed projects into Component operational acquisition cycles or commercial products (project/solution dependent).	FY 2023 Q1	FY 2023 Q4	6-7
FY 2024			
Deliver knowledge product consisting of a data set of 500 synthetic images for use in training millimeter wave-based detection algorithms related to on-person screening at TSA checkpoints.	FY 2024 Q1	FY 2024 Q4	6-7
Release new solicitation calls in one to two specific areas covering broad DHS and critical infrastructure needs and requirements as identified through S&T requirement sourcing activities.	FY 2024 Q1	FY 2024 Q4	N/A
Transition project technology product outputs to operational Component for submission into their acquisition cycles or into the licensing process for commercial products.	FY 2024 Q1	FY 2024 Q4	6-7
Transition technologies that provide CBP Office of Trade with supply chain traceability across natural gas imports, cross-border oil imports, steel imports, direct-to-consumer e-commerce shipments.	FY 2024 Q1	FY 2024 Q4	6-7
FY 2025			
Release new solicitation calls in at least one specific area covering broad DHS and critical infrastructure needs and requirements as identified through S&T requirement sourcing activities.	FY 2025 Q1	FY 2025 Q4	N/A
Transition project technology product outputs to DHS Component operational acquisition cycles or commercial products (project/solution dependent).	FY 2025 Q1	FY 2025 Q4	6-7
Transition technologies that provide USCG and ICE with offline Language Translation capabilities for operational use.	FY 2025 Q1	FY 2025 Q4	6-7
Transition technologies that provide USCG with maritime object tracking technologies for mission critical operational use.	FY 2025 Q1	FY 2025 Q4	6-7
Transition technologies that provide USCIS with the ability to operationally test digital versions of currently paper based immigration credentials that are based on open standards and are globally interoperable.	FY 2025 Q1	FY 2025 Q4	6-7

Technology Transfer and Commercialization (T2C)

- **Problem:** The transfer and commercialization of federally funded technologies is frequently a time consuming and expensive undertaking especially when resources are constrained for Government agencies.
- **Solution:** S&T will support required staff needs and will allow the office to procure and maintain a technology transfer knowledge management system, support the continuation of the Homeland Security Startup Studio program, actively manage HSWERX, the new DHS Innovation Hub, which will facilitate technology development and de-risk DHS R&D program activities and investments, and track intramural and extramural invention disclosures, monitor S&T program activities and engage with PMs throughout S&T's internal Business Process Flow (BPF) process, fund our Federal Laboratory Consortium dues and meaningfully participate in interagency Federal technology transfer programs and activities.
- **Justification:** The FY 2025 Budget provides \$2.5M for this project, consistent with the FY 2023 Enacted. Funding will enable prioritization to support key initiatives such as the DHS Innovation Hub and the Homeland Security Startup Studio programs and complete required activities which include funding and participating in the Federal Laboratory Consortium. Maintaining other T2C programs will be curtailed, including reducing the size of the DHS Partnership Intermediary Agreement (PIA) Network and pausing new awards under the Commercialization Accelerator Program.
- **Impact:** Technology transfer is a key metric for Federal research agencies as it documents the impact of the agency's research investments and ensures that the public benefits from new products and services. DHS has an interest in ensuring that its technologies are commercialized and made available to its Components and the HSE. Long term, this translates into local economic impact as measured by venture capital/angel investment, the creation of jobs, and increased tax revenue. DHS needs to adequately resource technology transfer and commercialize to realize its broader goals and support the DHS mission.

Type of Research

Developmental

Technical Readiness Level

This is part of the R&D life cycle development and deployment for all programs and projects to gauge the state of the market and to ensure S&T leverages academia, industry, and other Federal entities. Project focuses on the transfer or commercialization of technologies at TRL-6 and TRL-7.

Transition Plans

The program will plan the transfer of all relevant DHS funded technologies to other government agencies, State, local, tribal, and territorial governments, and the open market via commercialization.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2023			
Acquired and customized intellectual property, technology transfer, and commercialization system to manage all Technology Transfer and Commercialization (T2C) Branch workflows including intellectual property (IP) docketing and licensing, Cooperative Research and Development Agreements (CRADAs), Partnership Intermediary Agreements (PIAs), (Memoranda of Understanding) MOU/ Memoranda of Agreement (MOA) and royalty disbursement.	FY 2023 Q3	FY 2023 Q4	N/A
Developed a DHS web-based technology/SME locator which incorporates all relevant (Office of National Labs) ONL information and Office of General Counsel IP/patent information for DHS inventions.	FY 2023 Q1	FY 2023 Q4	N/A
Expanded the Homeland Security Startup Studio program to include a phase 0 module which will be codeveloped with ONL to provide entrepreneurship training and skills development for DHS researchers.	FY 2023 Q1	FY 2023 Q4	N/A
FY 2024			
Acquire, customize, and begin implementation of intellectual property, technology transfer, and commercialization system to manage all Technology Transfer and Commercialization (T2C) Branch workflows including intellectual property docketing and licensing, Cooperative Research and Development Agreements Partnership Intermediary Agreements, MOU (Memoranda of Understanding)/ Memoranda of Agreement (MOA) and royalty disbursement.	FY 2024 Q1	FY 2024 Q4	N/A
Monitor CAP funded research projects to accelerate the transfer and commercialization of the CAP supported technologies to homeland security end users in partnership with the CAP performer.	FY 2024 Q1	FY 2024 Q4	3-7
Continue seminar series designed to raise awareness and educate the DHS workforce on issues impacting R&D and successful technology transfer and commercialization and to encourage the development and identification of suitable DHS intramural inventions for the Homeland Security Startup Studio.	FY 2024 Q3	FY 2024 Q4	N/A
Develop SOPs for the DHS Innovation Hub and conduct seminars to promote the utilization of the DHS Innovation Hub.	FY 2024 Q2	FY 2024 Q4	N/A
FY 2025			
Continue the seminar series to raise awareness and educate the DHS workforce on issues impacting R&D and successful technology transfer and commercialization and to encourage the development and identification of suitable DHS intramural inventions for the Homeland Security Startup Studio.	FY 2025 Q3	FY 2025 Q4	N/A
Execute the development of at least 2 follow-on projects in partnership with the Commercialization Accelerator Program (CAP) cohort of performing laboratories by collaborating with non-profit and private sector partners focused on transfer of CAP-supported technologies to the HSE.	FY 2025 Q1	FY 2025 Q4	N/A
Manage at least 10 projects through the DHS Innovation Hub and document technology development, technology transfer, commercialization and/or transition outcomes.	FY 2025 Q1	FY 2025 Q4	1-7

Technology Centers Program – The Technology Centers conduct enduring, foundational, basic, and applied research activities into cross-cutting scientific, engineering, and technological areas. This will ensure advancements in science and technology are harnessed for cutting edge solutions for operational challenges and ensure technical SME capabilities are available to S&T and DHS for decision making. The Technology Centers are the source within S&T for scientific, engineering, and technology expertise and solutions to widespread challenges across DHS mission spaces. The funding for Technology Centers is applied towards broad outcomes that fundamentally change or provide a unique capability to address DHS’s recognized gaps, needs, and emerging threats, to include:

- Maintaining S&T’s technical baseline competency and awareness of the state-of-the-art/art-of-the-possible in key science, engineering, and technology areas.
- Advancing the state of science and technology where needed to address operational gap areas common to multiple missions/multiple portfolios.
- Exploring emerging technology areas and their potential threat and/or application to current and future DHS missions.
- Providing cross cutting solutions against challenging and persistent DHS mission needs and Component requirements.
- Delivering rapid-response expertise to urgent needs.

The Technology Centers are grouped under three primary focus areas, analogous to research projects from a budgetary perspective: Advanced Computing, Enduring Sciences, and Innovative Systems. S&T may establish or retire specific technology centers as DHS priorities and research needs evolve.

Advanced Computing Technology Centers

- **Problem:** We, as a Nation and a member of the global community, face a rapidly evolving digital environment, one in which rapid advancements in distributed computing architectures, information storage, quantum computing, immersive and augmented reality, and AI/ML are pushing the edge of innovation. These advancements enable us to explore new ways of training and protecting officers, detecting threats, and analyzing systems that were previously too complex or too dangerous to examine in the real world. However, this speed of innovation also makes it difficult to track and assess needed solution options for critical homeland security missions. In addition, our adversaries are exploiting these systems via weaknesses in our cybersecurity defenses to thwart, deter, and/or slow down our progress and ability to execute our mission. DHS Components are generating and have access to more relevant data for decision-making than can be processed, assimilated, and used. Components continue to face challenges with leveraging additional data sources to compute threats, impacts, risks, and to maintain situational awareness due to the exponential growth of data, particularly data associated with IoT, commercial, non-profit, open source, and publicly available information. Not only is research into these spaces necessary but the SME to ensure proper adaption of these new technologies and capabilities into the DHS mission spaces is critical for being able to successfully leverage the promise of these new technologies, as well as inform the risks and potential unintended consequences.
- **Solution:** The Advanced Computing Technology Centers bring together a full complement of capabilities and SME as S&T’s key resource in the fields of data sciences & analytics, cybersecurity, AI/ML, computational methods, modeling and simulation techniques, and Quantum Information Science (QIS). Research investments in emerging innovations enable our subject matter experts to experiment, learn, inform, and

apply the strengths of these various advanced computing developments to homeland security systems and operations. Working across multiple disciplines, S&T SMEs illuminate next-generation problem sets, tools, techniques, technologies, and simulation environments to increase mission effectiveness. Research investments provide access to the ecosystem of experts, tools, and applications that can be leveraged for new applications, such as training applications that augment human perception and comprehension and conducting computationally and data-intensive research in support of DHS missions. Finally, the Advanced Computing Technology Centers serve to educate the broader DHS community by hosting communities of interest in the areas of Big Data, AI/ML, Modeling & Simulation, and QIS, while collaborating with interagency and international partners, to ensure S&T can fulfill its responsibility to inform and advise DHS on the proper use and implementation of advanced computing capabilities, especially at scale. The Advanced Computing Technology Centers conduct research in the following focus areas:

- Data Modeling and Simulation Sciences (formerly Data Science & Analytics): We are shifting from a world of rare, expensive data to one where data are ubiquitous, commonplace, and inexpensive. In this data-rich environment, we can leverage data science developments across multiple homeland security missions to find signals, patterns, or structure within high-dimensional, noisy, uncertain input data and simulation sciences conduct experiments to predict different operational outcomes. This focus area keeps pace with the rapidly evolving and emerging digital environments by experimenting with growing data sets and next generation technologies at scale, including publicly available information, real-time analytics, secure multi-party computation, high performance computing, edge computing, blockchain, modeling & simulation tools, immersive simulations, and cloud environments to inform program planning, avoid technical obsolescence, accelerate transition, and prevent mission surprise. This program provides DHS and S&T programs with coordinated research and SME to improve program efficiency, share best practices, and improve security and privacy protection across DHS system investments, with additional reach back capability provided by our collaboration with interagency partners and our hosted communities of interest for Big Data and Modeling & Simulation.
- Emerging Computing Paradigms (formerly QIS): The need to improve current-generation conventional computing paradigms while preparing for next-generation computing paradigms, provides two classes of research activities under the Emerging Computing Paradigms topic:
 - Engineering and architectural analysis of specialized digital computing derivatives (e.g., parallel, distributed, edge, etc.) and special purpose chips (e.g., AI accelerators, graphics processing units, tensor processing units, etc.).
 - Understanding the likely trajectory of relevant hardware and software technologies in next generation computing paradigms (e.g., quantum, neuromorphic, extreme parallelism, etc.), as well as preparing for experiments with these technologies.
 - S&T has established a DHS-wide QIS community of interest that engages Components to promote a better understanding of QIS technologies (including quantum computing & networking, quantum sensing and quantum communications) and identify potential mission areas where QIS technologies will provide significant impact. Informed by these engagements, as well as SME engagements with industry, academia, and international partners, we will continue to host the QIS community of interest while pursuing research to achieve the following objectives: (a) Identify key challenges for DHS missions using multiple networked devices on multi-cloud, inter-cloud, edge, supercomputing, and visualization of capabilities and multi-modal interfaces; (b) Identify key challenges for scaling data-driven applications deployed in a distributed networked environment and that require efficient compute over high loads of streaming data, some of which may belong to different parties; and (c) Understand how DHS use cases centered on “Big Compute” may be further enhanced by next-generation computing capabilities, such as leading edge industry AI Accelerator chip capabilities.

- Artificial Intelligence and Autonomous Systems (AS) (formerly AI/ML and Autonomy): DHS’s initial examination of emerging technology threats to homeland security has identified that AI pose significant opportunities and threats to homeland security. As AI and AS become mainstream, it is critical that we understand the landscape, the evolution of the various aspects of the technology, the supporting science, and the needs of the Department. Key areas of AI R&D include computer vision for applications such as surveillance and screening systems and biometrics, and natural language processing for applications such as law enforcement and immigration services. Key use cases for AS include transportation (automotive, aerospace, maritime, and rail), utilities (water and wastewater, oil and gas, electric power, and telecommunications), facility operations (security, energy management, environmental control, and safety). It is imperative that operators in the homeland security enterprise are comfortable and engaged with the capabilities possible from these technology advances. This focus area looks ahead in the AI and AS space to understand capabilities, identify and push through limitations to meet Departmental needs, and anticipate potential threats. S&T will also continue to host the DHS-wide AI community of interest that promotes the understanding of AI fundamentals and shared practices for foundational data and infrastructure needs of AI capabilities.
 - Cybersecurity Resiliency: Cybersecurity is a very fast-moving technical challenge for government agencies and critical infrastructure partners. Operational assurance in an increasingly digitally integrated environment requires resiliency across data, software, hardware, and communications networks. DHS operations are often conducted in challenging, congested, and contested environments across cyber and electromagnetic domains. While technologies continue to evolve independently in both domains, it will be critical to integrate multi-domain solutions that are able to prevent, detect, and respond to threats holistically at speed and scale to secure operations across the homeland security enterprise. S&T works closely with CISA to research and develop new cyber-threat hunting, information security, and software assurance capabilities for CISA and others as part of a technology pipeline for rapid deployment of effective cybersecurity against an ever-changing threat landscape. This focus area is aimed at increasing the reliability, employability, and resilience of data, software, and hardware used to execute homeland security mission functions.
- **Justification:** The FY 2025 Budget provides \$17.6M for this project, consistent with the FY 2023 Enacted. Funding supports research and development of analytics infrastructures to characterize multi-cloud and hybrid environments that will enable data sharing and collaboration across system owners, authorities, and policies, as well as continue predictive threat modeling of DHS operational domains and continue to support CISA by providing a cybersecurity SME. S&T will continue research and development into advanced analytics, quantum and emerging computing paradigms, trustworthiness and explain ability of artificial intelligence solutions, and enhancements of cyber threat mitigation approaches. Additionally, as privacy, data and digital trust concerns continue to grow, we continue research and development of privacy enhancing technologies for data handling (such as secure multi-party computation).
 - **Impact:** The Advanced Computing Technology Centers enable DHS to push beyond the state-of-the-art and harness new technologies that both increase the productivity and effectiveness of the homeland security workforce and solve hard problems in more efficient ways. By investing in capabilities that empower data discovery, data curation, advanced cognition, and increased perception, homeland security end users and operators can spend more time looking at the right data and understanding the situation, rather than looking for data and missing opportunities. In addition, these centers bring together communities of interest in relevant disciplines, which focus a broad set of collaborative experts towards researching opportunities and solutions to homeland security challenges. This research ensures DHS stays ahead of emerging technology, is informed of the impacts of such technology, and avoids technology surprise. Research investments in advance computing will inform how to implement large-

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scale AI that engenders trust with the public, address vulnerabilities in protecting DHS assets given advances in quantum computing, builds next generation cybersecurity capabilities for protecting networks and cyber-physical systems, and enable large-scale M&S to provide critical insights for addressing critical mission problems.

Type of Research

Basic and Applied

Technical Readiness Level

Projects range from TRL-2 to TRL-5. The Technology Centers focus on basic and applied research to address critical knowledge gaps that inform policy, strategy, requirements, mission assessments and operational plans. Activities are initiated based on stakeholder (e.g., DHS Components, HHS, DoD, State and local practitioners, DOJ, etc.) strategic needs. Most deliverables are knowledge products and tools to inform decision makers. For this reason, the TRL level on many of its projects tend to be lower.

Transition Plans

The Technology Centers work directly with DHS Components and critical infrastructure communities of interest to share knowledge and understanding of state-of-the-art, in addition to providing experimental results through technical reports and briefings that are relevant to homeland security missions. This transition of knowledge products provides inputs to S&T program planning, in addition to DHS Component acquisition planning and ongoing operations. Reports of research results are provided to the broader DHS and Interagency communities through the DHS Technology Clearinghouse.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
AI/ML: Delivered two technical reports summarizing model performance and metrics for enabling and protecting next generation AI mission systems.	FY 2022 Q2	FY 2023 Q2	3
AI: Initiated execution of the AI/ML strategy, establishing and resourcing subject matter experts for the AI/ML Center and working with DHS Components and Offices to communicate research activities for next generation AI/ML capabilities to ensure alignment with mission needs.	FY 2022 Q1	FY 2023 Q3	N/A
Cybersecurity, Communications & Digital Trust: Hosted seminars and deliver research papers identifying specific advances in artificial intelligence as applied to cybersecurity for further development.	FY 2022 Q2	FY 2023 Q3	N/A
Cybersecurity, Communications & Digital Trust: Developed roadmaps for cybersecurity R&D activities to include Zero-trust, as well as cybersecurity law-enforcement tool and critical infrastructure cybersecurity R&D activities that communicates DHS needs for designated audiences.	FY 2023 Q1	FY 2023 Q4	N/A

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Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
Cybersecurity, Communications & Digital Trust: Identified and prioritize cyber threats to civil space systems to inform future strategy, policy, R&D needs, and decision-making for resilient space systems.	FY 2022 Q4	FY 2023 Q4	4
Data Science & Analytics: Delivered two technical research reports summarizing evaluation results of emerging computational technologies to guide acquisitions across DHS Components and the broader Government.	FY 2022 Q4	FY 2023 Q4	3
Data Science & Analytics: Developed two knowledge products based on emerging technology evaluations that guide acquisitions across DHS Components and the broader Government. Conduct two advanced data analytics demonstrations to inform Component mission operations and expand DHS operational capabilities.	FY 2023 Q1	FY 2023 Q4	3-7
Data Science & Analytics: Developed two knowledge products based on emerging technology evaluations that guide acquisitions across DHS Components and the broader Government. Conduct two advanced data analytics demonstrations to inform Component mission operations and expand DHS operational capabilities.	FY 2022 Q4	FY 2023 Q4	5
Evidence Building: Continued to host the DHS ModSim COI and increase community’s membership to enhance the sharing of best practices and emerging M&S capabilities with interagency and DHS Component partners. Reports and knowledge products are shared via quarterly forum in a government accessible knowledge repository.	FY 2023 Q1	FY 2023 Q4	3-7
Evidence Building: Developed a knowledge product that assesses the landscape of M&S technologies, allowing S&T MS-TC to improve understanding of the technology horizon, direction of technological developments in the M&S domain, and its implications to the HSE.	FY 2023 Q1	FY 2023 Q1	3-7
QIS: Completed analysis of two use cases for DHS QIS applications.	FY 2023 Q1	FY 2023 Q4	3
QIS: Engaged the international community in assessing practical applications of quantum sensing.	FY 2021 Q4	FY 2023 Q4	N/A
	FY 2024		
Advanced Communications and Cyber Resiliency: Develop interdisciplinary roadmap incorporating long-term cross-portfolio opportunities and risks for cyber resiliency across DHS mission areas that communicates DHS cybersecurity needs to government/industry/academic research communities.	FY 2024 Q2	FY 2024 Q4	6
Advanced Communications and Cyber Resiliency: Identify research initiatives to address cybersecurity gaps within civil space systems.	FY 2024 Q1	FY 2024 Q4	4
AI and AS: Conduct two demonstrations of artificial intelligence capabilities to inform Component mission operations and expand DHS operational effectiveness.	FY 2024 Q1	FY 2024 Q4	6
AI and AS: Deliver a report understanding causal inference and fundamental limitation of data informativity.	FY 2024 Q1	FY 2024 Q4	3-5
AI and AS: Deliver a technical report on characterizing the existing approaches for Effectively incorporating first-principles models into machine learning methods (e.g., to reduce training time, etc.).	FY 2024 Q1	FY 2024 Q4	3-5

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Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
AI and AS: Deliver final report of workshop identifying international research collaboration efforts on autonomous systems.	FY 2024 Q2	FY 2024 Q4	6
AI and AS: Deliver report on workshop results to identify international collaboration on research areas in autonomous systems.	FY 2024 Q1	FY 2024 Q4	3-5
AI and AS: Deliver results of evaluation of performance, vulnerabilities, and biases of new biometric identification workflows.	FY 2024 Q1	FY 2024 Q4	3-5
AI and AS: Develop a set of best practices for reducing AI/ML Risk.	FY 2024 Q1	FY 2024 Q4	3-7
Communications and Cyber Resiliency: Deliver a literature review of distributed algorithms and private algorithmic decisions processes, such as consensus, gossip, voting, crowdsourcing, or prediction market mechanisms.	FY 2024 Q1	FY 2024 Q4	3-5
Communications and Cyber Resiliency: Deliver a technical report and simulation study on countering adversarial use of artificial intelligence in zero-trust environments.	FY 2024 Q2	FY 2024 Q4	3-5
Communications and Cyber Resiliency: Deliver results of analysis of central bank digital currency design options and effect on law enforcement.	FY 2024 Q2	FY 2024 Q4	3-5
Communications and Cyber Resiliency: Develop ML-based cyber-attack mitigation mechanism to improve cyber-physical system protection and demonstrate prototype leveraging privacy preserving model for data sharing.	FY 2024 Q2	FY 2024 Q4	3-5
Data, Modeling & Simulation Sciences: Characterize the landscape of digital laboratories and related capabilities and provide recommendations on how S&T can leverage these capabilities.	FY 2024 Q1	FY 2024 Q4	3-7
Data, Modeling & Simulation Sciences: Complete assessment of existing crowd models & initial schema for modeling and simulation catalog.	FY 2024 Q1	FY 2024 Q4	3-7
Data, Modeling & Simulation Sciences: Conduct two advanced data analytics demonstrations to inform Component mission operations and expand DHS operational capabilities for blockchain, data autonomy and web 3.0 applications.	FY 2024 Q1	FY 2024 Q4	3-5
Data, Modeling & Simulation Sciences: Conduct two advanced data analytics demonstrations to inform Component mission operations and expand DHS operational capabilities for intercloud, high performance and edge computing, along with real-time analytics.	FY 2024 Q1	FY 2024 Q4	3-5
Data, Modeling & Simulation Sciences: Conduct two advanced data analytics demonstrations to inform Component mission operations and expand DHS operational capabilities for privacy enhancing technologies.	FY 2024 Q1	FY 2024 Q4	3-5
Data, Modeling & Simulation Sciences: Conduct two advanced data analytics demonstrations to inform Component mission operations and expand DHS operational capabilities.	FY 2024 Q1	FY 2024 Q4	3-5
Data, Modeling & Simulation Sciences: Deliver results of landscape assessment of modeling and simulation advancements for DHS equities.	FY 2024 Q1	FY 2024 Q4	3-7
Data, Modeling & Simulation Sciences: Develop two knowledge products based on emerging modeling and simulation technology evaluations that guide acquisitions across DHS Components and the broader Government.	FY 2024 Q1	FY 2024 Q4	3-5

