FY 2024

DEFENSE BUDGET

FOR UNCREWED SYSTEMS AND ROBOTICS

AUVSI™

The Association for Uncrewed Vehicle Systems International, the world's largest nonprofit organization dedicated to the advancement of uncrewed systems and robotics, represents corporations and professionals from more than 60 countries involved in industry, government and academia. AUVSI members work in the defense, civil and commercial markets.

Our vision is to create a future in which remotely operated and automated transportation technologies are fully accepted, valued and utilized to move people, things and data safely and efficiently — providing broad and lasting economic and social benefit.

Our community of innovators, leaders, and dare-to-dreamers is drafting the blueprint for autonomy, assuring its safe and seamless integration into everyday life. To learn more or get involved, visit auvsi.org/our-impact.

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RDT&E Structure

Starting with RDT&E, Figure 1 shows a RDT&E program as it appears in the PB request justification documents. Three data points are called out in the figure:

1. The appropriation type and budget activity.
2. The program name and alphanumeric unique identifier.
3. Any projects funded under the program.

You will also see that the table provides the total funding for prior years, the actual funding for FY 2022, the enacted funding for FY 2023, the requested funding for FY 2024, and the projected funding for FY 2025 – 2028.

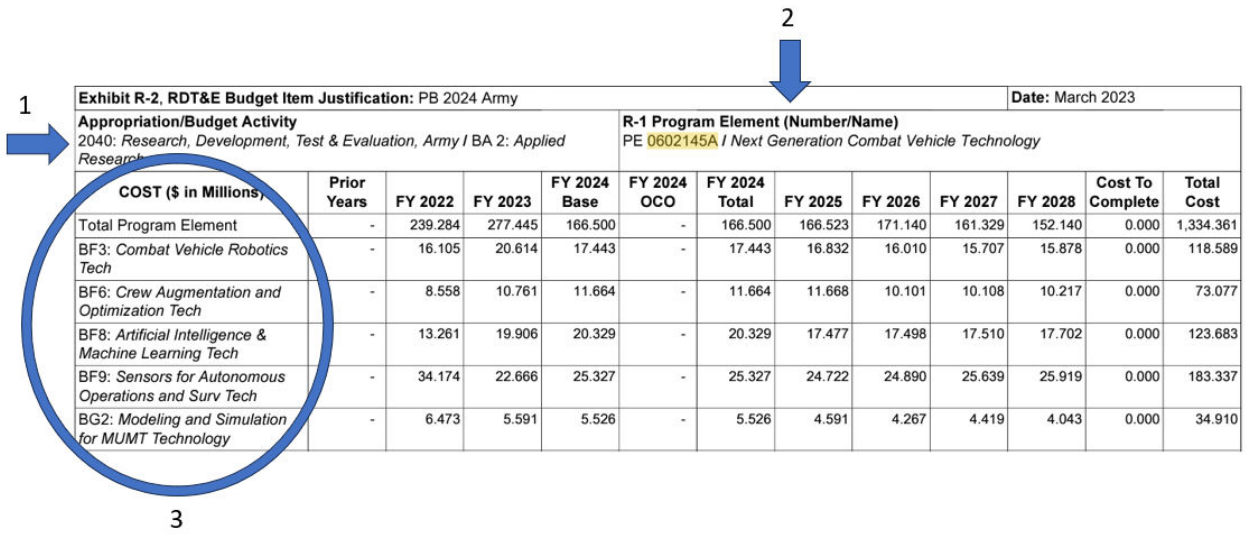


Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army | **Date:** March 2023

Appropriation/Budget Activity
2040: *Research, Development, Test & Evaluation, Army* / BA 2: *Applied Research*

R-1 Program Element (Number/Name)
PE 0602145A / *Next Generation Combat Vehicle Technology*

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	239.284	277.445	166.500	-	166.500	166.523	171.140	161.329	152.140	0.000	1,334.361
BF3: *Combat Vehicle Robotics Tech*	-	16.105	20.614	17.443	-	17.443	16.832	16.010	15.707	15.878	0.000	118.589
BF6: *Crew Augmentation and Optimization Tech*	-	8.558	10.761	11.664	-	11.664	11.668	10.101	10.108	10.217	0.000	73.077
BF8: *Artificial Intelligence & Machine Learning Tech*	-	13.261	19.906	20.329	-	20.329	17.477	17.498	17.510	17.702	0.000	123.683
BF9: *Sensors for Autonomous Operations and Surv Tech*	-	34.174	22.666	25.327	-	25.327	24.722	24.890	25.639	25.919	0.000	183.337
BG2: *Modeling and Simulation for MUMT Technology*	-	6.473	5.591	5.526	-	5.526	4.591	4.267	4.419	4.043	0.000	34.910

Figure 1: Example of an RDT&E program as it appears in the PB request justification documents.