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Innovative Research and Foundational Tools Thrust Area

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
Data, Modeling & Simulation Sciences: Identify requirements for reality/virtual reality/mixed reality experimentation lab designed to incorporate artificial intelligence technologies to enhance training.	FY 2024 Q1	FY 2024 Q4	3-7
Emerging Computing Paradigms: Deliver Two Technical Deep Dive Papers on DHS specific use cases of emerging computing capabilities.	FY 2024 Q1	FY 2024 Q4	3-5
Advanced Sensing: Deliver knowledge product report on status of at least one promising quantum sensing applications for DHS use.	FY 2024 Q1	FY 2024 Q4	3-6
	FY 2025		
AI and AS: Conduct a survey and write a white paper of causal inference and fundamental limitation of data informativity.	FY 2025 Q1	FY 2025 Q4	3-5
AI and AS: Conduct two demonstrations of artificial intelligence capabilities to inform Component mission operations and expand DHS operational effectiveness.	FY 2025 Q1	FY 2025 Q4	6
AI and AS: Deliver a technical report on the potential use cases to reduce sample complexity for training, improve validation results, and other efficiency gains.	FY 2025 Q1	FY 2025 Q4	3-5
Communications and Cyber Resiliency: Deliver a research roadmap on distributed algorithms for cybersecurity.	FY 2025 Q1	FY 2025 Q4	3-5
Communications and Cyber Resiliency: Deliver a Distributed Algorithms Security Characterization and Distributed Algorithms Research Roadmap.	FY 2025 Q1	FY 2025 Q4	3-5
Communications and Cyber Resiliency: Deliver characterization and assessment of methodologies to increase cyber resilience through human-machine and machine-machine collaboration in continuous covert remediation.	FY 2025 Q1	FY 2025 Q4	3-5
Communications and Cyber Resiliency: Demonstrate technology option for track and monitor Central Bank Digital Currency transactions.	FY 2025 Q1	FY 2025 Q4	3-5
Communications and Cyber Resiliency: Document homeland security-related requirements and technical gaps for tracking and monitoring of Central Bank Digital Currency transactions.	FY 2025 Q1	FY 2025 Q4	3-5
Communications and Cyber Resiliency: Expand data sets and develop generalizable privacy preserving models for data sharing across information/operational technology domains.	FY 2025 Q1	FY 2025 Q4	3-5
Data, Modeling & Simulation Sciences: Conduct two advanced data analytics demonstrations to inform Component mission operations and expand DHS operational capabilities for blockchain, data autonomy and web 3.0 applications.	FY 2025 Q1	FY 2025 Q4	3-5
Data, Modeling & Simulation Sciences: Conduct two advanced data analytics demonstrations to inform Component mission operations and expand DHS operational capabilities for intercloud, high performance and edge computing, along with real-time analytics.	FY 2025 Q1	FY 2025 Q4	3-5
Data, Modeling & Simulation Sciences: Conduct two advanced data analytics demonstrations to inform Component mission operations and expand DHS operational capabilities for privacy enhancing technologies.	FY 2025 Q1	FY 2025 Q4	3-5
Data, Modeling & Simulation Sciences: Conduct two advanced data analytics demonstrations to inform Component mission operations and expand DHS operational capabilities.	FY 2025 Q1	FY 2025 Q4	3-5

Research, Development, and Innovation – PPA**Innovative Research and Foundational Tools Thrust Area**

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
Data, Modeling & Simulation Sciences: Develop two knowledge products based on emerging technology evaluations that guide acquisitions across DHS Components and the broader Government.	FY 2025 Q1	FY 2025 Q4	3-5
Emerging Computing Paradigms: Deliver two Technical Deep Dive Papers on DHS specific use cases of emerging computing capabilities.	FY 2025 Q1	FY 2025 Q4	3-5

Enduring Sciences Technology Centers

- **Problem:** DHS continues to observe that the threat (hazards and risks) landscape to the homeland is evolving and becoming more volatile, uncertain, complex, and ambiguous. Challenges and threats range from terrorism and emergency incidents such as chemical and biological attacks, global pandemics, active shooter, and violent extremism, technological and cyber on networks and critical infrastructure, natural hazards such as fires, earthquakes, superstorms, and floods to potential impacts from climate change. These evolving threat vectors stretch our operational and technical capabilities and result in immense economic and human costs. Challenges persist in our ability to prevent, prepare for, respond to, and recover from the effects of such actions and events. The HSE focused on these risks and threat vectors, often lack critical data and expertise necessary to formulate appropriate policy, operational, and system-level requirements, and knowledge of current and merging science and technologies related to interventions, counter measures and training. This capability provides DHS the ability to understand the drivers behind the various threat vectors to mitigate these risks, while identifying new technologies that impact its ability to address such risks (threats and hazards), when integrating solutions into operational use. It also enables the Department to collect, analyze, publish, and disseminate information on topics critical to the homeland security mission space – including data on acts of terrorism, targeted violence, violent extremist movements, and more.
- **Solution:** The Enduring Sciences Technology Centers are S&T’s resource for supporting awareness of mapping the causes and consequences of and understanding the characteristics of current, emerging, and potential future threats. The Enduring Sciences Technology Centers provide the Department with expertise in decision and risk science, biotechnology, and social sciences through a centralized function within S&T to coordinate that critical expertise; provide access to knowledge products (i.e., technical reports) generated through rigorous technical analysis or laboratory experimentation; and identify and fill critical data gaps and insight on the properties of chemical, biological, and explosive threat agents as well as the hazards that they pose; and strategic insights into the motivations and actions behind human trafficking, violent extremism, insider threats and terrorism to meet the policy, operational, and public needs to improve the effectiveness of interventions, counter and protective measures, and violence prevention efforts implemented by FSLTT and non-governmental stakeholders to inform DHS activities and operations. The ongoing research will continue as threats and our need to understand them evolve. The Enduring Sciences Technology Centers conduct research in the following focus areas:
 - Earth Systems Science (formerly Risk Science): Disasters from all-hazards and climate change will continue to challenge DHS across a range of missions and frontline operations exacerbating known and unknown risks to public safety and national security. Physical impacts of extreme weather and changing climatic conditions such as environmental degradation will increasingly intersect with human impacts of population growth, economic development, and technological innovation (geo-engineering and digitization). DHS will be affected in the short and long term with rising disaster costs and losses, worsening risks of environmental degradation, critical infrastructure and supply chain disruptions, civil unrest, and social instability. S&T’s ongoing efforts in this focus area align with the Department’s priority mission to prepare the Nation to respond to and recover from disasters and combat the climate crisis. We seek to understand the impacts of climate change to DHS missions along the lines of safety and security. Issues that DHS will address include emerging security challenges associated with a changing climate, effects of climate change on DHS missions and operations, and the potential for malign actors to exploit climate risks and/or climate technology innovation.

- **Social Science:** Developing a scientific understanding of how individuals, small groups, and organizations affect threats, prevention, deterrence, resilience, security, and recovery activities related to the Homeland Security mission is a massive but vitally important undertaking. Social sciences focus on the root causes of behavior at individual, organizational, and institutional levels and represent numerous fields including sociology, economics, psychology, criminology, or political science to name a few. Capability enhancement, and data development focusing on social and behavioral science support countering human trafficking, countering foreign influence, and targeted violence and terrorism prevention to ensure that stakeholders who perform, oversee, select, and direct prevention and protection activities can understand and predict their effects and success in a variety of settings based on evidence. Through this research, new findings are developed along with scientific data on the nature of threats, crimes, organizations, and individuals to better understand where, when, and how to best intervene and prevent future public safety threats. Social Science also applies best practices in social science research to new and emergent DHS priorities, including countering online disinformation, where foundational research will improve our understanding and decision making.
- **Biotechnology:** Advances in cross-disciplinary life, physical, and social sciences and convergence of material, medical, computing, and artificial intelligence technologies that leverage breakthroughs such as Clustered Regularly Interspaced Short Palindromic Repeats pose significant risks through expanding threats and increasingly broad and complex impacts. Synthetic biology and bio-chemical technologies are evolving rapidly and is a multi-trillion-dollar market driven by billions in venture capital and national investments. With the rapid pace of innovation in biotechnology and the threats emerging from this domain, it is critical that S&T understand the landscape, the evolution of the various aspects of the technology, the complexities, the supporting science, and the needs of Department to shape investment decisions. It is also critical for S&T to look ahead in this domain and anticipate future trends and Departmental needs relative to biotechnology.
- **Novel Materials and Manufacturing:** The future impacts of novel materials and manufacturing are quickly gaining interest in the U.S. and abroad due to the projected impact of these areas on innovation and the ability to adapt technologies at an accelerated pace. Novel materials and their availability could be incorporated into multiple DHS systems with the promise of reducing cost and providing enhanced benefits. Advanced manufacturing is comprised of techniques that can produce highly customized products at lower cost, greater efficiency, and less waste which holds the promise to have broad-reaching impacts to lowering cost and availability of technologies for DHS use. As these technical advances mature, so does the ability of “bad actors” to devise new threats using this technology. Challenges arise where research and development and products in this area are dual use with implications for DHS operations to screen, interdict and protect against items that could also be common commodity items. Microelectronics or the semiconductor-based integrated circuit safety and supply chain has garnered significant national attention in the last decade. This is due to the migration of the manufacturing base from the US to other countries along with the uptick in malicious actors threatening to cause havoc on U.S. infrastructure. Executive Order 14017: America’s Supply Chains assigns DHS the responsibility of building resilient supply chains and securing microelectronics. To assist in addressing this responsibility, the Innovative Systems Technology Centers are advancing research into combatting trafficking in counterfeit, fake, and maliciously affected chips from entering U.S. borders.
- **Statistical Collection and Reporting:** Through Statistical Collection and Reporting research, the Enduring Sciences Technology Centers will begin to collect, store, maintain, analyze, and disseminate key terrorisms statistics that DHS Operations can act on and can be messaged to the

public, and will look to a scalable solution that will enable DHS to systematically make evidence-based decisions on domestic violent extremism and terrorism prevention using objective, independent, quality-controlled data. This work will be closely coordinated with the DHS Office of Homeland Security Statistics and the Office of the Chief Data Officer, for ensuring similar data standards are maintained, as appropriate, and for long-term benefits of this data and other Department-wide programs.

- **Justification:** The FY 2025 Budget provides \$25.4M for this project, which is a \$5.0M decrease from the FY 2023 Enacted. This project maintains SME and conduct long-term biodefense, chem-defense, explosives, and terrorism threat research that directly informs DHS Component risk assessment efforts. S&T will acquire additional subject matter experts through a variety of mechanisms, engage technical communities of interest, and exchange technical information with strategic interagency partners. The Enduring Sciences Research Centers will continue ongoing research and development as threats and our need to understand them evolve: (1) Evaluation of chemical, biological, and explosive sciences and technology developments to understand what may impact the DHS mission in 3-5 years; (2) exploration of new and advanced methods to inform threat characterization; (3) assessment and evaluation of terrorism trends, terrorism prevention strategies, and technology adoption to inform policy makers; (4) identifying and assessing new advances in geophysical, materials, self-healing, and regenerative sciences; (5) analyzing the structure and functioning of the Earth as an adaptive, integrated system to better the impacts of threats (climate, pandemic, man-made) and opportunities for increased resiliency; and (5) retaining and maturing SME in these key areas for immediate reach back capabilities for the Department.
- **Impact:** Enduring Sciences Technology Centers establish and leverage innovative science-based capabilities to provide DHS and our partners with the expertise, research, data, and knowledge necessary to implement best-practices and appropriate understanding of functional requirements for solutions to current and emerging chemical, biological, and explosive, as well as climate change, and natural, and technological hazards. Science-informed and evidence-based policy and practice also support more efficient and accurate analysis of the threats posed by violent extremists and evidence-based terrorism prevention policies, programs, and interventions. The application of expertise, enduring research, and knowledge coordinated through the centers increases the efficiency of DHS by enabling development of more effective solutions based on consistent and defensible recommendations, such as developing and fielding more effective transportation security equipment, providing better training to front line personnel, and validating and monitoring continuing and emerging threats.

Type of Research

Basic and Applied

Technical Readiness Level

Projects range from TRL-2 to TRL-7. The Enduring Sciences Technology Centers focus on basic and applied research to address critical knowledge gaps that inform policy, strategy, requirements, mission assessments and operational plans. Therefore, we do not transition technologies directly to Components as we do not directly develop technology. Activities are initiated based on stakeholder strategic needs. At times, this research requires appropriately accredited facilities to support our research. Most deliverables are knowledge products and tools to inform decision makers, which we share with our partners and stakeholders through a variety of mechanisms. For this reason, the TRL level on many of its projects tend to be lower.

Transition Plans

The Technology Centers work directly with DHS Leadership, DHS Components, and interagency partners to deliver/transition knowledge and insight produced through various products and research results regularly. Recipients of the knowledge products and research results include internal S&T programs, all DHS Components, DHS Headquarters elements – to include the Office of Terrorism Prevention Partnerships, Offices of the Principal Deputy Counterterrorism Coordinator, PLCY, DHS I&A, DHS Office for Partnerships and Engagement, Fusion Center, Civil Rights and Civil Liberties, Center for Countering Human Trafficking, State and local governments, and local terrorism prevention practitioners, as well as DoD, and the Intelligence Community. This transition of knowledge products provides input to S&T program planning as well as Component acquisition planning and ongoing operations. Reports of research results are provided to the broader DHS and Interagency communities through the DHS Technology Clearinghouse or publication on S&T’s public website.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Decision & Risk Science: Identified hazard targets for risk modeling likely to be impacted by climate change, the associated climate conditions that could impact their spread, and likely impacted regions encountering these conditions.	FY 2023 Q1	FY 2023 Q4	3-7
Decision & Risk Science: Piloted one technology foresight and assessment capability for evaluation of applicability to DHS risk assessment.	FY 2023 Q1	FY 2023 Q4	3
Evidence Building: Characterized an improvised explosive in joint effort with US and international partner.	FY 2023 Q1	FY 2023 Q4	3
Evidence Building: Delivered a report on risk mitigating strategies to prevent terrorism and targeted violence.	FY 2023 Q1	FY 2023 Q4	3-7
Evidence Building: Delivered report identifying more efficient techniques to characterize the acute toxicity of existing and emerging chemical hazards.	FY 2022 Q1	FY 2023 Q3	3
Evidence Building: Delivered report on public perceptions of one emerging technology to inform acquisition, fielding development and deployment.	FY 2023 Q1	FY 2023 Q4	N/A
Evidence Building: Delivered report on the impact of mental health/wellness for DHS law enforcement and first responders.	FY 2022 Q4	FY 2023 Q4	4
Evidence Building: Delivered reports to DHS Components and the HSE based via appropriate portals on the analyses of risks, hazards, vulnerabilities, characterizations, and other assessments conducted.	FY 2023 Q1	FY 2023 Q4	N/A
Evidence Building: Developed characterization approach for explosive hazards that will inform DHS’s risk profile.	FY 2023 Q1	FY 2023 Q4	3-7
Evidence Building: HAC-TC: Generated prioritization for basic research for the Chemical Threat Characterization Project’s FY 2024 Activities.	FY 2023 Q1	FY 2023 Q4	N/A
Evidence Building: HAC-TC: Generated prioritization for basic research for the Chemical Threat Characterization Project’s FY 2024 Activities.	FY 2023 Q1	FY 2023 Q4	N/A

Research, Development, and Innovation – PPA

Innovative Research and Foundational Tools Thrust Area

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
Evidence Building: Mapped the Information Threat Landscape for DHS that informs DHS Component partners of state of disinformation.	FY 2023 Q1	FY 2023 Q4	N/A
HAC-TC: Facilitated international collaboration on current and emerging biological threats, hazards, and risks through establishment and participation in an international forum for exchanging information.	FY 2023 Q1	FY 2023 Q4	N/A
Risk Science: Coordinated/facilitated a community of interest exchange of information event on explosives threats, research, or operations.	FY 2023 Q1	FY 2023 Q2	N/A
Social Science Tech Center (SS-TC): Completed scientific assessment of insider threats facing domestic law enforcement agencies, with specific focus on identification and analysis of research, prevention efforts, and internal policies.	FY 2023 Q1	FY 2023 Q4	3-7
SS-TC: Conducted an outcome evaluation of the Digital Forums on Terrorism prevention in support of DHS Center for Prevention Programs and Partnerships (CP3) initiative.	FY 2023 Q1	FY 2023 Q4	3-7
SS-TC: Developed the framework for the Blue Campaign evaluation and validate the Blue Campaign human trafficking indicators.	FY 2023 Q1	FY 2023 Q4	3-7
SS-TC: Disseminated a dataset and corresponding codebook examining acts of terrorism or extremist violence in the United States for use by research, DHS I&A fusion centers, DHS’s CP3, and other HSE partners.	FY 2023 Q1	FY 2023 Q4	3-7
SS-TC: Established the collection and sharing of independent, objective data related to individuals, events, and organizations participating in targeted violence in the United States.	FY 2023 Q1	FY 2023 Q4	3-7
Statistical Collection and Reporting: Collected recommendations from known experts on lessons learned for statistical offices and provide report to DHS PLCY.	FY 2023 Q1	FY 2023 Q2	N/A
Statistical Collection and Reporting: Delivered recommendations for the collection, reporting and dissemination of data in support of establishing a department level capability to DHS PLCY.	FY 2023 Q1	FY 2023 Q4	4
Statistical Collection and Reporting: Identified data dissemination methods.	FY 2023 Q2	FY 2023 Q4	N/A
Statistical Collection and Reporting: Identified standards for the collection of terrorism data.	FY 2023 Q1	FY 2023 Q3	3
Statistical Collection and Reporting: Identified terrorism data needs of key DHS, Interagency, Legislative, OMB, and State, local, tribal, and territorial partners.	FY 2023 Q1	FY 2023 Q2	N/A
Statistical Collection and Reporting: Received legal and privacy analysis from DHS Headquarters on measures necessary to ensure all statistical data is collected in a way that protects individual privacy, civil rights, and civil liberties.	FY 2023 Q1	FY 2023 Q2	N/A
Synthetic Biology: Delivered one technical report on an agent or technology that may impact future biological threats.	FY 2023 Q1	FY 2023 Q4	N/A
Synthetic Biology: Delivered one technical report on an agent or technology that may impact future chemical threats.	FY 2022 Q1	FY 2023 Q1	N/A
	FY 2024		
Biotechnology: Deliver recommendation for basic research priorities for S&T’s Chemical Threat Characterization Project’s FY 2025 Activities.	FY 2024 Q1	FY 2024 Q4	3-5

Research, Development, and Innovation – PPA

Innovative Research and Foundational Tools Thrust Area

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
Biotechnology: Deliver report to DHS Components and the HSE via appropriate portals on the analysis of risk, hazards, vulnerabilities, characterizations, and other assessments conducted.	FY 2024 Q1	FY 2024 Q4	3-5
Biotechnology: Deliver technical report on an agent or technology that may impact future biotechnological threats.	FY 2024 Q1	FY 2024 Q4	3-5
Biotechnology: Deliver technical report on the development and deployment of AI/ML enabled technologies to monitor and assess the evolving landscape of basic scientific knowledge and impacts to DHS core mission.	FY 2024 Q1	FY 2024 Q4	3-5
Biotechnology: Develop and provide technical report on key data needed for future approaches to agent agnostic biodetection.	FY 2024 Q1	FY 2024 Q4	3-5
Novel Materials & Secure Manufacturing: Characterize an improvised explosive in joint effort with the U.S. and international partner(s).	FY 2024 Q2	FY 2024 Q4	3-7
Novel Materials & Secure Manufacturing: Develop final report, sampling frame, user testing, cost benefit analysis to meet goals of the ballistic pendulum testing study.	FY 2024 Q1	FY 2024 Q4	3-7
Social Sciences: Deliver assessment of the challenges, limitations and barriers to terrorism and targeted violence evaluation research.	FY 2024 Q1	FY 2024 Q4	3-7
Social Sciences: Deliver recommendations for systematic approaches to public perception analysis.	FY 2024 Q3	FY 2024 Q4	6
Social Sciences: Deliver trend analysis of traffickers and victims within USCIS T-visa applications and case file labor trafficking investigations.	FY 2024 Q1	FY 2024 Q4	3-7
Statistical Collection and Reporting: Deliver report and data set of data collected according to standards for the collection of terrorism data identified in previous fiscal year.	FY 2024 Q1	FY 2024 Q4	4
	FY 2025		
Biotechnology: Deliver recommendation for basic research priorities for S&T’s Chemical Threat Characterization Project’s FY 2026 Activities.	FY 2025 Q1	FY 2025 Q4	3-5
Biotechnology: Deliver report to DHS Components and the HSE via appropriate portals on the analysis of risk, hazards, vulnerabilities, characterizations, and other assessments conducted.	FY 2025 Q1	FY 2025 Q4	3-5
Biotechnology: Deliver technical report on an agent or technology that may impact future biotechnological threats.	FY 2025 Q1	FY 2025 Q4	3-5
Biotechnology: Deliver technical report on the development and deployment of AI/ML enabled technologies to monitor and assess the evolving landscape of basic scientific knowledge and impacts to DHS core mission.	FY 2025 Q1	FY 2025 Q4	3-5
Biotechnology: Develop and provide technical report on key data needed for future approaches to agent agnostic biodetection.	FY 2025 Q1	FY 2025 Q4	3-5
Earth Sciences: Identify hazard targets for risk modeling likely to be impacted by climate change, the associated climate conditions that could impact their spread, and likely impacted regions encountering these conditions.	FY 2025 Q1	FY 2025 Q4	3-5
Social Sciences: Complete public perception analysis of at least 2 emerging technologies.	FY 2025 Q3	FY 2025 Q4	6

Innovative Systems Technology Centers

- **Problem:** Technology can be a tool for increasing the efficiency and effectiveness of homeland security operations; it can enhance capabilities and collaboration, provide better awareness and information, speed decision making, and deliver the ability to do things that were once not possible. Emerging technology and private sector innovations in the areas of communication, sensors, and identity technologies are playing an increasingly significant role in securing the Homeland against dynamic threats. However, S&T lacks a coordinated approach to research and analyze these next generation technologies through the lens of DHS and its unique mission needs and requirements and inform DHS on technical maturity and potential risks of new technology. This includes potential vulnerabilities and/or malicious dual use of emerging technology.
- **Solution:** The Innovative Systems Technology Centers are S&T’s resource for understanding and harnessing next-generation systems and emerging innovations for cross-cutting mission capabilities. Along with providing deep subject matter expertise in telecommunications, sensors, and identity technologies, these centers focus on understanding, exploring, researching, and analyzing these next generation technologies and capabilities to inform DHS on how to leverage these advancements to better meet mission needs and evolving requirements, while identifying and preventing potential vulnerabilities and/or malicious dual use. This is done, in part, by experimenting with and field-testing innovations to identify technological maturity, operational uses, and vulnerabilities of these systems. The Innovative Systems Technology Centers conduct research in the following focus areas:
 - **Advanced Communications:** Advanced communication networks are a key element of tomorrow’s digital infrastructure and a technology enabler. The promises of advances in technologies such as 5G are expected to be revolutionary. Much more than traditional cellular communications, 5G enables high speed machine-to-machine communication and is expected to facilitate fundamentally new classes of applications, from real-time remote operations and enhanced situational awareness, to self-driving cars, smart buildings, augmented reality and more. 5G is the platform and infrastructure these capabilities will leverage. The ability to communicate is vital to DHS front line workers and public safety, harnessing the advances of new technologies while ensuring their security and resiliency for DHS missions is paramount. The Innovative Systems Technology Centers’ research will enhance the communications and network capabilities of DHS, while maintaining security and resiliency, using advanced communications.
 - **Advanced Sensing:** Many DHS operations involve detecting, tracking, monitoring, and identification of activities, goods, or people across different environments – including borders, maritime, wildlands, urban, transportation, space, etc. – and in different event situations and venues ranging from daily operations to disaster response. These operations also occur across multiple jurisdictions involving Federal, State, and local law enforcement, adding complexity to efficient and effective operations. Research into quantum-based sensors as well as next generation intelligent sensors, including innovative sensors that detect a broad spectrum of threats, and advanced emergency and security alert technologies ensures operators have access to, and can take advantage of, emerging sensor capabilities.
 - **Digital Trust & Privacy: Digital Identity & Trust:** The ability to establish and verify an individual’s identity enables the Department to perform risk-based decision making that is tailored to the individual. With the supply chain challenges surrounding 5G creating vulnerabilities

in our infrastructure, to emerging new use of digital capabilities such as mobile driver’s licenses (mDL), digital trust and its enabling technologies will be a prevalent issue in the coming years, with widespread impact to many Department missions. Digital trust is critical to verifying the validity of data, maintaining privacy, and ensuring integrity across multiple platforms and applications. The Innovative Systems Technology Centers’ research into digital identity, trust and privacy focuses on enabling digital trust across platforms, technologies, and applications of importance to DHS. DHS continues to need an enhanced set of identity technologies, and capabilities (including but not limited to biometric capabilities) that Component partners and S&T program managers can incorporate into their R&D projects. Additionally, they provide a sustainable, common platform for driving biometric and identity technology standards, best practices, and innovation across the Department. This enables DHS Components to quickly establish technical competence using more capable and cost effective biometric and identity technologies that facilitate operational excellence.

- **Justification:** The FY 2025 Budget provides \$10.5M for this project, which is a \$3.0M decrease from the FY 2023 Enacted. This project acquires and maintains subject matter experts through a variety of mechanisms, engage technical communities of interest, and exchange technical information with strategic interagency partners to access supplementary expertise and leverage ongoing research for homeland security applications. S&T will also conduct innovative research, and experiment with state-of-the-art of intelligent sensors and autonomous systems; resilient and advanced communications equipment, data, and networks; and advanced biometrics and digital identity capabilities. S&T will address the emerging opportunities and risks in biometrics and digital identity, continue study 5G/XG advanced communication concerns—including the advanced technological capability, network security, and supply chain threats—as well as continue S&T’s partnerships with CISA, DOT, NIST, and SLTT to secure public safety communication, ensure interoperability, and to securely move capabilities into the next generation of telecom equipment. S&T will explore the next generation of intelligent sensors and systems for use across the HSE. S&T will acquire additional subject matter experts through a variety of mechanisms, engage technical communities of interest, and exchange technical information with strategic interagency partners to access supplementary expertise and leverage ongoing research for homeland security applications.
- **Impact:** The Innovative Systems Technology Centers enable DHS Components, as well as State, tribal, local governments, and industry partners, public safety to better take advantage of next generation and emerging innovations in communication, sensor, and identity technologies. These centers and testbeds ensure that operators can effectively identify, evaluate, and integrate technologies into use and that potential vulnerabilities are mitigated.

Type of Research

Basic, Applied and Developmental

Technical Readiness Level

Projects range from TRL-2 to TRL-7. The Innovative Systems Technology Centers focus on basic and applied research to address critical knowledge gaps that inform policy, strategy, requirements, mission assessments and operational plans. Within the Innovative Systems Technology Centers, TRL levels tend to be generally higher (TRL 5-7) than other technology centers as they often conduct experiments with existing capabilities to understand how they can be adapted into applications to meet the needs of DHS end users. Activities are initiated based on stakeholder strategic needs. At times, this research requires appropriately accredited facilities to support our research. Most deliverables are knowledge products and tools to inform decision makers.

Transition Plans

The Innovative Systems Technology Centers work directly with DHS Leadership, DHS Components, and interagency partners to deliver/transition knowledge and insight produced through various products and research results regularly. Recipients of the knowledge products and research results include internal S&T programs, all DHS Components, DHS Headquarters elements, and State and local governments. This transition of knowledge products provides inputs to S&T program planning as well as Component acquisition planning and ongoing operations. Reports of research results are provided to the broader DHS and Interagency communities through DHS's Technology Clearinghouse or publication on S&T's public website.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Autonomy: Identified enduring research questions in autonomous systems in maritime environments by collaborating with DHS Components through targeted workshops.	FY 2023 Q1	FY 2023 Q2	N/A
Cybersecurity, Communications & Digital Trust: Conducted technology experiment for 5G/XG in support of operational DHS Components and first responder missions.	FY 2023 Q1	FY 2023 Q4	4
Cybersecurity, Communications & Digital Trust: Contributed to digital identity and biometric technology standards and best practices in coordination with relevant entities (e.g., NIST) on topics including Quantifying biometric system performance variation across demographic groups.	FY 2023 Q1	FY 2023 Q4	N/A
Cybersecurity, Communications & Digital Trust: Developed results, analysis, and recommendations for 5G Domain Awareness and Remote Operations.	FY 2023 Q2	FY 2023 Q4	N/A
Cybersecurity, Communications & Digital Trust: Selected 5G/5G Advanced/6G capabilities and standards of impact to DHS missions, define requirements or gaps associated, and the risk or opportunity posed by these forthcoming capabilities and standards, e.g., messaging prioritization standards over wireless networks, and their impact to DHS mission critical communications.	FY 2023 Q1	FY 2023 Q4	3-7
Cybersecurity, Communications & Digital Trust: Updated risk and vulnerability assessments of mDL Digital Identity Documents and support DHS Component technology evaluations.	FY 2023 Q1	FY 2023 Q4	N/A
Cybersecurity, Communications & Digital Trust: Updated risk and vulnerability assessments of mDL Digital Identity Documents and support DHS Component technology evaluations.	FY 2023 Q1	FY 2023 Q4	N/A
Evidence Building: Collaborated with industry solution developers to address challenging DHS biometric and identity border and aviation use cases through cooperative evaluations.	FY 2023 Q1	FY 2023 Q4	6-7
Evidence Building: Developed draft biometric equipment acquisition framework to differentiate between biometric capabilities based and perform limited evaluations.	FY 2023 Q1	FY 2023 Q4	3-7
Evidence Building: Developed test methods to assess the integrity and vulnerabilities of biometric capabilities relevant to DHS missions.	FY 2023 Q1	FY 2023 Q4	3-7
Novel Materials and Manufacturing: Delivered landscape assessment of the risks to the microelectronic supply chain and our ability to secure the Nation’s critical infrastructure.	FY 2022 Q4	FY 2023 Q4	4
	FY 2024		
Advanced Communications: Deliver results of a 5G based communications interoperability and resiliency assessment.	FY 2024 Q2	FY 2024 Q4	6
Advanced Sensing: Deliver an expanded In-Building Sensor Testbed that can assess environmental, air quality, particulate, chemical, and biological sensors using a CWMD mass spectrometer and an Executive Office of the President, Office of Science and Technology Policy, Pandemic Innovation Task Force sensor detection capability.	FY 2024 Q2	FY 2024 Q4	3-7
Advanced Sensing: Deliver knowledge product assessment report of laser scanning technology.	FY 2023 Q3	FY 2024 Q4	4-5

Research, Development, and Innovation – PPA

Innovative Research and Foundational Tools Thrust Area

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
Communications and Cyber Resiliency: Develop and present two technical proposals re: SIM-less authentication and resilient network slicing to 3 rd Generation Partnership Project for industry feedback.	FY 2024 Q2	FY 2024 Q4	6
Communications and Cyber Resiliency: Develop Interoperable framework to assure interoperability for DHS Components and First Responder voice communications.	FY 2024 Q1	FY 2024 Q4	3-7
Digital Identity & Trust: Deliver 4 public NIST reports and 2 internal S&T reports on performance of biometric matching systems on operationally relevant data.	FY 2024 Q1	FY 2024 Q4	3-5
Digital Identity & Trust: Deliver results of one vulnerability and risk assessment of commercial biometric technologies relevant to DHS operations.	FY 2024 Q1	FY 2024 Q4	3-5
Digital Identity & Trust: Deliver results on one fraud TTP analysis using Financial Crimes Enforcement Network (FinCEN) Suspicious Activity Report and Currency Transaction Report data.	FY 2024 Q1	FY 2024 Q4	3-5
Digital Identity & Trust: Deliver updated draft biometric equipment acquisition framework that includes operational performance criteria and quantitative test methods perform expanded evaluations.	FY 2024 Q3	FY 2024 Q4	7
	FY 2025		
Advanced Communications: Complete detailed implementation documentation for 5G use case for CBP POE.	FY 2025 Q1	FY 2025 Q4	7
Advanced Communications: Deliver results of assessment to identify key vulnerabilities and threat indicators of space systems.	FY 2025 Q1	FY 2025 Q4	4
Advanced Sensing: Demonstrate prototype of Rydberg Atom Field Sensor with USCG.	FY 2025 Q1	FY 2025 Q4	3-6
Digital Identity & Trust: Complete comprehensive evaluation of biometric equipment to inform and reduce risks to DHS acquisition programs and refresh outdated technologies.	FY 2025 Q1	FY 2025 Q4	7
Digital Identity & Trust: Deliver results of analytics developed on FinCEN data with DHS Components or other Federal agencies that access FinCEN.	FY 2025 Q1	FY 2025 Q4	3-5
Digital Identity & Trust: Deliver results of vulnerability and risk assessment of DHS biometric capabilities.	FY 2025 Q1	FY 2025 Q4	3-5
Novel Materials & Manufacturing: Preliminary infrastructure using Hyperledger with limited test data from Field Programmable Gate Arrays testing.	FY 2025 Q1	FY 2025 Q4	6

**Physical Security and Critical Infrastructure Resilience Thrust Area
Research and Development**

Technology Readiness Level Exhibit

(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget
Physical Security and Critical Infrastructure Resilience Thrust Area	\$42,558	\$42,558	\$33,550

R&D Thrust Area Description

PHYSICAL SECURITY AND CRITICAL INFRASTRUCTURE RESILIENCE THRUST AREA: S&T invests in the R&D technologies, methods, and procedures to enhance the physical security of the Nation’s critical infrastructure which includes the Nation’s air travel system, mass transportation systems, and schools as well as soft targets such as mass public gatherings. S&T also conducts RDT&E to analyze the foreign influence spectrum; how it can impact critical functions such as the media and elections, and what can be done to prevent them. This research will enable policy makers and operational end-users to make informed decision to mitigate vulnerabilities and enhance community resilience in the face of various physical, social, and behavioral threats.

PHYSICAL SECURITY AND CRITICAL INFRASTRUCTURE RESILIENCE THRUST AREA <i>(Dollars in Thousands)</i>				
Program	Project	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President’s Budget
Baggage / Cargo / People Screening		\$34,080	\$34,080	\$27,550
	Air Cargo Screening	\$3,250	\$3,250	\$3,250
	Checked Baggage Technology Development	\$7,750	\$7,750	\$4,300
	Next Generation Explosives Trace Detection	\$6,080	\$6,080	\$5,250
	Primary Screening for Carry-On Bags	\$5,500	\$5,500	\$5,000
	Primary Screening for Passengers	\$4,000	\$4,000	\$3,250
	Screening at Speed	\$7,500	\$7,500	\$6,500
Countering Violent Extremism		\$6,478	\$6,478	\$5,000
	Public Safety and Violence Prevention	\$6,478	\$6,478	\$5,000
Physical Security		\$2,000	\$2,000	\$1,000
	Soft Target Security (formerly Soft Targets, Vehicular, School Safety, Protective Sites)	\$2,000	\$2,000	\$1,000
Total – Physical Security and Critical Infrastructure Resilience Thrust		\$42,558	\$42,558	\$33,550

Baggage / Cargo / People Screening Program – This program develops prototype solutions for high priority technology capability gaps within the security screening processes for the Nation’s air travel and other mass transportation systems.

Air Cargo Screening

- Problem:** Air Cargo is the third critical components of Aviation Security, along with Checked Baggage and Checkpoint Screening. Approximately 50 percent of the contents in a passenger aircraft are cargo and almost all U.S. commercial carrier passenger flights carry air cargo. P.L. 110-53, mandates 100 percent screening of air cargo on passenger aircraft, to the same standards as checked baggage. In July 2021, the International Civil Aviation Organization (ICAO) mandated that all outgoing U.S. cargo must be screened to the same level as cargo on passenger planes. The extraordinarily wide range of air cargo commodities, the much larger size and weight of cargo skids compared to checked baggage, and the need to keep the costs down and affordable to the hundreds of private TSA certified cargo screening companies poses enormous challenges to developing screening systems for cargo. The current state of Air Cargo Screening deployment is critically behind that of checked baggage screening. Evolving threats and the ever-increasing volume of air cargo makes it impossible to screen securely with screening

technologies currently being used in the air cargo domain. These issues necessitate the need to develop next generation cargo screening systems that can address the above challenges.

- **Solution:** To securely screen the extremely high volume of cargo shipped by hundreds of shippers, TSA has decentralized the security screening of cargo to private cargo screening of cargo to privately owned TSA Certified Screening Facilities. To receive this TSA certification, facilities must meet certain operational and performance requirements. Facilities that meet these requirements must use equipment listed in TSA's Air Cargo Screening Technology List (ACSTL). S&T's Air Cargo Screening program directs the development of equipment that can meet TSA's operational and performance requirements and be listed on the ACSTL. Additionally, since most private screening companies are low-margin facilities, screening equipment must also be affordable. TSA and S&T coordinate with private screening companies through the Aviation Security Advisory Council to determine viable solutions. The Air Cargo Screening solution space involves a combination of short term, mid-term, and long-term strategies. These include (a) augmenting existing x-ray screening systems via advanced hardware and software to support increased security in the short term, (b) developing low-cost Computed Tomography (CT) systems for 3D imaging of skids, (c) automated threat and anomaly detection algorithms, (d) developing technologies to screen dense cargo in the midterm, and (e) in the long term, developing technologies to continually address evolving threats and the significant growth of cargo. This strategy will close capability gaps identified and updated annually by the TSA Air Cargo program. The Air Cargo Screening program also funds the Transportation Security Laboratory (TSL) to continue develop test and evaluation capabilities that are air cargo specific.
- **Justification:** The FY 2025 Budget provides \$3.3M for this project, which is consistent with the FY 2023 Enacted. Funding supports the research, development, and productization for solutions in the areas of both cargo and passenger safety. The focus of the Air Cargo program is to identify technology for screening complex and dense cargo, advance high-speed screening to support exponential growth of cargo and continue development of test and evaluation capability for cargo screening equipment at TSL. The technologies developed for screening air cargo for explosives can also be adapted and applied to other operational scenarios and Component requirements, including the use of hardware for the screening of opioids and other contraband for CBP, as well as the use in high security areas and sites for USSS. S&T's Air Cargo program is working with CWMD to coordinate the development of cargo scanners that can also detect Special Nuclear Material. In June 2021, new mandates were released requiring the screening of all air cargo to reduce significantly and address ongoing threats and the risk of catastrophic events occurring aboard commercial aircraft. In addition, this funding will accelerate development of new technology for effective screening of high-density air cargo pallets for threat items.

- Impact:** This developmental work is critical to TSA meeting its Congressionally mandated requirements for Air Cargo Screening and for U.S. freight carriers to meet their ICAO obligations. Without this developmental effort, both air cargo and passenger safety will be at risk. Air Cargo security is critical to not only protecting significant economic interests and passenger safety but also in supporting public health. As an example, in 2020 over one trillion dollars of pharmaceuticals were shipped as air cargo endangering the public and air safety. Funding this research will close a major security loophole in the aviation security triad. Major developments planned for FY 2025 include (a) adding the capability to automatically load and unload cargo to the IDSS cargo scanner, (b) completion of software relating to mapping of cargo images to manifest data, (c) AI based ATR will be hosted on emulators using images from the IDSS and Astrophysics scanners, (d) completing “qualification readiness” for cargo CT scanners, and (e) completing a lab prototype of a hybrid X-Ray/Neutron imaging cargo scanner in collaboration with CWMD.

Type of Research

Applied and Developmental

Technical Readiness Level

The TRL levels associated with Air Cargo screening projects typically start at a level of 3 or 4 and end at 7. The projects cover a spectrum of topics that include developing cargo scanners and their associated software as well as augmenting existing scanners using the latest software and hardware technology.

Transition Plans

When the air cargo skid scanners development reaches a TRL-7, the products will be available for TSA qualification tests. Successful completion of TSA qualification tests will lead to the availability of products in the marketplace for deployment.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Completed build and submit test plan to government for approval of laboratory prototype neutron skid scanner being developed by Bubble Technology Industries.	FY 2021 Q4	FY 2023 Q1	5
Completed design review of high-density penetration CT system being developed at LLNL.	FY 2022 Q1	FY 2023 Q1	5
Completed laboratory prototype neutron skid scanner (Bubble Technology Industries).	FY 2021 Q4	FY 2023 Q3	1-5
Demonstrated an x-ray simulation tool at the TSL.	FY 2022 Q2	FY 2023 Q2	7
Performed formal test and evaluation of cargo CT scanner (Astrophysics) at TSL and generate a final technical report detailing performance and issues.	FY 2022 Q2	FY 2023 Q1	7
Provided final Convolutional Neural Network (CNN) ATR Report.	FY 2020 Q3	FY 2023 Q1	7

Research, Development, and Innovation – PPA

Physical Security and Critical Infrastructure Resilience Thrust Area

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2024			
Complete initial evaluation of ATR algorithms at TSL. The algorithms will be hosted on simulators and use data collected from the CT scanners under development by the Air Cargo Screening program.	FY 2023 Q1	FY 2024 Q4	7
Complete software design to identify and improve image quality of dense areas in a cargo skid. This is planned to be achieved through an initial scan to identify dense areas and then subjecting those areas to photon saturation.	FY 2023 Q1	FY 2024 Q4	7
Continue development of a CT-like Multi-Use Cargo Skid Screening System cargo scanner and perform ACSTL qualification readiness tests covering image quality, penetration & Field Data Recording Systems.	FY 2024 Q1	FY 2024 Q4	7
Initiate joint development project with CWMD to develop a neutron imaging scanner to support both TSA and CWMD requirements.	FY 2023 Q4	FY 2024 Q4	4
Initiate prototype construction of high-energy tomographic air cargo scanner.	FY 2023 Q2	FY 2024 Q4	5
FY 2025			
Add automated conveyance capability to the Integrated Defense and Security Solutions (IDSS) cargo scanner and perform a Factory Acceptance Test. A report will be generated that will detail next steps.	FY 2024 Q1	FY 2025 Q1	6
Deliver final report related to implementation of Common ATR in the IDSS and Astrophysics skid scanners. [TeleSecurity Sciences]	FY 2024 Q3	FY 2025 Q2	7
Implement Common ATR in the IDSS and Astrophysics skid scanners. [TeleSecurity Sciences]	FY 2024 Q3	FY 2025 Q1	7
Perform Factory Evaluation Test of high-density cargo scanner prototype. The system will be tested at LLNL, and the test results will be submitted to S&T for approval. (Predicated on funding availability)	FY 2024 Q2	FY 2025 Q4	4
Produce and deliver a productization final report that includes all aspects of the Astrophysics system’s performance, at the close of the project. The report shall document a system that is fully capable of performing in a production environment and is ready for TSA qualification testing at a place of the Government’s choosing.	FY 2024 Q4	FY 2025 Q1	7

Checked Baggage Technology Development

- **Problem:** Explosive threats continue to expand due to improvised explosives. Detection of the full array of existing and emerging threats in checked baggage is limited due to the finite capabilities of currently deployed technologies. In addition, the current operational false alarm conditions are stressing the resources of TSA Electronic Baggage Screening Personnel, in term of number of secondary inspections which must be undertaken to clear baggage for safe flight.
- **Solution:** S&T and TSA are working jointly with industry and academia to research and develop next generation technologies that enhance capabilities until the next generation explosive detection systems are developed and deployed. Acquired technologies will incorporate novel detection algorithms, enhanced software, more robust components, and innovative, scalable systems. The Checked Baggage Program has five specific focus areas:
 - **Advanced X-ray Systems Development:** Development and testing of systems of full up design models, including orthogonal screening technologies, such as x-ray diffraction, which provide additional material discrimination and information distinct to that available from traditional x-ray transmission screening.
 - **Algorithms:** Development and maturation of threat detection and, false alarm reduction, and alarm resolution algorithms, integration into operational/prototype systems, and demonstration.
 - **Component Technology Development:** Development and maturation of system components and subsystems (such as X-ray Sources and Detectors) necessary to evolve laboratory and experimental prototypes into full up X-ray system designs able to meet the Advanced X-ray Systems requirements.
 - **Baggage Movement Technology:** Development of information-based methods to include new methods of baggage classification, screening, and transport in the checked baggage domain to enable multiple parallel screening tiers to adjudicate bag safety outside of X-ray technologies.
 - **Screening Performance and Training Applications:** Development of software integrated with currently deployed systems to facilitate data collection in support of performance management.
- **Justification:** The FY 2025 Budget provides \$4.3M for this project, a \$3.5M decrease from the FY 2023 Enacted. This project continues to fund ongoing and new research and development activities through test and evaluation and ultimately through transition to TSA operations. Such activities would focus on the following three solution areas: Advanced X-Ray Systems Development, Algorithms, and Screening Performance. Funding will also support the demonstration and evaluation of officer training and evaluation improvements.
- **Impact:** These next generation explosive detection systems and subsystems will provide TSA with enhanced threat detection capabilities, lower false alarm rates, improved alarm resolution, and reduced lifecycle costs. This will allow TSA to be more efficient and effective in addressing emerging threats and keeping pace with public travel requirements. Future program goals include the following:
 - Expanded library of explosives and explosives signatures that can be effectively detected.
 - Improved automated explosives detection.
 - Improved false alarm resolution and performance.

Research, Development, and Innovation – PPA

Physical Security and Critical Infrastructure Resilience Thrust Area

- Enhanced ability to detect priority non-explosive components of explosive devices.
- Improved system reliability, screening speed (throughput) and reduced cost of ownership.
- Improved baggage movement technologies that support changes to security parameters which will improve operations and allow for innovative infrastructure solutions.

Type of Research

Applied and Developmental

Technical Readiness Level

The Checked Baggage Technology Program will continue to initiate R&D through targeted TRL 2-6 projects that develop novel approaches and re-envision existing technologies to resolve current TSA capability gaps.

Transition Plans

- Perform independent testing to determine detection, identification, and false alarm performance characteristics of all prototype systems to assess transition worthiness and present data analysis and results to relevant stakeholders.
- Initiate transition of prototypes through knowledge products and acquisition alignment with TSA.
- Transition developed components to original equipment manufacturers for both system retrofit and future system production.
- Coordinate development with TSA’s recapitalization plans ensuring coordinated, timely technology insertion.
- Develop technology transition plans for qualifying software and data packages, ensuring these tools are provided to TSA with the data rights necessary for capability integration. Complete transition through coordination sessions supported by interagency agreements and Technology Transfer Agreements.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Awarded technology development contract(s) in accordance with TSA Electronic Baggage Screening Technology Roadmap Strategy.	FY 2023 Q1	FY 2023 Q3	4-6
Conducted preliminary design review for cost-effective multi-energy CT detector components.	FY 2021 Q3	FY 2023 Q2	5-7
Conducted preliminary design review for detection algorithm which identifies threat device components.	FY 2021 Q3	FY 2023 Q1	5-7
Demonstrated a backwards compatible CT detector using the 4-side butt-able CT Module components in an existing system.	FY 2022 Q1	FY 2023 Q4	5-7

Research, Development, and Innovation – PPA

Physical Security and Critical Infrastructure Resilience Thrust Area

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
Demonstrated and test an algorithm that assists an operator with alarm resolution by identifying threat device components in addition to the explosives alarm.	FY 2022 Q1	FY 2023 Q3	5-7
Demonstrated novel system and subsystem development for Hybrid XRD system for Checked Baggage detection.	FY 2023 Q1	FY 2023 Q2	5-7
Performed testing of prototype hybrid CT-X-ray-diffraction baggage screening system.	FY 2022 Q1	FY 2023 Q1	6
	FY 2024		
Critical Design Review and initial software release for prototype officer evaluation tool platform to harmonize and streamline the Transportation Security Officer (TSO) training and certification process across the TSA Explosive Detection System fleet.	FY 2024 Q2	FY 2024 Q4	4-6
Critical Design Review for next-generation X-Ray diffraction imaging (XRDI) system and its integration with a high-throughput EDS to produce a Hybrid CT + XRDI system.	FY 2024 Q2	FY 2024 Q4	5-7
Deliver a Checked Baggage Inspection Systems version 8.0 report on existing Checked Bagged Screening systems to TSA.	FY 2023 Q1	FY 2024 Q1	N/A
Preliminary Design Review for a full engineering CT-XRD prototype, having a single rotating gantry system with both CT and XRD components collocated on a common gantry.	FY 2024 Q2	FY 2024 Q3	4-6
	FY 2025		
Commissioning of next-generation X-Ray diffraction imaging (XRDI) system and initial data collections.	FY 2024 Q2	FY 2025 Q3	5-7
Completion of initial base build of a full engineering CT-XRD prototype, having a single rotating gantry system with both CT and XRD components collocated on a common gantry with specific focus on signal integrity at increasing rotational speed.	FY 2024 Q2	FY 2025 Q3	4-6
Critical Design Review for a full engineering CT-XRD prototype, having a single rotating gantry system with both CT and XRD components collocated on a common gantry.	FY 2024 Q2	FY 2025 Q1	4-6
Critical Design Review for extension of prototype officer evaluation software to provide local and wide area network functionality.	FY 2024 Q2	FY 2025 Q4	4-6

Next Generation Explosives Trace Detection (NextGen ETD)

- **Problem:** As terrorists continue to evolve their tactics and threats, the variety of Homemade Explosives (HMEs) used in explosive devices has simultaneously increased. This leads to an enduring need for enhanced explosives screening and novel R&D solutions for employment at aviation checkpoints, border crossings, and large events. As part of understanding the nature of emerging threats and associated scope of R&D, S&T must continue to assess the effectiveness of deployed technologies against emerging threats; identify capability gaps; develop novel capabilities to address these gaps; and test, evaluate, mature, and transition these capabilities to end-users. In addition to identifying and defeating emerging threats, the Program also explores and experiments with pathways to integrate Small-bulk Confirmatory Capabilities through Barriers with NextGen trace and vapor detection for checkpoint applications. Looking beyond current needs, the Program spearheaded a ML effort to explore whether ML modules can learn features of new threats, shorten the development of detection algorithms, and, ultimately, increase accuracy of threat detection.
- **Solution:** As a result of collaborations with DHS Components, industry, academia, and Federally Funded Research and Development Center partners, S&T gained a comprehensive understanding of the nature of threats and operational requirements. This understanding provides the framework for the development of a three-pronged R&D plan:
 - Short Term Solution: enhancing detection capabilities of currently deployed systems. This includes retrofitting currently deployed Explosives Trace Detectors, training end-user on sampling efficiency, and expanding detection library to include emerging threats.
 - Mid-Term Solution: conducting R&D of Small-bulk Confirmatory Capabilities through Barriers and maturing NextGen Mass Spectrometry ETDs.
 - Long Term Solution: further developing novel detection capabilities (ex: Small-bulk Confirmatory Capabilities through Barriers, Vapor Detection, and Machine Learning) to revolutionize Alarm Resolution (AR) capabilities.
 - With the expanded scope of AR, the Program has the knowledge, know-hows, and experiences needed to execute R&D and deliver solutions to the DHS Components effectively.
- **Justification:** The FY 2025 Budget provides \$5.3M for this project, which is a \$0.8M decrease from the FY 2023 Enacted. The funding will develop innovative solutions for DHS Components while putting in place developmental milestones and framework needed for technical and capability breakthroughs in the future. There are multiple DHS Component requests, collaborations, and joint R&D efforts spanning four different AR thrust areas (i.e., enhanced capabilities of deployed systems, NextGen Mass Spectrometry ETDs, Small-bulk Confirmatory Capabilities through Barriers, and Vapor Detection). Additionally, a portion of FY 2025 funding will be devoted to developing novel X-Ray Diffraction technologies that detect and identify explosives through metal, ceramic, and other dense materials.
- **Impact:** In collaboration with TSA's Acquisition Program Management and Requirements Capabilities Analysis Center, the program demonstrated an excellent record of transitioning R&D solutions to TSOs, CBP laboratories, Federal agents, and police officers. These solutions increased probability of detection of deployed systems, kept false alarm rates low, increased security effectiveness to meet evolving threats, and enhanced end-user satisfaction. In addition to TSA, capabilities developed under this program also contributed to detection enhancements for

officers in the USSS and CBP. Active collaborations with both agencies are ongoing.

- **Mission Impact:** The NextGen ETD Program works to advance DHS’s mission to counter terrorism and homeland security threats, particularly those in operational environments such as airports and airways. NextGen ETD prioritizes developing new and improved trace explosives detection capabilities to satisfy the wide variety of operational environments and DHS Components/ partners. NextGen ETD works closely with Federal laboratories, academic institutions, and private sector companies to conduct RDT&E of trace explosive-related technologies, to better detect, identify, and mitigate potential threats. Emerging detection technologies will address previous capability gaps encountered by the Homeland while simultaneously improving the end-user experience.
- **Public and End-User Benefit**

Short-Term Solutions	
Retrofitting Currently Deployed ETDs	<ul style="list-style-type: none"> • Fewer alarm rates • Faster throughput • Enhance collection efficiencies
Training End-Users on Sampling Efficiency	<ul style="list-style-type: none"> • Easier to use processes and technologies • Enhance operational capabilities of TSOs
Expanding Detection Library to include Emerging Threats	<ul style="list-style-type: none"> • More threats captured • Confidence that every threat is accounted for
Mid-Term Solutions	
R&D of Small-bulk Confirmatory Capabilities through Barriers	<ul style="list-style-type: none"> • Quickly identify hazardous materials • No sample preparation, faster throughput • More accurate and efficient instrumentation • Expand what passengers can bring • Advanced access control point credential authentication systems
Maturing NextGen Mass Spectrometry ETDs	
Long-Term Solutions	
Further Developing Novel Detection Capabilities	<ul style="list-style-type: none"> • More streamlined process for the end-user • Increasing security effectiveness while dramatically reducing wait times • Reliably detecting a wider range of prohibited items regardless of concealment • Minimize pat down procedures and enable touchless screening
Revolutionize AR Capabilities	

Type of Research

Applied and Developmental

Technical Readiness Level

Grounded in operational needs, the Program invests in selected technologies spanning all four thrust areas. As such, R&D efforts span a wide range of TRLs, from 4 – 7 for emerging capabilities to 7 – 8 for mature technologies. Whereas emerging capabilities are developed at the requests of DHS Components, matured technologies are developed with active participation and joint funding from DHS Components. In particular, the development and maturation of NextGen Mass Spectrometry ETDs has been singled out for joint funding. This is a testament to S&T’s R&D excellence and laser focus on turning requirements into capabilities.

Transition Plans

The Project embraced and embodied S&T Matrix Team to develop and deliver innovative R&D solutions to DHS Components. Transition plans are developed jointly at the beginning of projects and include R&D roadmaps and transition milestones. The Program then leverages all resources available within S&T and in some instances selected resources from the Components and international partners such as the United Kingdom (UK) Department for Transport (DfT) and Defence Science and Technology Laboratory to achieve those transition milestones. To date, four transition plans have been jointly developed, one with TSA, two with the USSS, and one with the UK DfT. The Matrix Team represents the best of DHS collaborative spirit, and the Program embraces this concept for years to come.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Assessed detection algorithms based on ML and compare their performance to conventional detection algorithms.	FY 2023 Q1	FY 2023 Q2	6
Completed a design review for a small-bulk confirmatory prototype capable of screening through barriers.	FY 2023 Q1	FY 2023 Q4	6
Developed, test, and evaluate an Ambient Desorption Ionization (ADI) module retrofitted into a mass spectrometer trace explosives detection system.	FY 2022 Q1	FY 2023 Q3	5
	FY 2024		
Deliver the airport demonstration report findings to TSA on machine learning algorithms running on a CAD used by Transportation Security Specialists-Explosives for high-threat analysis.	FY 2023 Q3	FY 2024 Q4	6
Deliver Test and Evaluation report findings on a Small-Bulk Confirmatory prototype capable of screening through barriers to TSA.	FY 2023 Q4	FY 2024 Q3	5
	FY 2025		
Develop novel XRD technologies that detect and identify explosives through metal, ceramic, and other dense materials.	FY 2023 Q4	FY 2025 Q2	3
Expand Detection Library to include Emerging Threats.	FY 2023 Q4	FY 2025 Q4	3
Together with DHS Small Business Innovation Research, NextGen ETD develops Machine Learning-Based Decision Analytics Tools for Alarm Resolution. These tools integrate and enhance sampling efficiency across AR technologies while reduce cognitive loads on end-users.	FY 2023 Q3	FY 2025 Q4	3

Primary Screening for Carry-On Bags

- **Problem:** TSA’s primary screening of carry-on bags and other personal items is slow, labor-intensive, and subject to significant operator performance variability. Furthermore, space constraints limit the types of solutions that can be deployed to smaller airports. As the number of travelers increases every year and, as new threats emerge, TSA’s capabilities must meet the increased demand. The high false alarm rate during carry-on screening requires TSOs to scrutinize on-screen images with even greater vigilance, resulting in lower passenger throughput and greater TSO fatigue.
- **Solution:** This project develops modular, dynamically upgradable carry-on baggage screening technologies to improve detection capability and increase passenger throughput, while maintaining or improving life cycle costs. Specifically, this project will deliver carry-on baggage screening systems, in full-size and reduced form factors, with ATR for explosives and other prohibited items. Technologies under development include CT-based X-ray systems augmented with enhanced material discrimination capabilities, to screen more effectively while reducing the need for divestiture. New systems will be compatible with TSA standards and systems.
- **Justification:** The FY 2025 President’s Budget provides \$5.0M for this project, which is a \$0.5M decrease from the FY 2023 Enacted. The funding for this project will develop primary and secondary X-ray screening systems and algorithms to meet TSA’s most challenging detection requirements, reduce operator cognitive load, and improve passenger throughput. Funds will also be used to adapt current computed tomography, or other primary aviation screening systems, to meet requirements from other DHS Components to create dual use technologies. Additionally, in FY 2025, this project plans to submit for certification a combined CT X-ray system with an augmenting X-ray technology (e.g., X-ray diffraction or Phase Contrast Imaging) to improve detection capabilities while reducing false alarms.
- **Impact:** TSA will be provided with technology that allows for greater throughput and higher security measures, while reducing operator burden. Improved technologies and algorithms would provide TSA the capability to detect prohibited items in over 600 bags per hour, without divestiture of electronics, liquids, aerosols, powders, or gels.

Type of Research

Applied and Developmental

Technical Readiness Level

TRL varies for specific project efforts between TRL-3 and TRL-7. TRL-3 and TRL-4 projects are evaluated through technology demonstrations using simulated or representative data and processes to validate viability against TSA requirements. Projects that are TRL-5 or higher are evaluated at S&T’s TSL (TRL-5/6), TSA’s System Integration Facility (TRL-6), and/or operational airport demonstrations (TRL-7) in coordination with TSA’s Innovation Task Force.

Transition Plans

The Primary Screening for Carry-On Baggage project regularly transitions technology and knowledge products to TSA. The project's R&D plan follows the Joint Consolidated Technology Roadmap, developed in partnership with TSA RCA and the TSA Capability Manager for Accessible Property Screening (APS). Aligning development to the roadmap ensures transitioned knowledge and capabilities meet TSA's technology development priorities. After the completion of DT&E at the TSL and R&D efforts conclude, critical knowledge products that define technology potential and capabilities, data collection and demonstration results about operational performance, and systems and algorithms for acquisition certification testing are delivered to TSA. Development spirals will be coordinated with TSA's recapitalization plans to ensure both a smooth and timely technology insertion. The Primary Screening for Carry-On Baggage project matures technologies to TRL 6, or as need per TSA guidance, and then transfers ownership of products to TSA for engineering development to move into their acquisition lifecycle. Not only do the transitioned products enable S&T and TSA to develop and refine acquisition requirements and continue to develop state-of-the-art capabilities to improve aviation security that meet TSA's priorities, but also offer other Government partners the opportunity to leverage the DT&E towards applications beyond the aviation environment.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2023			
Completed Transportation Security Laboratory data collection and receive report for an augmenting X-ray detection system (e.g., phase contrast imaging or X-ray diffraction) more capable of distinguishing explosive, chemical, and 3-D printed threat items from benign passenger belongings than current primary screening systems.	FY 2022 Q4	FY 2023 Q1	5
Demonstrated a complete video analytics solution that associates passengers and their belongings throughout the checkpoint, detects anomalies, and enables next-generation concepts of operations like self-screening.	FY 2023 Q1	FY 2023 Q4	6
Demonstrated a small-form factor computed tomography CT X-ray system capable of meeting TSA’s most challenging detection requirements while also meeting size, weight, and power requirements necessary to deploy CT systems at smaller airports.	FY 2021 Q2	FY 2023 Q3	5
FY 2024			
Initiate an operational pilot of a mobile X-ray-based screening system capable of providing cutting-edge non-intrusive detection on demand.	FY 2023 Q4	FY 2024 Q2	7
Integrate an automated data labeling tool into the TSA-approved Common Graphical User Interface to demonstrate the capability to perform real-time labeling of stream of commerce X-ray images at a checkpoint to support AI/ML algorithm development.	FY 2023 Q1	FY 2024 Q3	7
Kickoff a new award for the feasibility and modelling assessment of a next-generation, photon counting detection upgrade for a CT X-ray screening system.	FY 2024 Q1	FY 2024 Q1	N/A
Perform data collection for a prototype small form factor CT X-ray System that can be shared with third parties for algorithm development and/or a prize competition.	FY 2023 Q4	FY 2024 Q4	5
FY 2025			
Complete a preliminary design review for a Photon Counting Computed Tomography X-ray detector array for integration with deployed X-ray screening systems.	FY 2024 Q4	FY 2025 Q2	3
Submit for certification a combined CT X-ray system with an augmenting X-ray technology (e.g., X-ray diffraction or Phase Contrast Imaging) to improve detection capabilities while reducing false alarms.	FY 2023 Q4	FY 2025 Q3	7
Submit for technical assistance testing a small form-factor CT X-ray equipped with a prototype automated threat recognition algorithm capable of detecting explosives and prohibited items.	FY 2024 Q3	FY 2025 Q4	5

Primary Screening for Passengers

- **Problem:** High false alarm rates and extensive divestiture requirements associated with passenger screening create significant bottlenecks at aviation checkpoints. Whenever passenger screening systems predict a potential threat, TSA staff engages in a secondary, manual screening process that increases operational costs and negatively impacts the experience of the traveling public. As the number of travelers increases every year and as new threats emerge, TSA’s capabilities must meet the increased demand. Additionally, currently qualified systems use proprietary architectures, which limits TSA’s ability to engage a broader HSE to deploy improved capabilities.
- **Solution:** This project develops people screening technologies that are safe, provide higher-resolution scans, and have better automated detection algorithms. These systems will substantially reduce the need for divestiture of shoes, headwear, outerwear, and small personal items. Novel approaches to solving these problems include improving competition winning algorithms for next-generation Advanced Imaging Technology (AIT) systems. New capabilities are under development for AIT systems include the ability to screen passengers with improved imaging resolution to more efficiently detected challenging and emerging threats. New systems may also include the ability to screen passengers while they walk or while wearing bulky outerwear and shoes, as well as developing novel solutions for screening passengers with limited mobility with millimeter wave passenger screening capabilities in a wand form factor.
- **Justification:** The FY 2025 Budget provides \$3.3M for this project, a \$0.7M decrease from the FY 2023 Enacted. This project will develop on-person screening systems, primarily millimeter-wave systems, and automated detection algorithms to meet TSA’s most challenging detection standards and throughput requirements to improve the passenger experience, mitigate insider threat risks, and reduce pat-down rates. Additionally, in FY 2025, this project also plans to demonstrate a millimeter wave wand technology suitable for screening passengers with limited mobility (e.g., passengers with disabilities or elderly passengers) that is capable of meeting TSA’s most challenging detection standards.
- **Impact:** When integrated with other advanced checkpoint technologies, these systems will provide faster, less invasive, and less costly screening of passengers. Limited divestiture will decrease passenger inconvenience and increase checkpoint throughput. Systems with material discrimination will confirm whether suspect items are potentially harmful or benign, reducing the rate of pat-downs and other intrusive security measures.

Type of Research

Applied and Developmental

Technical Readiness Level

TRL varies for specific project efforts between TRL-3 and TRL-7. TRL-3 and TRL-4 projects are evaluated through technology demonstrations using simulated or representative data and processes to validate viability against TSA requirements. Projects that are TRL-5 or higher are evaluated at S&T’s TSL (TRL-5/6), TSA’s System Integration Facility (TRL-6), and/or operational airport demonstrations (TRL-7) in coordination with TSA’s Innovation Task Force.

Transition Plans

The Primary Screening for Passengers project regularly transitions technology and knowledge products to TSA. The project's R&D plan follows the Joint Consolidated Technology Roadmap, developed in partnership with TSA RCA and the TSA Capability Manager for On-Person Screening (OPS). Aligning development to the roadmap ensures transitioned knowledge and capabilities meet TSA's technology development priorities. After the completion of DT&E at the TSL and R&D efforts conclude, critical knowledge products that define technology potential and capabilities, data collection and demonstration results about operational performance, and systems and algorithms for acquisition certification testing are delivered to TSA. Development spirals will be coordinated with TSA's recapitalization plans to ensure both a smooth and timely technology insertion. The Primary Screening for Passengers project matures technologies to TRL 6, or as needed per TSA guidance, and then transfers ownership of products to TSA for engineering development to move into their acquisition lifecycle. Not only do the transitioned products enable S&T and TSA to develop and refine acquisition requirements and continue to develop state-of-the-art capabilities to improve aviation security that meet TSA's priorities, but they also offer other Government partners the opportunity to leverage the DT&E towards applications beyond the aviation environment.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2023			
Delivered three High-Definition AIT Retrofit Kits to TSA capable of improving the detection performance of existing AIT systems through improved image quality.	FY 2022 Q1	FY 2023 Q3	5
Demonstrated a prototype, handheld MMW screening device in a wand form factor that will be used to resolve on-person screening alarms or as a primary on-person screening device in space constrained environments.	FY 2022 Q2	FY 2023 Q3	5
Demonstrate an in-motion advanced imaging technology prototype that enables next-generation concepts of operations such as passenger self-screening or high-throughput screening.	FY 2022 Q3	FY 2023 Q4	6
Submit for certification readiness testing a shoe scanner with an automatic threat recognition algorithm capable of detecting weapons or organic threat items concealed in footwear without requiring passengers to remove their shoes.	FY 2021 Q3	FY 2023 Q4	6
FY 2024			
Complete a technical design review for a tool to screen passengers with limited mobility (e.g., passengers with disabilities or elderly passengers) that is capable of meeting TSA’s most challenging detection standards.	FY 2022 Q3	FY 2024 Q3	5
Complete certification readiness testing of a shoe scanning system equipped with an automatic threat recognition algorithm capable of detecting explosives and prohibited items concealed in footwear without requiring passengers to remove their shoes.	FY 2023 Q4	FY 2024 Q3	6
Deliver a certification readiness testing report that demonstrates a real-time AIT system with an automatic threat recognition algorithm is capable of meeting TSA’s most challenging detection standards while enabling passenger throughputs like a metal detector.	FY 2023 Q4	FY 2024 Q4	7
FY 2025			
Complete certification readiness testing with a real-time AIT system capable of meeting TSA’s most challenging detection standards while enabling passenger throughputs like a metal detection.	FY 2024 Q3	FY 2025 Q4	5
Demonstrate a screening solution for passengers with limited mobility (e.g., passengers with disabilities or elderly passengers) that is compatible with existing checkpoint screening concept-of-operations.	FY 2024 Q3	FY 2025 Q2	5

Screening at Speed (SaS)

- **Problem:** Current DHS checkpoints use standalone sensors that do not speak to each other and are costly and time-consuming to upgrade in response to evolving threats. Current sensors are also prone to false alarms that require intrusive pat downs and manual searches to resolve and require that individuals being screened divest personal belongings to screen effectively. All these factors increase the per-person screening cost, operator fatigue, probability of missed threats, and the frustration of individuals being screened. The current screening process will become untenable as the number of people needing to be screened at TSA, USSS, and CBP permanent and temporary checkpoints continues to rise, and new threats continue to emerge. DHS Components require detection technologies that effectively and efficiently screen for concealed threats using an integrated system-of-system that uses layered screening technologies.
- **Solution:** The SaS program is developing independent sensors that will be integrated to enable a seamless curbside-to-gate security solution. It will reliably detect a wider range of prohibited items regardless of concealment, using technologies for passenger screening, property screening, video analytics, and infrastructure supporting technologies. Integrated systems will enable optimization of TSA resources through capabilities such as passenger self-service screening solutions, and future systems that record and analyze a richer array of data will provide greater security while limiting the number of invasive, time-consuming false alarms. This could eliminate the need for today’s cumbersome requirement to remove footwear, footwear, and personal belongings; reduce TSO manual searches and pat downs; and enable future checkpoint automation.
- **Justification:** The FY 2025 Budget provides \$6.5M for this project, a \$1.0M decrease from the FY 2023 Enacted. The funding will be used to develop an integrated system of sensors from curbside-to-gate, which may include stand-off millimeter wave, trace explosives detection, and video analytics. Integrating these and other sensors into the same system will reduce technology stovepipes and enable rapid deployment of new capabilities and upgrades to the field at reduced acquisition costs. Funding to integrate sensors will also enable TSA’s next generation concept of operations to dramatically increase passenger throughput while enhancing TSA security capabilities by increasing the amount of unstructured screening performed before the checkpoint, reducing the amount of screening necessary at the checkpoint, and meeting TSA’s high detection standards. In FY 2025, the project also plans to demonstrate a small footprint, “pod-style” passenger self-service screening solution that allows for both property screening and on-person screening to occur with limited TSO engagement.
- **Impact:** The SaS program will integrate screening tools with real-time and walk-by sensing, wide-area surveillance, credential authentication, risk-based screening, and other technologies to further reduce overall risk throughout airports and in other operational areas including soft targets and national special security events. Improved detection probabilities and reduced false alarms will translate into fewer secondary inspections, lowering per-passenger costs for TSA, and reducing passenger inconvenience. A system-of-systems approach integrated using open architectures and capable of deploying a layered aviation security posture from curbside-to-gate will reduce security risks and costs, and facilitate rapid, cost-effective system upgrades to continue countering evolving adversaries.

Type of Research

Applied and Developmental

Technical Readiness Level

TRL varies for specific project efforts between TRL-3 and TRL-7. The SaS program uses spiral development techniques to deliver intermediate capabilities that contribute to the system-of-systems approach. TRL-3 and TRL-4 projects are evaluated through technology demonstrations using simulated or representative data and processes to validate viability against TSA requirements. Projects that are TRL-5 or higher are evaluated at S&T's TSL (TRL-5/6), TSA's System Integration Facility (TRL-6), and/or operational airport demonstrations (TRL-7) in coordination with TSA's Innovation Task Force.

Transition Plans

The Screening at Speed project regularly transitions technology and knowledge products to TSA. The project's R&D plan follows the Joint Consolidated Technology Roadmap for Architecture, developed in partnership with TSA RCA and the TSA Capability Managers for APS and OPS. Aligning development to the roadmap ensures transitioned knowledge and capabilities meet TSA's technology development priorities. After the completion of DT&E at the TSL and R&D efforts conclude, critical knowledge products that define technology potential and capabilities, data collection and demonstration results about operational performance, and systems and algorithms for acquisition certification testing are delivered to TSA. Development spirals will be coordinated with TSA's recapitalization plans to ensure both a smooth and timely technology insertion. The Screening at Speed project matures technologies to TRL 6, or as need per TSA guidance, and then transfers ownership of products to TSA for engineering development to move into their acquisition lifecycle. Not only do the transitioned products enable S&T and TSA to develop and refine acquisition requirements and continue to develop state-of-the-art capabilities to meet TSA's priorities, but they also offer other Government partners the opportunity to leverage the DT&E towards applications beyond the aviation environment.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2023			
Demonstrated a secure, integrated checkpoint computing environment that enables the use of more advanced algorithms and improves passenger throughput while reducing overall system costs.	FY 2022 Q1	FY 2023 Q4	5
Demonstrated an integrated self-screening automated checkpoint system which can enable flexible TSO assignment and resource optimization and provide an enhanced passenger experience.	FY 2022 Q1	FY 2023 Q2	6
Kicked off two contracts designed to produce highly accurate synthetic computed tomography images necessary for deep learning-based algorithms for explosives and prohibited item detection.	FY 2022 Q4	FY 2023 Q1	N/A
FY 2024			
Demonstrated, at an airport, a passenger self-service screening solution that allows for both property screening and on-person screening to occur with limited TSO engagement.	FY 2022 Q1	FY 2024 Q2	7
Kicked off two SVIP Phase IV awards to develop video analytic capabilities that detect passenger divestment actions and assist with passenger self-service screening operations.	FY 2024 Q1	FY 2024 Q1	N/A
Publish a fully synthetic, non-sensitive dataset to support third-party development of on-person screening and property screening algorithms.	FY 2023 Q1	FY 2024 Q4	N/A
FY 2025			
Demonstrate a small footprint, “pod-style” passenger self-service screening capability that enables checkpoint screening concept-of-operations with limited TSO engagement.	FY 2024 Q1	FY 2025 Q2	6
Demonstrate interconnected sensor systems that automatically fuse data from both sensors to improve overall detection performance while reducing false alarm rates.	FY 2024 Q1	FY 2025 Q4	5

Countering Violent Extremism Program – Acts of violence can pose a significant impact to American lives and Federal, State, local, and tribal governments. This Program aims to conduct evidence-based social science research to meet the policy, operational, and public needs to improve effectiveness of public safety and violence prevention efforts implemented by FSLTT, and non-governmental stakeholders. This research will enable policy makers and operational end-users to make informed decision to divert vulnerable individuals, prevent potential offenders, mitigate vulnerabilities, and enhance community resilience in the face of various social and behavioral threats.

Public Safety and Violence Prevention

- **Problem:** With a growing and evolving threat landscape, with changing motivations and actors, effective response requires a proactive, analytical, and qualitative approach to the prevention of, protection from, mitigation of, response to, and recovery from acts of violence that impact public safety. One of DHS’s top priorities is to protect citizens from terrorism and other homeland security threats; however, the drivers behind these acts that impact public safety are not fully understood. Targeted violence and terrorism are not a single issue, but a complex host of problems, crimes and activities that are related to several threats. This program supports the *National Strategy for Countering Domestic Terrorism* (June 2021) and *National Security Mandate (NSM-13) Memorandum on U.S. International Counterterrorism Policy*, which highlights the need to better understand the full range of domestic terrorism threats in our country.
- **Solution:** S&T will conduct evidence-based social science research to identify high quality data to better understand the nature and threats in the U.S. while providing independent, objective assessment of activities to ensure that practitioners, State/Local stakeholders can continually improve and integrate new evidence and research in pursuit of the general welfare of our citizens. This program will utilize the application of fundamental research within social science disciplines to assist in the development of knowledge, tools, and techniques to support SLTT efforts as we aim to mitigate and prevent acts that put an individual(s) or group(s) safety into question, with a specific focus on targeted violence and terrorism prevention, information integrity, soft target security and community resilience. Findings from this research aims to build evidence, data and knowledge products that shall strengthen public safety and violence prevention programming efforts domestically and internationally.
- **Justification:** The FY 2025 Budget provides \$5.0M for this project, which is a \$1.5M decrease from the FY 2023 Enacted. Funding for this project will be used to develop knowledge products (e.g., best practices, evaluations) and capabilities that aim to improve our understanding of how and why individuals radicalize to violence, mobilize to violence, and disengage from violence. Funding will support the publications of rapid evidence reviews, evaluation reports, best practice guides, and other knowledge products that aim to improve prevention approaches to enhance the global evidence base for terrorism prevention policy, strategy, and activity.
- **Impact:** Provides the HSE with knowledge and findings to enable education and awareness to reinforce a whole-of-society prevention architecture. These efforts will equip and empower local efforts including practitioners, peers, teachers, community leaders, and law enforcement – to minimize a threat as it evolves while enhancing emergency preparedness and response by better understanding how current prevention programming can improve while highlighting opportunities to enhance and strengthen local prevention initiatives. Data and knowledge derived from the program shall increase understanding about what works, what doesn’t, and what’s promising in enhancing public safety and violence prevention efforts, while informing strategy, policy and operations for DHS Components and other key stakeholders.

Type of Research

Varies (Basic and Applied)

Technical Readiness Level

TRL varies for specific project activities between TRL-5 and TRL-7. This project’s R&D efforts will start by performing a survey of tools and techniques that could be adapted for the purposes of this effort. Identified tools and techniques are then adapted or prototyped and then validated in a relevant environment (TRL-5/6). Following successful validation, the most promising solution(s) are evaluated in an operational environment (TRL-7) prior to transition.

Transition Plans

- Knowledge products in the form of best practices, protocols, evidence reviews, and educational materials shall be shared publicly and for use by DHS and prevention programming practitioners. Evidence developed shall be shared broadly to help inform future policy and practice in terrorism prevention programming.
- Recommendations, best practices, and techniques that are developed for local use are adopted, piloted, evaluated for impact and consequences, are transferred and applied to sector-specific training, guidance, and exercise services within the HSE.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Delivered an assessment on the utilization of threat assessment tools and techniques that have been implemented by State and local security stakeholders.	FY 2021 Q1	FY 2023 Q3	N/A
Delivered an impact and/or outcome evaluation of locally based prevention programs in support of the CP3 Grants Program.	FY 2023 Q1	FY 2023 Q4	N/A
Implemented social-behavioral modeling to examine human factor influence and countermeasures for IED response operations.	FY 2021 Q4	FY 2023 Q4	N/A
Published at least two Systematic Reviews of prior research and evaluation to build a global evidence base for terrorism prevention policy, strategy, and activity.	FY 2022 Q1	FY 2023 Q4	N/A
Published best practices on rehabilitation and reintegration programming that includes and expands on how the approach can be applied to different settings (i.e., school health and safety management teams).	FY 2021 Q4	FY 2023 Q4	N/A

Research, Development, and Innovation – PPA

Physical Security and Critical Infrastructure Resilience Thrust Area

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2024		
Deliver to DHS PLCY and the public case study analysis findings to assist local stakeholders in violence prevention on trends in online targeted violence to HSE.	FY 2023 Q4	FY 2024 Q4	6
Deliver to DHS PLCY and the public the impact/outcome evaluations findings of Federal, State, or locally based targeted violence and terrorism prevention programs to HSE.	FY 2022 Q4	FY 2024 Q4	N/A
Deliver a Social-Behavioral Model of a soft target that will test countermeasures in responding to an IED event to CISA OBP.	FY 2023 Q4	FY 2024 Q4	N/A
Deliver to DHS Office of Policy and the public the impact/outcome evaluations findings of threat assessments tools and models while identifying pathways to successful implementation.	FY 2023 Q2	FY 2024 Q4	5-6
Deliver the outcome measures for male domestic violent extremists, which can be used to help inform practice and programs to DHS PLCY and the public.	FY 2023 Q4	FY 2024 Q4	N/A
Deliver and publish three Systematic Reviews of prior research and evaluation to build a global evidence based for terrorism prevention policy, strategy, and activity to DHS PLCY and the public.	FY 2023 Q4	FY 2024 Q4	N/A
	FY 2025		
Complete state of science report on the trends, nature, causes, and correlates in terrorism and targeted violence.	FY 2024 Q2	FY 2025 Q4	1-7
Develop a training program for foreign terrorist fighter family reentry and reintegration to the U.S.	FY 2024 Q2	FY 2025 Q4	1-7
Develop, pilot, and evaluate a text-enabled intervention helpline and referral system.	FY 2024 Q2	FY 2025 Q4	1-7
Conduct impact/outcome evaluations of Federal, State, or locally based targeted violence and terrorism prevention programs.	FY 2023 Q4	FY 2025 Q4	N/A
Creation of a searchable online database of risk assessment tools based on a specific field.	FY 2023 Q4	FY 2025 Q2	N/A
Develop practitioner guides to mitigate and reduce the risk of targeted violence.	FY 2023 Q4	FY 2025 Q4	N/A
Develop two program evaluation toolkits that can be used by local stakeholders and terrorism prevention practitioners.	FY 2023 Q4	FY 2025 Q4	N/A
Publish at least four Systematic Reviews of prior research and evaluation to build a global evidence based for terrorism prevention policy, strategy, and activity.	FY 2023 Q4	FY 2025 Q4	N/A

Physical Security – Provides a layered and integrated capability to safely screen for potential threat items in unstructured crowds within soft-target venues and crowded spaces without impact to the speed of travel while maintaining individual privacy.

Soft Targets Security (formerly Soft Targets, Vehicular, School Safety, Protective Sites)

- **Problem:** Current security capabilities for screening people and their belongings in soft targets and crowded places (such as surface transportation environments) are extremely limited. The unique requirements of soft targets and crowded places (an open system with no fixed checkpoints, extremely high throughput, and an unalterable existing infrastructure within which technologies for various threats or anomalous behavior detection must fit) dictate the need for a dedicated program to address vulnerabilities.
- **Solution:** S&T will provide an orthogonal, layered, and integrated capability to safely screen for potential threat items in unstructured crowds within soft-target venues and crowded spaces without impact to the speed of travel while maintaining individual privacy.
- **Justification:** The FY 2025 Budget provides \$1.0M for this project, which is a \$1.0M decrease from the FY 2023 Enacted. The funding for this project will be used to develop the Wall Assessment for Hazard Level (WAHL) application which includes a curtain wall failure modality to include in USSS event vulnerability modeling and to complete a simplified assessment tool to consider attacks using firearms in occupied spaces which will result in a prototype Active Shooter Application. The applications will be developed by the Army Engineer Research and Development Center (ERDC) for CISA and USSS CONOPS with the final versions being installed in the Special Events Protection Tools portal on the CISA Gateway. Continue a survey of available commercial off-the shelf active vehicle barriers to determine those capable of being assembled and deployed using minimal personnel, capable of stopping a vehicle of specified weight, and at a designated impact speed. Develop real-time video analytics to alert on leave behind events or other anomalous behaviors through the SVIP. Establish a testbed benefiting USSS, CBP, and FPS, which will support the evaluation of emerging technologies across multiple perimeter protection use cases. Continue development of an Unreal Engine platform for scenario development and collaboration of immersive environments for USSS.
- **Impact:** Leave-Behind detection with surrounding circumstance assessment will allow security personnel to clear 30-50 percent of suspicious packages without necessitating an emergency response (\$0.6M/year manpower savings per Washington Metro Area Transit Authority (WMATA) and increase screening from three percent (current bag searches) to a goal of 95 percent of all passengers. Developing a fast-running tool to assess the vulnerability of an entire curtail wall will help security planners understand the threat and provide accurate standoff information. Establishing a testbed to evaluate emerging perimeter protection technologies reduces unnecessary and costly investments by providing Components a venue to test, evaluate, and select technology through a proven R&D process prior to making major acquisition investment decisions.

Type of Research

Developmental

Technical Readiness Level

TRL varies for specific project activities between TRL-5 and TRL-7. This project's R&D efforts typically start by performing a market survey of available COTS and GOTS technology that could be adapted for DHS Component use. Identified technology is then adapted and validated in a relevant environment (TRL-5). Following successful validation, the most promising solution(s) are then prototyped and evaluated first in a relevant environment (TRL-6) then in an operational environment (TRL-7) prior to transition.

Transition Plans

- DT&E and OT&E will be conducted with surface transportation end-users within TSA Mass Transit Test Beds (MTTBs). When technologies reach appropriate maturity, they will be transitioned to an industry partner for commercialization. Once in the marketplace, the technology can be added to the approved equipment list (AEL) for purchase by surface transportation authorities.
- Massachusetts Institute of Technology Lincoln Laboratory (MIT/LL) has entered into a technology transition agreement with Liberty Defense Technologies (LDT). LDT has obtained the license to an MIT/LL patent (based on the MMW Flat Panel Imaging Array technology under development for S&T) to develop a portal-based millimeter wave system for detecting potential threat items entering large venues (i.e., stadiums) and schools.
- The ERDC developed a Special Events Protection portal containing Event Security Decision Support Tools for use by CISA and DHS Regional Protective Security Advisors (PSAs). Tools will be used to assist event coordinators with planning, assessing, and implementing effective physical security measures at events held at the State or local level which may receive limited Federal support. Newly developed tools/applications will be transitioned to the portal and hosted on the CISA Gateway.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Conducted DT&E of stand-off chemical detector for vehicle borne IED detection in lab environment.	FY 2023 Q1	FY 2023 Q3	5-7
Delivered OT&E final report of FOVEA tool suite to TSA Multimodal and Public Area Capabilities (MPAC) Division.	FY 2023 Q1	FY 2023 Q2	5-7
Integrated component technologies into layered system with automated threat detection for proof of principle.	FY 2022 Q4	FY 2023 Q4	5-7
	FY 2024		
Deliver Active Shooter Application to CISA, integrate within the Special Event Planning Tool (SEPT) Portal on the CISA Gateway.	FY 2023 Q4	FY 2024 Q1	7
Finalize project scope and requirements following contracts award to two SVIP performers for real time alert algorithms.	FY 2024 Q1	FY 2024 Q2	2-4
Receive final report on developmental T&E from Vehicle Borne IED detection performer.	FY 2024 Q1	FY 2024 Q1	6-7
	FY 2025		
Conduct testing on different configurations of curtain walls and develop high fidelity models to simulate comprehensive curtain wall behavior.	FY 2025 Q1	FY 2025 Q4	3-4
Design and build full-scale reaction structure for repeatable tests to be conducted to investigate various configurations of curtain walls.	FY 2025 Q1	FY 2025 Q4	2-3

University Programs – PPA

Budget Comparison and Adjustments

Comparison of Budget Authority and Request

(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget	FY 2024 to FY 2025 Change
Centers of Excellence	\$45,880	\$45,880	\$45,880	-
Minority Serving Institutions (MSI)	\$7,657	\$7,657	\$7,657	-
Total	\$53,537	\$53,537	\$53,537	-
Subtotal Discretionary - Appropriation	\$53,537	\$53,537	\$53,537	-

PPA Level I Description

University Programs (UP) supports homeland security-related research and education at U.S. colleges and universities to address high-priority DHS-related issues and to enhance homeland security capabilities over the long term. This PPA includes programs that bring together scientists, mathematicians, and engineers from many academic disciplines and institutions. These researchers investigate research questions important to DHS, as well as develop new technologies and approaches to solve complex and challenging homeland security problems.

UP includes the following programs:

Centers of Excellence (COE): The COE program focuses on building homeland security expertise in the academic community, creating strategic partnerships among universities, commercial interests, and public agencies, and developing a new science and engineering workforce dedicated to homeland security. COE program priorities are developed by DHS Components, based on their long-term mission needs.

Minority Serving Institutions (MSI): This program enhances the capabilities of MSIs to develop homeland security-related science, technology, engineering, and mathematics research and curricula, and prepare MSI students for successful homeland security careers.

University Programs – PPA
Budget Authority and Obligations
(Dollars in Thousands)

	FY 2023	FY 2024	FY 2025
Enacted/Request	\$53,537	\$53,537	\$53,537
Carryover - Start of Year	\$44,217	\$32,391	\$28,704
Recoveries	\$354	-	-
Rescissions to Current Year/Budget Year	-	-	-
Net Sequestered Resources	-	-	-
Reprogramming/Transfers	(\$17)	-	-
Supplementals	-	-	-
Total Budget Authority	\$98,091	\$85,928	\$82,241
Collections - Reimbursable Resources	\$500	\$500	\$500
Collections - Other Sources	-	-	-
Total Budget Resources	\$98,591	\$86,428	\$82,741
Obligations (Actual/Estimates/Projections)	\$66,200	\$57,724	\$55,169
Personnel: Positions and FTE			
Enacted/Request Positions	-	-	-
Enacted/Request FTE	-	-	-
Onboard and Actual FTE			
Onboard (Actual/Estimates/Projections)	-	-	-
FTE (Actual/Estimates/Projections)	-	-	-

**University Programs – PPA
Summary of Budget Changes**

(Dollars in Thousands)

	Positions	FTE	Amount
FY 2023 Enacted	-	-	\$53,537
FY 2024 Annualized CR	-	-	\$53,537
FY 2025 Base Budget	-	-	-
Centers of Excellence	-	-	\$45,880
Minority Serving Institutions (MSI)	-	-	\$7,657
Total Research and Development Projects	-	-	\$53,537
FY 2025 Request	-	-	\$53,537
FY 2024 TO FY 2025 Change	-	-	-

**University Programs – PPA
Non Pay Budget Exhibits**

Non Pay by Object Class
(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget	FY 2024 to FY 2025 Change
21.0 Travel and Transportation of Persons	\$24	\$24	\$7	(\$17)
25.1 Advisory & Assistance Services	\$702	\$702	\$196	(\$506)
25.3 Other Purchases of goods and services	\$1,692	\$1,692	\$1,123	(\$569)
25.5 Research & Development Contracts	\$3,511	\$3,511	\$1,262	(\$2,249)
31.0 Equipment	\$20	\$20	\$13	(\$7)
41.0 Grants, Subsidies, and Contributions	\$47,588	\$47,588	\$50,936	\$3,348
Total - Non Pay Budget Object Class	\$53,537	\$53,537	\$53,537	-

**Research and Development
Research and Development Projects**

Summary of Projects

(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget
Centers of Excellence	\$45,880	\$45,880	\$45,880
Minority Serving Institutions (MSI)	\$7,657	\$7,657	\$7,657

**Centers of Excellence
Research and Development**

Technology Readiness Level Exhibit

(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget
Centers of Excellence	\$45,880	\$45,880	\$45,880

R&D Project Description

CENTERS OF EXCELLENCE: S&T’s Centers of Excellence (COEs) develop multidisciplinary, partner-driven, homeland security science and technology solutions and help train the next generation of homeland security experts. The COE network is an extended consortium of hundreds of universities conducting groundbreaking research to address homeland security challenges. COEs work closely with the homeland security community to develop partner-driven, innovative tools and technologies to solve real-world challenges. COE partners include academic institutions; industry; national laboratories; DHS Components; S&T divisions; other Federal agencies; State, local, tribal, and territorial homeland security agencies; and first responders. These partners work in concert to develop critical technologies and analyses to secure the Nation. In support of Administration priorities, this request maintains additional funding across the COEs to strengthen the Nation’s investments in foundational, early-stage R&D at universities, to further secure our future.

CENTERS OF EXCELLENCE <i>(Dollars in Thousands)</i>			
Project	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President’s Budget
Center for Accelerating Operational Efficiency (CAOE)	\$4,875	\$4,875	\$4,875
Coastal Resilience Center of Excellence (CRC) ¹	\$4,875	-	-
Criminal Investigations and Network Analysis (CINA)	\$4,876	\$4,876	\$4,875
Critical Infrastructure Resilience Institute (CIRI) ²	\$4,876	-	-
Cross Border Threat Screening and Supply Chain Defense (CBTS)	\$4,876	\$4,876	\$4,876
Soft-target Engineering to Neutralize the Threat Reality (SENTRY)	\$4,876	\$4,876	\$4,876
Master of Business Administration/Security Technology Transition (MBA/STT)	\$2,000	\$2,000	\$2,000
National Counterterrorism Innovation, Technology and Education Center of Excellence (NCITE)	\$4,875	\$4,875	\$4,875

CENTERS OF EXCELLENCE <i>(Dollars in Thousands)</i>			
Project	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President’s Budget
Center for Homeland Security in the Arctic (CHSA) ³	\$4,875	\$4,875	\$4,876
Procurement Sensitive New COE Topic #1 ⁴	\$4,876	\$4,876	\$4,875
Procurement Sensitive New COE Topic #2 ⁵	-	\$4,875	\$4,876
Procurement Sensitive New COE Topic #3 ⁶	-	\$4,876	\$4,876
Total – Centers of Excellence Thrust Area	\$45,880	\$45,880	\$45,880

¹ CRC will be reaching the end of its period of performance and a new COE Topic (Procurement Sensitive) will be in the planning stages. FY 2024 funding for CRC would be for this new COE Topic.
² CIRI will be reaching the end of its period of performance and a new COE Topic (Procurement Sensitive) will be in the planning stages. FY 2024 funding for CIRI would be for this new COE Topic.
³ This new SENTRY COE was awarded in FY 2022 Q1. Previously known as Engineering Secure Environments from Targeted Attacks COE.
⁴ FY 2022 funding for ADAC is being applied to this new COE topic (Procurement Sensitive pending posting of the Notice of Funding Opportunity). FY 2023 and FY 2024 funding for ADAC would be applied as well.
⁵ FY 2022 funding for BTI is being applied to this new COE topic (Procurement Sensitive pending posting of the Notice of Funding Opportunity). FY 2023 and FY 2024 funding for BTI would be applied as well.
⁶ In FY 2024, CIRI will be reaching the end of its period of performance and a New COE Topic (Procurement Sensitive) will be in the planning stages. FY 2024 funding for CIRI is being applied to this new COE topic (Procurement Sensitive pending posting of the Notice of Funding Opportunity).
⁷ In FY 2024, CRC will be reaching the end of its period of performance and a New COE Topic (Procurement Sensitive) will be in the planning stages. FY 2024 funding for CRC is being applied to this new COE topic (Procurement Sensitive pending posting of the Notice of Funding Opportunity).

Center for Accelerating Operational Efficiency (CAOE)

This Center conducts end user-focused research to enhance the application of analytic tools that support real-time decision making to address homeland security related threats and hazards. The Center also provides education and professional development to improve data management and analysis, to facilitate operations research and systems analysis, to identify the economic impact of security threats and hazards, and to critically assess future risks posed to DHS’s mission.

- **Problem:** Our country’s homeland security workforce faces complex challenges that require split-second decision making, wise allocation of scarce resources and accurately predicting consequences of natural and manmade disasters. In addition, constantly changing information requirements make it difficult to provide dynamic and adaptable tools and processes to address these challenges.
- **Solution:** The overarching goal of the Center is to develop tools and methods for all levels of the homeland security workforce (e.g., leaders, analysts, and operators) to improve predictions to enhance preparation and response; to optimize screening and border operations for threat detection; and to inform prevention policy through risk and cost analysis. The activities under this project include:
 - Improving predictions to enhance preparation and response: CAOE’s work in predictive analytics in advancing methodologies in terms of

ability to provide analytic results faster and with more accuracy. Researchers are examining methods to analyze real-time streaming data to provide almost real-time solutions so that DHS operations can react quicker to changing situations. Research applies techniques to improve the accuracy of the predictions and build confidence in the results, whether it be in decision support tools or evaluation of the performance of artificial intelligence.

- Optimizing screening and border operations for threat detection: CAO simulation and modeling advances understanding of the characteristics of homeland security threats and homeland security CAO researchers are using analytics to identify where and what type of infrastructure should be in place to counter specific threats along with enabling increased apprehensions at ports of entry, improved threat detection, and/or reduction in operating costs.
- Informing prevention policy through risk and cost analysis: CAO's economic analysis and risk assessment capabilities are applied to DHS activities and mission areas, using "design science". Researchers are using both qualitative case-studies methods and quantitative psychometric/econometric approaches. The resulting design improvements touch areas across DHS, including acquisition and operations, cyber critical infrastructure, as well as the performance of TSOs.
- **Justification:** The FY 2025 Budget continues to provide \$4.9M for this project, consistent with the FY 2023 Enacted. In FY 2025, CAO plans to conduct at least one education and outreach initiative such as seminar series, and summer education program to engage 10-20 undergraduate students in homeland security science and engineering, as well as develop at least one proof of concept of demonstration that uses privacy enhancing technology to support HSE analysis tasks.
- **Impact:** Research outcomes will include analytical tools, technologies, and knowledge products for the homeland security workforce that may allow them to assess the analytical data more accurately they are collecting during operational duties. Outcomes also may improve threat detection, leading to increased identification of threats, at lower costs. The Center will produce new capabilities, test them in operational settings, and make validated solutions available and useful to homeland security professionals at all levels.

Type of Research

Basic, Applied, and Developmental

Technical Readiness Level

CAOE conducts a portfolio of projects currently at TRL-3 but can range from TRL-2 through TRL-7, from initial concept development to system prototypes tested in the field. Each COE conducts multiple projects across its research and education theme areas. The range of TRL levels changes throughout a COE's life cycle, with a progression toward more TRL levels at the higher end of the scale; however, even a later-phase COE portfolio may include lower range TRLs in its portfolios to address emerging risks.

Transition Plans

OUP Program Managers work with the CAOE to structure and position projects to align with customer needs, beginning from conception, through testing, and piloting in the field. Technology development activities sync with the scientific and program management milestones appropriate for each project. These efforts differ depending upon the research gap being addressed, but involve partnerships with technology providers, data owners, commercialization entities, DHS Components, and other public-sector agencies. Management methods are designed to reduce the technical and programmatic risks of new technologies to the point where industry and other Federal partners are willing to invest in technology commercialization or move towards direct acquisition. S&T manages planned, formal technical and strategic annual and biennial reviews to assess individual project performance against key performance parameters. These reviews readjust overall research portfolio investments to respond to market forces and customer demand. Program managers coordinate with the Office of General Counsel, the General Counsel of the performing institution(s), and COE Technology Commercialization Offices to support legal, privacy, market, and technology transfer elements of each project. DHS encourages COEs work with their technology transfer offices to attract investments, address legal concerns, and leverage university infrastructures to execute the plans necessary to enable long-term sustainment of technologies.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Conducted at least one education and outreach initiative, such as the annual Hackathon, seminar series, and summer education program to engage 10-20 undergraduate students in homeland security science and engineering.	FY 2023 Q1	FY 2023 Q3	N/A
Developed at least one proof of concept for demonstration that uses AI technology to support HSE analysis tasks.	FY 2023 Q1	FY 2023 Q4	3
Implemented results of Biennial Review to ensure the research remains relevant to DHS missions.	FY 2023 Q1	FY 2023 Q4	N/A
	FY 2024		
Conduct at least one education and outreach initiative, such as the annual Hackathon, seminar series, and summer education program to engage 10-20 undergraduate students in homeland security science and engineering.	FY 2024 Q1	FY 2024 Q4	N/A
Develop a new Request for Proposal targeting novel research in privacy, risk, or other relevant CAO domains.	FY 2024 Q1	FY 2024 Q4	N/A
Develop at least one proof of concept for demonstration that uses AI technology to support HSE analysis tasks.	FY 2024 Q1	FY 2024 Q4	3
	FY 2025		
Conduct at least one education and outreach initiative, such as the annual Hackathon, seminar series, and summer education program to engage at least 20 undergraduate students in homeland security science and engineering.	FY 2025 Q1	FY 2025 Q4	N/A
Develop at least one proof of concept of an innovative approach to privacy enhancing technologies that may provide the ability to control the sharing and use of sensitive information while minimizing the risk of unauthorized use in support of homeland security analysis tasks.	FY 2025 Q1	FY 2025 Q4	3

Coastal Resilience Center of Excellence (CRC)

- **Problem:** Damage caused by floods and hurricanes poses a near-constant threat to lives and property. A lack of resilience to natural hazards at the individual and community level is contributing to the increasing public share of disaster response and recovery costs. As of July 9, 2021, there have been eight weather/climate disasters in the United States with losses exceeding \$1.0B each. These events included one drought, two floods, four severe storms, and one winter storm. Overall, these events resulted in the deaths of approximately 331 people and had significant economic effects on the impacted areas. The 1980–2020 annual average is 7.1 events (CPI-adjusted); the annual average for the most recent five years (2016–2020) is 16.2 events (CPI-adjusted).¹
- **Solution:** This CRC conducts research and education to enhance the Nation’s ability to safeguard people, infrastructure, and economies from natural hazards such as floods and hurricanes. It also considers the impact of future climate trends on coastal resilience. CRC’s work directly addresses key challenges associated with growing coastal vulnerability and assists S&T, FEMA, USCG, CISA and local communities in coordination with public and private sector partners. Coastal Infrastructure Resilience examines new methods to assess vulnerability and assist practitioners. Building Resilient Communities conducts research and education to help communities mitigate, recover, and adapt to natural hazard risks. Disaster Dynamics advances coastal storm surge and flood forecasting capabilities and communicates the results to improve coastal resilience through flood risk maps and other mechanisms. Education formulates and delivers resilience-oriented undergraduate and graduate courses, concentrations, minors, certificates, and training, with strong emphasis on Minority Serving Institutions.
- **Justification:** The FY 2025 Budget does not include funding for this project. CRC will reach the end of its period of performance in FY 2024 and become an Emeritus COE. Previous funding for this project was used for the research required to develop the new COE topic designation package, the creation of the Notice for Funding Opportunity, and management of the competition to stand up a new COE.
- **Impact:** CRC’s work produces tangible research and education results for use by DHS, other Federal agencies, State and local governments, and other relevant entities that help reduce the adverse impacts of coastal natural disasters on the Nation’s citizens, infrastructure, and economy.

Type of Research

Basic, Applied, and Developmental

Technical Readiness Level

CRC conducts a portfolio of projects currently at TRL-7 but can range from TRL-2 through TRL-7, from initial concept development to system prototypes tested in the field. Each COE conducts multiple projects across its research and education theme areas. The range of TRL levels changes throughout a COE’s life cycle, with a progression toward more TRL levels at the higher end of the scale; however, even a later-phase COE portfolio may include lower range TRLs in its portfolios to address emerging risks.

¹ NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2020). <https://www.ncdc.noaa.gov/billions/>, DOI: 10.25921/stkw-7w73

Transition Plans

S&T coordinates with CRC to structure and position projects to align with customer needs, beginning from conception, through testing, and piloting in the field. OUP technology development activities sync with the scientific and program management milestones appropriate for each project. These efforts differ depending upon the research gap being addressed, but involve partnerships with technology providers, data owners, commercialization entities, DHS Components, and other public-sector agencies. OUP’s management methods are designed to reduce the technical and programmatic risks of new technologies to the point where industry and other Federal partners are willing to invest in technology commercialization or move towards direct acquisition.

OUP manages planned, formal technical and strategic annual and biennial reviews to assess individual project performance against key performance parameters. These reviews readjust overall research portfolio investments to respond to market forces and customer demand. OUP Program Managers work with S&T’s Office of General Counsel, the General Counsel of the performing institution(s), and COE Technology Commercialization Offices to support legal, privacy, market, and technology transfer elements of each project. DHS encourages COEs work with their technology transfer offices to attract investments, address legal concerns, and leverage university infrastructures to execute the plans necessary to enable long-term sustainment of technologies.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Conducted research to inform equitable administration and application of FEMA’s Building Resilient Infrastructure and Communities (BRIC) program to marginalized groups, neighborhoods, and communities.	FY 2023 Q1	FY 2023 Q4	N/A
Provided coastal flooding and storm surge guidance using the APSTM for hurricanes impacting the East and Gulf coasts to inform decision making for emergency management, hazard mitigation and post-storm damage estimations.	FY 2023 Q1	FY 2023 Q4	7
Worked with States, such as Rhode Island and Louisiana to enable use of ADCIRC Prediction System (APS) TM -coastal hazards modeling outputs for State emergency management agencies.	FY 2023 Q1	FY 2023 Q4	7
	FY 2024		
N/A	-	-	-
	FY 2025		
N/A	-	-	-

Criminal Investigations and Network Analysis (CINA)

The CINA conducts end user-focused research to enhance investigation strategies to address TCO activities and other homeland security-related crimes. This COE also provides education and professional development to improve the cost-effectiveness of criminal investigations, prosecution, prediction, and prevention.

- **Problem:** TCOs are committing heinous crimes in both physical and cyber space. This COE focuses on a major, cross-cutting DHS mission area, criminal law enforcement, that the COEs have not yet addressed. While technological innovations promise continuing improvements in the quality of life for individuals around the globe, criminal organizations are capitalizing on these transformative advances to become more agile and expand their illicit activities. Sophisticated criminal networks can easily appear, disappear, and reorganize in response to opportunities and authority gaps. These networks function as complex social structures across the cyber and physical spaces, and operate at a variety of scales, ranging from local to international.
- **Solution:** The overarching goal of CINA is to develop tools and methods for agents, officers, and investigators to better coordinate investigative strategies with on-the-ground and cybersecurity activities to predict, thwart, and prosecute crime. The activities under this project include:
 - Criminal Network Analysis: Focusing on equipping HSE stakeholders with a thorough understanding and knowledge of criminal activity, its evolution, and convergence, CINA researches the structure of organized gangs, illicit supply networks, and cartels; furthering the development of tools to monitor and disrupt these activities.
 - Dynamic Patterns of Criminal Activity: This initiative seeks to improve prediction and forecasting for HSE stakeholders through the development of cutting-edge methods, agent-based models, and game theory to forecast criminal actions, gang activities, and threats to the United States. Studying the threats at the geographical, social, and cyber dimensions, can prevent, interdict, mitigate and deter homeland security threats or future losses.
 - Forensics: With the intent on developing and deploying state-of-the-art forensic methods, tools, and technologies within the HSE community, CINA leverages advancements in multimedia support, biometric characteristics, and digital identifiers, allowing law enforcement officers to attribute malicious incidents with threat actors.
 - Criminal Investigative Processes: Intent on improving HSE end user investigative processes used to detect, pursue, and solve transnational criminal activity, this COE is focusing on solving complex investigative processes associated with human trafficking, cybercrimes, and money laundering.
- **Justification:** The FY 2025 Budget continues to provide \$4.9M for this project, consistent with the FY 2023 Enacted. This funding continues academic research focused on thwarting criminal networks and transnational crime by advancing tools available to law enforcement officers within the HSE and providing analysts and policy officials with insights into the networked structure of these illicit actors. In FY 2025, CINA plans to host at least six speakers as part of CINA’s Distinguished Speaker Series that provides homeland security-related thought leadership and that also results in quality video resources for the HSE.

- **Impact:** Research outcomes will include analytical tools, technologies, and knowledge products for the workforce. The Center will produce new capabilities, test them in operational settings, and make validated solutions available and useful to law enforcement agencies at all levels.

Type of Research

Basic, Applied and Developmental

Technical Readiness Level

CINA conducts a portfolio of projects that currently range from TRL-3 through TRL-6 but can range from TRL-2 through TRL-7, from initial concept development to system prototypes tested in the field. Each COE conducts multiple projects across its research and education theme areas. The range of TRL levels changes throughout a COE's life cycle, with a progression toward more TRL levels at the higher end of the scale; however, even a later-phase COE portfolio may include lower range TRLs in its portfolios to address emerging risks.

Transition Plans

S&T works with CINA to structure and position projects to align with customer needs, beginning from conception, through testing, and piloting in the field. Technology development activities sync with the scientific and program management milestones appropriate for each project. These efforts differ depending upon the research gap being addressed, but involve partnerships with technology providers, data owners, commercialization entities, DHS Components, and other public-sector agencies. Management methods are designed to reduce the technical and programmatic risks of new technologies to the point where industry and other Federal partners are willing to invest in technology commercialization or move towards direct acquisition. S&T manages planned, formal, technical, and strategic annual and biennial reviews to assess individual project performance against key performance parameters. These reviews readjust overall research portfolio investments to respond to market forces and customer demand.

OUP Program Managers coordinate with the Office of General Counsel, the General Counsel of the performing institution(s), and COE Technology Commercialization Offices to support legal, privacy, market, and technology transfer elements of each project. COEs work with their technology transfer offices to attract investments, address legal concerns, and leverage university infrastructures to execute the plans necessary to enable long-term sustainment of technologies.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Conducted Biennial Review on all research, education, and CINA’s Management efforts and provided actions and recommendations to be implemented in the next year’s workplan.	FY 2023 Q1	FY 2023 Q3	N/A
Hosted six Distinguished Speaker events that provide homeland security thought leadership and resulted in quality video resources for the HSE.	FY 2023 Q1	FY 2023 Q4	N/A
To increase the Center’s likelihood of self-sustainability, CINA conducted market research and established thorough transition/transfer plans for at least two projects.	FY 2023 Q1	FY 2023 Q4	5-6
	FY 2024		
Conduct market research and identify relevant transition partners for the technologies resulting from at least three CINA projects. S&T PMs will utilize these reports to help inform the research portfolio.	FY 2024 Q1	FY 2024 Q4	N/A
Host at least six speakers as part of CINA’s Distinguished Speaker Series that provides homeland security-related thought leadership and that also results in quality video resources for the HSE.	FY 2024 Q1	FY 2024 Q4	N/A
Implement the recommended actions resulting from its Biennial Review.	FY 2024 Q1	FY 2024 Q3	N/A
	FY 2025		
Host at least six speakers as part of CINA’s Distinguished Speaker Series that provides homeland security-related thought leadership and that also results in quality video resources for the HSE.	FY 2025 Q1	FY 2025 Q4	N/A
To increase the Center’s likelihood of self-sustainability, CINA will conduct market research and establish thorough transition/transfer plans for at least three projects.	FY 2025 Q1	FY 2025 Q4	N/A
Work with DHS Component stakeholders to create research challenge questions for consideration for CINA’s Year 9 Request for Proposals.	FY 2025 Q1	FY 2025 Q2	N/A

Critical Infrastructure Resilience Institute (CIRI)

The CIRI conducts research and education to enhance the resiliency of the Nation’s critical infrastructures, and the businesses and public entities that own and operate them. This research will provide a better understanding of risk management of catastrophic disruptions to infrastructure operations focusing on the dynamic interface between cyber and physical systems.

- **Problem:** Federal and State governments and the private sector need industries and regional economies working again as soon as possible after catastrophic events, particularly in locales that also host critical infrastructure systems and industries. Therefore, DHS must understand the complex public and private sector linkages that comprise an infrastructure system and community, and how the severe stress of catastrophic events impacts them. Infrastructure systems are increasingly reliant upon cyber physical systems. Those systems may become compromised because of cyber-attacks. Infrastructure owners and operators need to understand how organizational risk and operational readiness is affected by cyber risks.
- **Solution:** CIRI explores the organizational, policy, business, and technical dimensions of critical infrastructure’s dependence on cyber assets. CIRI examines how computer hardware and software both contribute to and threaten resiliency and how industry makes decisions about cyber assets which contribute to resilience. The Center develops business cases for preparing for and mitigating the effects of catastrophic incidents with an emphasis on how computer hardware and software contribute to and threaten resiliency. The activities under this project include:
 - The Application of Critical Infrastructure Research in the Real-World: CIRI evaluates policy options and identifies, tests, and pilots’ technologies and non-material solutions to support effective decision-making in a collaborative risk management environment in real-world settings. Investigating areas from Cybersecurity Assurance for Critical Infrastructure to Electromagnetic Pulse (EMP) Risk Assessment and Mitigation Prioritization and Hybrid Quantum-Classical Reinforcement Learning, CIRI is leveraging existing publications, analyses, and verified and validated models to evaluate and select cross-sector issues that are amenable to real-world testing.
 - Understanding Resilient Critical Infrastructure Systems: Infrastructure systems are owned and operated by a variety of businesses and public entities, including municipal and other types of governments that vary in their knowledge of, and flexibility to manage catastrophic risk. To this end, CIRI is performing an Assessment and Measurement of Port Disruptions and will deliver a “proof-of-concept” framework that would allow port authorities to conduct contextually relevant threat-based assessments of port infrastructure.
 - The Business Case for Infrastructure Resiliency: Understanding how businesses that make up infrastructure systems make decisions before, during, and after a catastrophic event will assist in defining future policies, incentives, and programs. CIRI is analyzing government policies and regulations and the dynamics of risk insurance markets to determine their effects on the motivations and behavior of decision makers throughout the HSE. By assisting with cybersecurity framework implementation, modeling, and planning dynamic resiliency, and leveraging AI for Disaster Response, researchers are developing future options for policies, regulations, and market conditions that will properly incentivize decision makers to make timely and appropriate investments in infrastructure security and resilience.

- The Future of Resilience: By researching cloud-based delivery of training related to cyber risk management processes, CIRI is improving risk-based cybersecurity postures within individual companies and government agencies.
- **Justification:** The FY 2025 Budget does not include funding for this project as CIRI will be ending its period of performance in FY 2024 and become an Emeritus COE. Previous funding for this project was used to research required to develop the new COE topic designation package, the creation of the Notice for Funding Opportunity, and management of the competition to stand up a new COE.
- **Impact:** The Center’s work will result in data-rich quantitative analyses, technologies, and other tools that assist DHS and the critical infrastructure industry in understanding threats and vulnerabilities, risk management strategies, and costs and trade-offs of risk management decisions.

Type of Research

Basic, Applied and Developmental

Technical Readiness Level

CIRI conducts a portfolio of projects that currently range from TRL-3 through TRL-5 but can range from TRL-2 through TRL-7, from initial concept development to system prototypes tested in the field. Each COE conducts multiple projects across its research and education theme areas. The range of TRL levels changes throughout a COE’s life cycle, with a progression toward more TRL levels at the higher end of the scale; however, even a later-phase COE portfolio may include lower range TRLs in its portfolios to address emerging risks.

Transition Plans

S&T works with CIRI to structure and position projects to align with customer needs from proof of concept through testing, and piloting in the field. Technology development activities sync with the scientific and program management milestones appropriate for each project. These efforts differ depending upon the research gap being addressed, but involve partnerships with technology providers, data owners, commercialization entities, DHS Components, and other public-sector agencies. Management methods are designed to reduce the technical and programmatic risks of new technologies to the point where industry and other Federal partners are willing to invest in technology commercialization or move towards direct acquisition. S&T manages planned, formal technical and strategic annual and biennial reviews to assess individual project performance against key performance parameters. These reviews readjust overall research portfolio investments to respond to market forces and customer demand.

OUP Program Managers work with the Office of General Counsel, the General Counsel of the performing institution(s), and COE Technology Commercialization Offices to support legal, privacy, market, and technology transfer elements of each project. COEs work with their technology transfer offices to attract investments, address legal concerns, and leverage university infrastructures to execute the plans necessary to enable long-term sustainment of technologies.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2023			
Began preparation for the completion of all research and education project activities for the final year of the COE.	FY 2023 Q1	FY 2023 Q4	N/A
Identified and conduct transition related activities to further at least two ongoing research projects.	FY 2023 Q1	FY 2023 Q4	N/A
Planned and implemented final Annual Meeting bringing together researchers, DHS Component stakeholders, and potential commercialization and transition partners to discuss all research and education activities.	FY 2023 Q4	FY 2023 Q4	N/A
FY 2024			
N/A	-	-	-
FY 2025			
N/A	-	-	-

Cross Border Threat Screening and Supply Chain Defense (CBTS)

CBTS focuses on researching and developing solutions, protocols, and capabilities to support the identification of potential biological threats and/or hazards within the DHS operational environment that could disrupt critical infrastructure supply chains and the supporting operational activities conducted at ports of entry, land borders, and other critical nodes within the supply chain.

- **Problem:** Certain technological fields such as biology, bioengineering, and supply chain analytics are rapidly evolving. New biological threats and hazards have the potential to significantly affect the health and well-being of people, animals, and plants, and to subsequently affect the Nation's economy and critical infrastructure. DHS needs the ability to better understand current and emerging biological threats that are faced at POEs and land borders and that may affect critical infrastructure supply chains.
- **Solution:** Potential approaches include the utilization of innovative technologies (e.g., screening physical cargo and passengers, and data analysis to identify potential conditions that warrant greater scrutiny), optimized operational procedures, and a skilled workforce trained in latest methods to identify and respond to biological threats and their corresponding impact on health and the economy. The activities under this project include:
 - Detecting Biological Threats and Disruption to People and Global Supply Chains: Develop simplified, cost effective, interoperable, and broad-spectrum approaches to screen for biological threats. CBTS is analyzing the feasibility of using blockchain and/or other IoT technologies to capture and securely transmit information throughout the supply chain. Additionally, CBTS is utilizing a hand-held device to develop a new assay that can identify infections in people before they develop symptoms, as well as differentiate between viral and bacterial pathogens in less than one hour.
 - Data Integration and Analytics: Improve decision analysis in the field by developing innovative tools, methodologies, and processes to support DHS and its partners. Researchers are developing interoperable field-deployable software tools that integrate data from multiple data sources such as sensors, health records, import/exports, supply chains, private industry, and government partners to support decision makers.
 - Novel Operational Methods to Use Emerging Tools to Reduce Risk: Produce timely decision-making through meaningful data integration and representation from disparate sources via advanced Bayesian analysis applied to threat assessment outputs to inform future research, training, and policy.
 - Time Critical Response Support: Research Early Warning and Workforce Protection against Highly Contagious Infectious Diseases will provide all levels of operators the guidance necessary to understand evolving global threats. This will help DHS respond to and support efforts to mitigate rapidly developing incidents.

- **Justification:** The FY 2025 Budget continues to provide \$4.9M for this project, consistent with the FY 2023 Enacted, and supports DHS’s efforts in reducing risks posed by biological threats and hazards encountered at borders, ports of entry, and within the global supply chain. By researching the countering biological threats in supply chains, CBTS will assist DHS operations that protect the global supply chain and reduce the risk of exposing people and infrastructures to new and evolving biological threats. In FY 2025, CBTS plans to foster collaboration with Federal, State, and local government as well as with partners in academia and industry to identify the state of research in food and agricultural security and potential gaps through at least one conference with plans to build on this initial conference.
- **Impact:** CBTS will strengthen DHS operational workforce, protect people, animals, and agriculture, and help to defend against threats to the global supply chain that, if comprised, would cause harm to public health and U.S. economy.

Type of Research

Basic, Applied and Developmental

Technical Readiness Level

CBTS conducts a portfolio of projects that currently range from TRL-2 through TRL-7, from initial concept development to system prototypes tested in the field. Each COE conducts multiple projects across its research and education theme areas. The range of TRL levels changes throughout a COE’s life cycle, with a progression toward more TRL levels at the higher end of the scale; however, even a later-phase COE portfolio may include lower range TRLs in its portfolios to address emerging risks.

Transition Plans

S&T works with CBTS to structure and position projects to align with customer needs, beginning from conception, through testing, and piloting in the field. Technology development activities sync with the scientific and program management milestones appropriate for each project. These efforts differ depending upon the research gap being addressed, but involve partnerships with technology providers, data owners, commercialization entities, DHS Components, and other public-sector agencies. Management methods are designed to reduce the technical and programmatic risks of new technologies to the point where industry and other Federal partners are willing to invest in technology commercialization or move towards direct acquisition. S&T manages planned, formal technical and strategic annual and biennial reviews to assess individual project performance against key performance parameters. These reviews readjust overall research portfolio investments to respond to market forces and customer demand.

OUP Program Managers work with the Office of General Counsel, the General Counsel of the performing institution(s), and COE Technology Commercialization Offices to support legal, privacy, market, and technology transfer elements of each project. DHS encourages COEs work with their technology transfer offices to attract investments, address legal concerns, and leverage university infrastructures to execute the plans necessary to enable long-term sustainment of technologies.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Conducted research that addresses known knowledge gaps related to border health, substandard, fraudulent, and counterfeit illegal medical supplies equipment, and how artificial intelligence (AI) can reduce biological risks. Developed case studies for specific supply chains of strategic value across North America (Mexico-U.S.-Canada) by addressing supply chains that vary by complexity and vary by evidence availability.	FY 2023 Q1	FY 2023 Q4	4
Developed a Truck Border Crossing Delays and Disruptions Economic Impact Assessment Model to provide a practical and efficient tool to help conduct economic impact analyses on border crossing changes. The Impact Planning and Analysis (IMPLAN) input/output model will be used to translate empirical data into regional and national economic impacts, using the model’s multipliers, for wage, labor, and production.	FY 2021 Q3	FY 2023 Q1	6
Examined how the homeland security enterprise can use data to discern relationships, detect anomalies, and display trends to mitigate a variety of risks to the supply chain; Demonstrated the effectiveness of models in identifying emerging supply chain risks.	FY 2023 Q1	FY 2023 Q4	3
	FY 2024		
Expand current research in the detection of biological threats using data integration and analytics by initiating two new projects in African Swine Fever.	FY 2024 Q1	FY 2024 Q4	2-3
Foster cross-border and transdisciplinary collaborations across Mexico, the United States, and Canada through a single research platform needed to assess the state of risk of U.S. supply chain across North America through at least two case studies.	FY 2024 Q1	FY 2024 Q4	4
	FY 2025		
Develop and execute at least one conference designed to bring together academia, government, and industry subject matter experts to discuss and identify possible gaps in food and agricultural security research.	FY 2025 Q1	FY 2025 Q4	N/A
Implement results of the 2024 Biennial Review to ensure the Center’s research remains relevant to DHS missions.	FY 2025 Q1	FY 2025 Q4	N/A

Soft-target Engineering to Neutralize the Threat Reality (SENTRY; formerly Engineering Secure Environments from Targeted Attacks)

SENTRY develops strategies and innovative solutions to secure environments that are easily accessible to large numbers of people, such as crowded spaces and transportation systems, from targeted attacks that inflict grave injury to human life and property.

- **Problem:** DHS was founded after the 9/11 attacks to safeguard the country from threats, foreign and domestic. Two decades after the attacks, the U.S. faces an increasingly complex and evolving threat of targeted violence directed at soft targets and crowded places (STCP) – high density, unsecured spaces with limited security or protective measures, making them vulnerable to attack. These attacks result in lasting devastating effects on the individual, collective, and societal level to the American population; and to physical, psychological, and financial losses.
- **Solution:** The overarching goal of SENTRY is to develop next-generation tools and methodologies for detecting, deterring, mitigating, and responding to targeted attacks and to develop education and training programs to enhance the capabilities of the current and future homeland security workforce in this area. The activities under this project include:
 - Real-time Management of Threat Detection and Mitigation; This research thrust supports the protection of STCPs in real time operations by developing decision support systems that will be able to extract information from diverse, unconventional data; manage dynamic information collection for threat identification and confirmation; develop and recommend intervention strategies for threat mitigation; and adapt to unique characteristics of specific venues.
 - Advanced Sensing Technologies: This research thrust will develop new sensor and sensing system capabilities to detect and identify threats within STCPs (e.g., chemical, and biological threats, explosives, UAVs, and weapons), including research and development of pervasive, inexpensive, networked sensors to detect unusual objects and concealed threats in crowds.
 - Threat Risk Detection, Prediction, and Deterrence: This research thrust will analyze risks to existing venues in which the architecture of the venues is already established using AI, ML, and game theory.
 - Layered Security Architectural Design and Simulation: This research thrust seeks to develop principles and techniques to design venues and environments that enhance the ability to protect against diverse attacks and will offer insights and tools that can guide risk-informed security planning and security system design, particularly when venues can have multiple security layers.

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- **Justification:** The FY 2025 Budget continues to provide \$4.9M for this project, consistent with the FY 2023 Enacted. This funding supports academic research on detecting, deterring, mitigating, and responding to targeted violence by researching and developing innovative solutions to secure environments that are easily accessible to large numbers of people, such as crowded spaces, built environments, and transportation systems. The Center will also develop training and education for the current and future homeland security workforce. In FY 2025, the SENTRY Center plans to conduct a series of Advanced Development for Security Applications (ADSA) and Advanced Development and Processes for Tomorrow (ADEPT) workshops attended by industry, academia, and USG stakeholders, and implement transition milestones for at least two projects with input from end users and stakeholders.
- **Impact:** Research and education outcomes will foster a culture of “security by design” that provide intentional and flexible architecture solutions to thwart an adaptive adversary through the integration of novel engineering design concepts, technologies, and capabilities that detect, deter, mitigate, and respond to targeted attacks. The Center will produce new capabilities, test them in operational settings, and make validated solutions available and useful to homeland security professionals at all levels.

Type of Research

Basic, Applied, and Developmental

Technical Readiness Level

SENTRY conducts a portfolio of projects currently at TRL-3 but can range from TRL-2 through TRL-7, from initial concept development to system prototypes tested in the field. Each COE conducts multiple projects across its research and education theme areas. The range of TRL levels changes throughout a COE’s life cycle, with a progression toward more TRL levels at the higher end of the scale; however, even a later-phase COE portfolio may include lower range TRLs in its portfolios to address emerging risks.

Transition Plans

S&T coordinates with SENTRY to structure and position projects to align with customer needs, beginning from conception, through testing, and piloting in the field. OUP technology development activities sync with the scientific and program management milestones appropriate for each project. These efforts differ depending upon the research gap being addressed, but involve partnerships with technology providers, data owners, commercialization entities, DHS Components, and other public-sector agencies. OUP’s management methods are designed to reduce the technical and programmatic risks of new technologies to the point where industry and other Federal partners are willing to invest in technology commercialization or move towards direct acquisition. OUP manages planned, formal technical and strategic annual and biennial reviews to assess individual project performance against key performance parameters. These reviews readjust overall research portfolio investments to respond to market forces and customer demand.

University Programs – PPA

Centers of Excellence

OUP Program Managers work with S&T’s Office of General Counsel, the General Counsel of the performing institution(s), and COE Technology Commercialization Offices to support legal, privacy, market, and technology transfer elements of each project. DHS encourages COEs work with their technology transfer offices to attract investments, address legal concerns, and leverage university infrastructures to execute the plans necessary to enable long-term sustainment of technologies.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
FY 2023			
Conducted a series of ADSA and ADEPT workshops attended by lead institution personnel, OUP officials, and engaged industry and DHS Component personnel.	FY 2023 Q1	FY 2023 Q4	N/A
Conducted Reconnect workshops, first responder training, hackathon, and community college modules as part of SENTRY Workforce Development and Professional Development portfolio.	FY 2023 Q1	FY 2023 Q3	N/A
Developed integrated case studies focused on school safety and secure surface transportation.	FY 2023 Q1	FY 2023 Q4	N/A
Identified at least two projects with transition potential and implement transition milestones with input from end users to be integrated into the work plan.	FY 2023 Q1	FY 2023 Q4	N/A
FY 2024			
Center Events: Conduct a presentation series as a quarterly offering for SENTRY Board of Directors (BOD) and other key external audiences; coordinate and execute the SENTRY Biennial Review; and continue the Advanced Development for Security Applications (ADSA) and Advanced Developments Encompassing Processes and Technologies (ADEPT) workshop series.	FY 2024 Q1	FY 2024 Q4	N/A
Research Transition: Launch a new Virtual Sentry Framework Testbed research project and identify at least two projects with transition potential. Once these projects are identified, the Transition Team will work with the PIs to implement transition milestones to be integrated into project workplans. Both the Virtual Sentry Framework Testbed project and project transition efforts will be facilitated by the transition team and leverage input from SENTRY leadership and end users.	FY 2024 Q1	FY 2024 Q4	3
Workforce and Professional Development (WPDP) Program: Continue and update existing WPDP projects including Reconnect workshops and SENTRY-related module development, first responder information sessions, and the annual student design challenge while initiating the DHS Practitioners Enhancing Engineering Regionally (PEERs) diversity-focused supplemental project.	FY 2024 Q1	FY 2024 Q4	N/A
FY 2025			
Host a series of Advanced Development for Security Applications (ADSA) / Advanced Developments Encompassing Processes and Technologies (ADEPT) workshops with participation from industry, academia, DHS Components, and other USG stakeholders.	FY 2025 Q1	FY 2025 Q4	N/A
Implement transition milestones for at least two projects with input from end users and stakeholders.	FY 2025 Q1	FY 2025 Q4	3

Master of Business Administration/Security Technology Transition (MBA/STT)

- **Problem:** Technology development, transition, and procurement will always be a foundational element of DHS’s strategy for keeping pace with current and emerging threats. The success of DHS’s efforts is dependent not only on direct investments in research, development, and procurement, but is equally dependent upon a skilled workforce capable of moving the technologies into an operational setting.
- **Solution:** The MBA/STT program is a non-traditional COE that partners with an academic institution to develop an MBA with a concentration in STT. S&T investment in this space will be a “first of its kind” program aimed to build a cross-DHS Collaborative workforce with the capability and skillset needed to develop, acquire, and implement operationally relevant technologies, understand and manage the process of technology transition, and reduce the barriers of technology transition that have historically derailed critical technological or operational improvements.
- **Justification:** The FY 2025 Budget continues to provide \$2.0M for this project, consistent with the FY 2023 Enacted. This funding continues the effort aimed to build a cross-DHS Collaborative workforce with the capability and skillset needed to develop, acquire, and implement operationally relevant technologies, understand and manage the process of technology transition, and reduce the barriers of technology transition that have historically derailed critical technological or operational improvements.
- **Impact:** Through leadership development, the MBA/STT will advance the DHS workforce with the ability to successfully manage R&D projects, tools, and technologies and will provide an impact technology transition across all other DHS missions.

Type of Research

Basic, Applied, and Developmental

Technical Readiness Level

TRL does not apply to MBA/STT program. MBA/STT does not develop new technologies. The program is doing case study research.

Transition Plans

OUP Program Managers work with the COEs to structure and position projects to align with customer needs, beginning from conception, through testing, and piloting in the field. OUP technology development activities sync with the scientific and program management milestones appropriate for each project. These efforts differ depending upon the research gap being addressed, but involve partnerships with technology providers, data owners, commercialization entities, DHS Components, and other public-sector agencies. OUP’s management methods are designed to reduce the technical and programmatic risks of new technologies to the point where industry and other Federal partners are willing to invest in technology commercialization or move towards direct acquisition. OUP manages planned, formal technical and strategic annual and biennial reviews to assess individual project performance against key performance parameters. These reviews readjust overall research portfolio investments to respond to market forces and customer demand.

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Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Cohort 1 of the MBA-STT Program graduated.	FY 2023 Q4	FY 2023 Q4	N/A
Developed Program Evaluation Study Plan.	FY 2022 Q4	FY 2023 Q1	N/A
Selected third cohort from qualified DHS candidates.	FY 2022 Q4	FY 2023 Q1	N/A
Third cohort began the MBA Program.	FY 2023 Q2	FY 2023 Q3	N/A
	FY 2024		
Cohort 2 of the MBA-STT Program graduates.	FY 2024 Q4	FY 2024 Q4	N/A
MBA STT Evaluation Study Interim Progress Review Brief 4.	FY 2024 Q1	FY 2024 Q3	N/A
	FY 2025		
Cohort 3 of the MBA-STT Program graduates.	FY 2025 Q4	FY 2025 Q4	N/A
MBA-STT Evaluation Study Interim Progress Review Brief 6 completed.	FY 2025 Q2	FY 2025 Q3	N/A

National Counterterrorism, Innovation, Technology and Education (NCITE)

NCITE (formerly Terrorism Prevention Counterterrorism Research (TPCR) Center) directly supports the HSE counterterrorism missions and professionals with user-inspired projects that are necessary to prevent terrorism and improve security. NCITE identifies, mentors, and evaluates products from the academic community and only conducts research that makes a difference to the HSE and can be applied to operations.

- **Problem:** In the past few years, the DHS Intelligence Enterprise (IE) has shifted their priorities and resources to focus on immediate counterterrorism operations. This has reduced DHS IE's capability to develop, test, and implement innovative strategic methods to counter terrorism. DHS needs new technologies, protocols, and capabilities to support the IE's long-term strategic thinking and develop new approaches to terrorism prevention.
- **Solution:** The NCITE COE harnesses the universities' domain expertise to provide the DHS IE with analytic tools and strategic thinking. NCITE conducts a range of activities including basic and applied research, and education and training initiatives to support and enhance DHS analytic efforts in detecting, deterring, and preventing terrorism.
- **Justification:** The FY 2025 Budget continues to provide \$4.9M for this project, consistent with the FY 2023 Enacted. This supports research and development and technical expertise that aligns with the counterterrorism mission of this COE. The NCITE program will ensure that OUP can provide DHS Components with the greatest range of scientific and technical domains not available through other means and programs. In FY 2025, the NCITE COE plans to conduct market research and create transition plan for at least two projects within its portfolio and expose students to homeland security challenges by funding at least 20 students within research, education, and core management activities at the Center.
- **Impact:** The NCITE COE has the potential to impact the entire DHS IE, SLTT, and private and public partners by coordinating with the Intelligence and Analysis Counterterrorism Mission Center. NCITE COE's involvement includes conducting a range of activities including basic and applied research, and education and training initiatives to support and enhance DHS analytic efforts that are not currently being done by other organizations in the space.

Type of Research

Basic, Applied, and Developmental

Technical Readiness Level

NCITE conducts a portfolio of projects currently at TRL-3 but can range from TRL-2 through TRL-7, from initial concept development to system prototypes tested in the field. Each COE conducts multiple projects across its research and education theme areas. The range of TRL levels changes throughout a COE's life cycle, with a progression toward more TRL levels at the higher end of the scale; however, even a later-phase COE portfolio may include lower range TRLs in its portfolios to address emerging risks.

Transition Plans

S&T works with NCITE to structure and position projects to align with customer needs, beginning from conception, through testing, and piloting in the field. OUP technology development activities sync with the scientific and program management milestones appropriate for each project. These efforts differ depending upon the research gap being addressed, but involve partnerships with technology providers, data owners, commercialization entities, DHS Components, and other public-sector agencies. OUP's management methods are designed to reduce the technical and programmatic risks of new technologies to the point where industry and other Federal partners are willing to invest in technology commercialization or move towards direct acquisition. OUP manages planned, formal technical and strategic annual and biennial reviews to assess individual project performance against key performance parameters. These reviews readjust overall research portfolio investments to respond to market forces and customer demand.

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Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Conducted Biennial Review on all research, education, and NCITE Management efforts and provided actions and recommendations to be implemented in the next year’s workplan.	FY 2023 Q2	FY 2023 Q2	N/A
Exposed students to homeland security challenges by funding at least 15 within research, education, and core management activities at the Center.	FY 2023 Q1	FY 2023 Q2	N/A
Identified, placed, and funded four Innovation graduate fellowships.	FY 2022 Q2	FY 2023 Q3	N/A
Worked with relevant DHS Components to create homeland security challenge areas, draft, and release request for proposal for potential research projects.	FY 2023 Q3	FY 2023 Q2	N/A
	FY 2024		
Conduct market research and establish transition plans for the technologies resulting from at least two NCITE projects. S&T PMs will utilize these reports to help inform the FY 2024 research portfolio.	FY 2024 Q1	FY 2024 Q4	N/A
Expose students to homeland security challenges by funding at least 15 students within research, education, and core management activities at the Center.	FY 2024 Q1	FY 2024 Q4	N/A
NCITE will implement the recommended actions resulting from its Biennial Review.	FY 2024 Q1	FY 2024 Q3	N/A
	FY 2025		
Conduct market research and establish transition plans for the technologies resulting from at least two NCITE projects. S&T PMs will utilize these reports to help inform the research portfolio.	FY 2025 Q1	FY 2025 Q4	N/A
Expose students to homeland security challenges by funding at least 20 students within research, education, and core management activities at the Center.	FY 2025 Q1	FY 2025 Q3	N/A
Work with relevant DHS Components to create homeland security challenge areas, draft, and release request for proposal for potential research projects.	FY 2025 Q1	FY 2025 Q2	N/A

Center for Homeland Security in the Arctic (CHSA)

- **Problem:** The U.S. Arctic is dynamic; evolving environmentally, operationally, and strategically. A challenging landscape and seascape, combined with the sheer vastness of distance from the mainland United States, austere communications, and limited infrastructure, exacerbate the harshness of Arctic operations. This new operating environment will not only require additional maritime security presence but will also necessitate new operational capabilities and additional resources to perform cyber and infrastructure security missions, trade and travel facilitation, and natural disaster response in the near term; and inevitably, additional mission sets,” 2021 DHS Strategic Approach for Arctic Homeland Security.
- **Solution:** CHSA will conduct research and education to enable a secure and resilient Arctic region. This will include interdisciplinary basic and applied research, education, and technology transition across four related research and education themes: (1) Advance All-Domain Situational Awareness, (2) Improve Understanding of Risks and Potential Impacts, (3) Enable Adaptation for Resilience, and (4) Expand Collaboration and Cooperation across the HSE.
- **Justification:** The FY 2025 Budget continues to provide \$4.9M for this project, consistent with the FY 2023 Enacted. This funding further develops the Center’s research and education portfolio. In FY 2025, OUP plans to develop a strategic plan and milestones for the Center’s research and education portfolio and initiate research and education to advance homeland security in the Arctic.
- **Impact:** CHSA’s work will develop capabilities and knowledge to advance homeland security in the Arctic, including tangible research and education results for use by DHS, other Federal agencies, State and local governments, and other relevant entities across the HSE. The Center’s research results will include tools, technologies, and knowledge products (e.g., best practices, resource guides, case studies) for use in improving homeland security operations, decision-making, and policy at all levels of government. The Center’s education and workforce development programs will include innovative initiatives that: embed students with homeland security practitioners to conduct research; foster opportunities for students to gain practical experience in homeland security-related professions; integrate homeland security studies into existing science, technology, engineering, and mathematics (STEM) graduate and undergraduate degree programs; and provide technical education and training programs for homeland security professionals.

Type of Research

Basic, Applied, and Developmental

Technical Readiness Level

N/A

Transition Plans

S&T works with CHSA to structure and position projects to align with customer needs, beginning from conception, through testing, and piloting in the field. OUP technology development activities sync with the scientific and program management milestones appropriate for each project. These efforts differ depending upon the research gap being addressed, but involve partnerships with technology providers, data owners, commercialization entities, DHS Components, and other public-sector agencies. OUP’s management methods are designed to reduce the technical and programmatic risks of new technologies to the point where industry and other Federal partners are willing to invest in technology commercialization or move towards direct acquisition. OUP manages planned, formal technical and strategic annual and biennial reviews to assess individual project performance against key performance parameters. These reviews readjust overall research portfolio investments to respond to market forces and customer demand.

OUP Program Managers work with S&T’s Office of General Counsel, the General Counsel of the performing institution(s), and COE Technology Commercialization Offices to support legal, privacy, market, and technology transfer elements of each project. DHS encourages COEs work with their technology transfer offices to attract investments, address legal concerns, and leverage university infrastructures to execute the plans necessary to enable long-term sustainment of technologies.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Posted Notice of Funding Opportunity.	FY 2022 Q4	FY 2023 Q3	N/A
Completed Notice of Funding Opportunity (NOFO) competition review and presented results to USST.	FY 2023 Q2	FY 2023 Q4	N/A
	FY 2024		
Facilitate S&T work-plan development workshop with cooperative agreement recipient.	FY 2024 Q2	FY 2024 Q3	N/A
Recruit and appoint Federal advisors within DHS Components to serve on COE Board of Directors.	FY 2024 Q2	FY 2024 Q2	N/A
	FY 2025		
Develop a strategic plan and milestones for the Center’s research and education portfolio.	FY 2024 Q4	FY 2025 Q1	N/A
Initiate research and education to advance homeland security in the Arctic.	FY 2025 Q1	FY 2025 Q4	N/A

New COE Topic #1 (Procurement Sensitive)

- **Problem:** DHS faces a myriad of complex threats and challenges in the execution of its duty to safeguard America and its people. To address the evolution of threats over time, DHS needs resources it can leverage to pursue long term research focused on these grand challenges and strengthens the creation of a capable workforce to enhance the homeland security.
- **Solution:** COEs are university-led consortia that work with industry, DHS Components, other government, and homeland security agencies (Federal, State, and local), and first responders to develop critical technologies and analyses to secure the homeland. COEs also develop homeland security-related curricula and training.
- **Justification:** The FY 2025 Budget provides \$4.9M for a new Center that aligns with DHS mission needs and priorities per the approved S&T COE Topic Designation Process. In FY 2025, OUP plans to complete and post a Notice of Funding Opportunity for the new Center and conduct a COE competition and present selection recommendation to Under Secretary of Science and Technology Directorate.
- **Impact:** COEs are university-led consortia with multiple partners from academia as well as potentially industrial partners. They bring a wealth of innovative thinking across a broad spectrum of technical fields. These consortia can respond to requests from DHS Components to address needs and fill gaps in science and technology research needs. The proposed increase in funding will strengthen the Nation’s investments in foundational, early-stage R&D at universities, to further secure our future and expand the scientific and technical outputs that Components rely on. COEs have developed more than 200 targeted tools, technologies, and knowledge products through COEs for use across the homeland security enterprise.

Type of Research

Basic, Applied, and Developmental

Technical Readiness Level

N/A

Transition Plans

S&T will coordinate with the new COE to structure and position projects to align with customer needs, beginning from conception, through testing, and piloting in the field. OUP technology development activities sync with the scientific and program management milestones appropriate for each project. These efforts differ depending upon the research gap being addressed, but involve partnerships with technology providers, data owners, commercialization entities, DHS Components, and other public-sector agencies. OUP’s management methods are designed to reduce the technical and programmatic risks of new technologies to the point where industry and other Federal partners are willing to invest in technology commercialization or move towards direct acquisition. OUP manages planned, formal technical and strategic annual and biennial reviews to assess individual project performance against key performance parameters. These reviews readjust overall research portfolio investments to respond to market forces and customer demand.

OUP Program Managers will work with S&T’s Office of General Counsel, the General Counsel of the performing institution(s), and COE Technology Commercialization Offices to support legal, privacy, market, and technology transfer elements of each project. DHS encourages COEs work with their technology transfer offices to attract investments, address legal concerns, and leverage university infrastructures to execute the plans necessary to enable long-term sustainment of technologies.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Conducted new Center of Excellence topic investigation and analysis.	FY 2022 Q4	FY 2023 Q4	N/A
	FY 2024		
Develop Notice of Funding Opportunity (NOFO).	FY 2024 Q1	FY 2024 Q3	N/A
Post Notice of Funding Opportunity for New COE.	FY 2024 Q2	FY 2024 Q4	N/A
	FY 2025		
Complete NOFO competition review and present results to USST.	FY 2024 Q4	FY 2025 Q2	N/A
Recruit and appoint Federal advisors within DHS Components to serve on COE Board of Directors.	FY 2025 Q1	FY 2025 Q3	N/A
Facilitate S&T work-plan development workshop with cooperative agreement recipient	FY 2025 Q2	FY 2025 Q4	N/A

New COE Topics #2 (Procurement Sensitive)

- **Problem:** DHS faces a myriad of complex threats and challenges in the execution of its duty to safeguard America and its people. To address the evolution of threats over time, DHS needs resources it can leverage to pursue long term research focused on these grand challenges and strengthens the creation of a capable workforce to enhance the homeland security.
- **Solution:** COEs are university-led consortia that work with industry, DHS Components, other government, and homeland security agencies (Federal, State, and local), and first responders to develop critical technologies and analyses to secure the homeland. COEs also develop homeland security-related curricula and training.
- **Justification:** The FY 2025 Budget provides \$4.9M for a new COE topic that aligns with DHS mission needs and priorities per the approved S&T COE Topic Designation Process. As part of the standard OUP planning and processes, S&T investigates new Center scopes and scientific areas to formulate potential COEs that will meet evolving DHS needs.
- **Impact:** COEs are university-led consortia with multiple partners from academia as well as potentially industrial partners. They bring a wealth of innovative thinking across a broad spectrum of technical fields. These consortia can respond to requests from DHS Components to address needs and fill gaps in science and technology research needs. The proposed increase in funding will strengthen the Nation’s investments in foundational, early-stage R&D at universities, to further secure our future and expand the scientific and technical outputs that Components rely on. COEs have developed more than 200 targeted tools, technologies, and knowledge products through COEs for use across the homeland security enterprise.

Type of Research

Basic, Applied, and Developmental

Technical Readiness Level

N/A

Transition Plans

S&T will coordinate with the new COE to structure and position projects to align with customer needs, beginning from conception, through testing, and piloting in the field. OUP technology development activities sync with the scientific and program management milestones appropriate for each project. These efforts differ depending upon the research gap being addressed, but involve partnerships with technology providers, data owners, commercialization entities, DHS Components, and other public-sector agencies. OUP’s management methods are designed to reduce the technical and programmatic risks of new technologies to the point where industry and other Federal partners are willing to invest in technology commercialization or move towards direct acquisition. OUP manages planned, formal technical and strategic annual and biennial reviews to assess individual project performance against key performance parameters. These reviews readjust overall research portfolio investments to respond to market forces and customer demand.

OUP Program Managers will work with S&T’s Office of General Counsel, the General Counsel of the performing institution(s), and COE Technology Commercialization Offices to support legal, privacy, market, and technology transfer elements of each project. DHS encourages COEs work with their technology transfer offices to attract investments, address legal concerns, and leverage university infrastructures to execute the plans necessary to enable long-term sustainment of technologies.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
N/A	-	-	-
	FY 2024		
Initiate topic investigation of new Center.	FY 2024 Q1	FY 2024 Q4	
	FY 2025		
Conduct new Center of Excellence topic investigation and analysis.	FY 2025 Q1	FY 2025 Q2	N/A
Develop Notice of Funding Opportunity.	FY 2024 Q3	FY 2024 Q4	N/A

New COE Topic #3 (Procurement Sensitive)

- **Problem:** DHS faces a myriad of complex threats and challenges in the execution of its duty to safeguard America and its people. To address the evolution of threats over time, DHS needs resources it can leverage to pursue long term research focused on these grand challenges and strengthens the creation of a capable workforce to enhance the homeland security.
- **Solution:** COEs are university-led consortia that work with industry, DHS Components, other government, and homeland security agencies (Federal, State, and local), and first responders to develop critical technologies and analyses to secure the homeland. COEs also develop homeland security-related curricula and training.
- **Justification:** The FY 2025 Budget provides \$4.9M for a new COE topic that aligns with DHS mission needs and priorities per the approved S&T COE Topic Designation Process. As part of the standard OUP planning and processes, S&T investigates new Center scopes and scientific areas to formulate potential COEs that will meet evolving DHS needs.
- **Impact:** COEs are university-led consortia with multiple partners from academia as well as potentially industrial partners. They bring a wealth of innovative thinking across a broad spectrum of technical fields. These consortia can respond to requests from DHS Components to address needs and fill gaps in science and technology research needs. The proposed increase in funding will strengthen the Nation’s investments in foundational, early-stage R&D at universities, to further secure our future and expand the scientific and technical outputs that Components rely on. COEs have developed more than 200 targeted tools, technologies, and knowledge products through COEs for use across the homeland security enterprise.

Type of Research

Basic, Applied, and Developmental

Technical Readiness Level

N/A

Transition Plans

S&T will coordinate with the new COE to structure and position projects to align with customer needs, beginning from conception, through testing, and piloting in the field. OUP technology development activities sync with the scientific and program management milestones appropriate for each project. These efforts differ depending upon the research gap being addressed, but involve partnerships with technology providers, data owners, commercialization entities, DHS Components, and other public-sector agencies. OUP’s management methods are designed to reduce the technical and programmatic risks of new technologies to the point where industry and other Federal partners are willing to invest in technology commercialization or move towards direct acquisition. OUP manages planned, formal technical and strategic annual and biennial reviews to assess individual project performance against key performance parameters. These reviews readjust overall research portfolio investments to respond to market forces and customer demand.

OUP Program Managers will work with S&T’s Office of General Counsel, the General Counsel of the performing institution(s), and COE Technology Commercialization Offices to support legal, privacy, market, and technology transfer elements of each project. DHS encourages COEs work with their technology transfer offices to attract investments, address legal concerns, and leverage university infrastructures to execute the plans necessary to enable long-term sustainment of technologies.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
N/A	-	-	-
	FY 2024		
Initiate topic investigation of new Center.	FY 2024 Q1	FY 2024 Q4	N/A
	FY 2025		
Conduct new Center of Excellence topic investigation and analysis.	FY 2025 Q1	FY 2025 Q2	N/A
Develop Notice of Funding Opportunity.	FY 2025 Q2	FY 2025 Q3	N/A

**Minority Serving Institutions (MSI)
Research and Development**

Technology Readiness Level Exhibit

(Dollars in Thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 President's Budget
Minority Serving Institutions (MSI)	\$7,657	\$7,657	\$7,657

Minority Serving Institutions (MSI)

This program enhances the capabilities of MSIs to develop homeland security-related science, technology, engineering, and mathematics research and curricula, and prepare MSI students for successful homeland security careers. Current MSI programs, include the Scientific Leadership Award (SLA) program, the Summer Research Team (SRT) program, and the Homeland Security Professional Opportunities for the Student Workforce to Experience Research (HS POWER). The programs provide research opportunities and experiential learning, as well as homeland security course content and training in areas critical to homeland security while building enduring partnerships with the COEs. With targeted investments, S&T expects significant returns in the development of a future, diverse workforce that is well postured to take RDT&E positions critical to the success of homeland security enterprise.

- **Problem:** Federal security agencies need diverse, well-qualified analysts and technologists to enter the homeland security science and engineering workforce. The identification, recruitment and retention of these individuals is necessary to secure a diversified workforce.
- **Solution:** MSIs which include Asian American and Native American Pacific Islander-Serving Institutions (AANAPISI), Hispanic Serving Institutions (HSI), Historically Black Colleges and Universities (HBCU), and Native American Serving Institutions will design innovative homeland security related science, technology, engineering, and math (STEM) curricula; support academic enhancements; provide student experiential learning opportunities; and support homeland security-relevant research projects or initiatives with significant involvement of early career faculty and in coordination with DHS COEs.

- **Justification:** The FY 2025 Budget provides \$7.7M for this project, which is consistent with the FY 2023 Enacted. Funding will support continued homeland security related STEM research and experiential learning opportunities at MSIs across the U.S., to include U.S. Territories and Tribal Nations. This aims to produce a diverse talent pool well postured to take RDT&E positions critical to the success of homeland security. Funds will also facilitate engagements with the Nation's MSIs, which include HBCUs, HSIs, Asian American, Native American, and Pacific Islander-Serving Institutions, and Tribal Colleges and Universities, and provide student experiential learning opportunities through science and engineering teaching initiatives, curriculum development, and scholarships. Additionally, funding will support capacity building efforts to provide MSI R&D access and support to Homeland Security critical needs by ensuring diverse and multivariate points of view are applied while seeking capabilities for Homeland Security.
- **Impact:** MSI students will enter careers within the Homeland Security Enterprise, thus increasing diversity and representation within the future homeland security RDT&E workforce. Additionally, funding provides MSIs increased faculty access and enhances capacity to support research opportunities to ensure that the HSE benefits from diverse research perspectives.

Type of Research

Basic, Applied, and Developmental

Technical Readiness Level

The MSIs conduct a portfolio of projects currently at TRL-2 but can range from TRL-2 through TRL-7, from initial concept development to system prototypes tested in the field. Each portfolio conducts multiple projects across its research and education theme areas. The range of TRL levels changes throughout a portfolio's life cycle, with a progression towards more TRL levels at the higher end of the scale; however, even a later-phase portfolio may include lower range TRLs in its portfolios to address emerging risks.

Transition Plans

S&T works with the MSIs to structure and position projects to align with customer needs, beginning from conception, through testing, and piloting in the field. Technology development activities sync with the scientific and program management milestones appropriate for each project. These efforts differ depending upon the research gap being addressed, but involve partnerships with technology providers, data owners, commercialization entities, DHS Components, and other public-sector agencies. Management methods are designed to reduce the technical and programmatic risks of new technologies to the point where industry and other Federal partners are willing to invest in technology commercialization or move towards direct acquisition. S&T manages planned, formal technical and strategic annual and biennial reviews to assess individual project performance against key performance parameters. These reviews readjust overall research portfolio investments to respond to market forces and customer demand.

OUP Program Managers work with S&T's Office of General Counsel, the General Counsel of the performing institution(s), and MSI Technology Commercialization Offices to support legal, privacy, market, and technology transfer elements of each project. MSIs work with their technology transfer offices to attract investments, address legal concerns, and leverage university infrastructures to execute the plans necessary to enable long-term sustainment of technologies.

Project Schedule

Research & Development Description	Planned Start Date	Planned Completion	TRL Level(s)
	FY 2023		
Awarded five to six Scientific Leadership Award grants to MSIs to help develop and strengthen homeland security related STEM curriculum.	FY 2023 Q3	FY 2023 Q4	N/A
Continued research and experiential learnings/internship programs partnering with the Federal National Labs in priority DHS focus areas, to include Cyber Security and AI.	FY 2023 Q3	FY 2023 Q4	N/A
Kicked-off FY 2023 Summer Research Team (SRT) internship program for MSI students and faculty members.	FY 2023 Q2	FY 2023 Q3	N/A
Launched two to three high-level DHS research projects in partnership with the MSI Research and Development Consortium.	FY 2023 Q1	FY 2023 Q2	2
	FY 2024		
Continue DHS mission related CBP research project in partnership with the MSI Research and Development Consortium.	FY 2024 Q1	FY 2024 Q1	N/A
Continue DHS mission related integrative use case development in partnership with the MSI Research and Development Consortium and Universities Space Research Association.	FY 2024 Q1	FY 2024 Q2	N/A
Continue research and work-based learning/internship programs partnering with Federal National Labs in priority DHS focus areas, to include Cyber Security, AI, and areas applicable to Space-based security and resilience.	FY 2024 Q2	FY 2024 Q4	N/A
Kickoff FY 2024 Summer Research Teams (SRT) internship program for MSI students and faculty members.	FY 2024 Q2	FY 2024 Q4	N/A
	FY 2025		
Award five to six Scientific Leadership Award grants to MSIs to help develop and strengthen homeland security related STEM curriculum.	FY 2025 Q1	FY 2025 Q4	N/A
Continue research and experiential learnings/internship programs partnering with the Federal National Labs in priority DHS focus areas, to include Cyber Security and Artificial Intelligence.	FY 2025 Q1	FY 2025 Q4	N/A
Kickoff FY 2025 Summer Research Team (SRT) program for MSI students and faculty members.	FY 2025 Q3	FY 2025 Q4	N/A
Launch two to three high-level DHS research projects in partnership with the MSI Research and Development Consortium.	FY 2025 Q1	FY 2025 Q2	2