Moving down to the project level (figure 3) we start to see the level of detail provided by the justification documents. The first arrow and corresponding box shows the name of a project, its unique alphanumeric identifier, and the funding for that project. The next set of arrows show what we have classified as "sub-projects" which include information on specific plans for the current and next fiscal years as well as the associated funding for these efforts. You will note that at the sub-project level, funding is only provided for the next fiscal year as well as the two previous fiscal years.

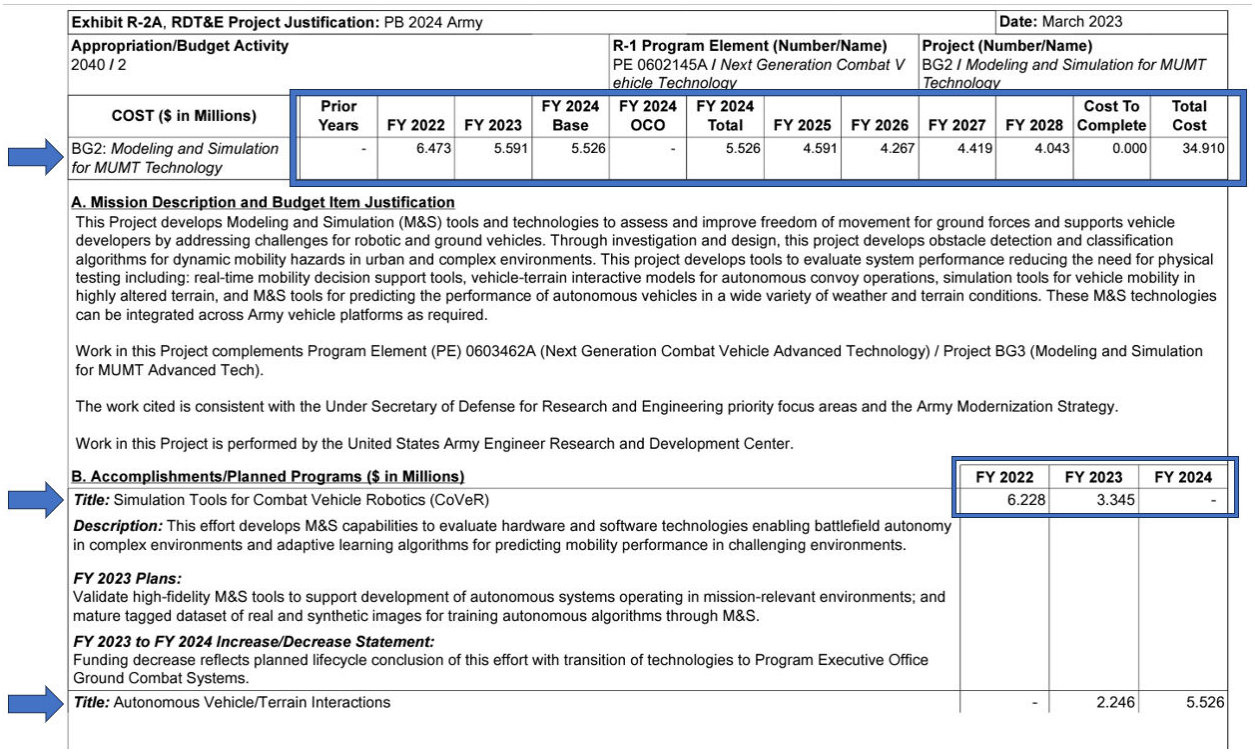


Exhibit R-2A, RDT&E Project Justification: PB 2024 Army | **Date:** March 2023

Appropriation/Budget Activity
2040 / 2

R-1 Program Element (Number/Name)
PE 0602145A / *Next Generation Combat Vehicle Technology*

Project (Number/Name)
BG2 / *Modeling and Simulation for MUMT Technology*

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
BG2: *Modeling and Simulation for MUMT Technology*	-	6.473	5.591	5.526	-	5.526	4.591	4.267	4.419	4.043	0.000	34.910

A. Mission Description and Budget Item Justification

This Project develops Modeling and Simulation (M&S) tools and technologies to assess and improve freedom of movement for ground forces and supports vehicle developers by addressing challenges for robotic and ground vehicles. Through investigation and design, this project develops obstacle detection and classification algorithms for dynamic mobility hazards in urban and complex environments. This project develops tools to evaluate system performance reducing the need for physical testing including: real-time mobility decision support tools, vehicle-terrain interactive models for autonomous convoy operations, simulation tools for vehicle mobility in highly altered terrain, and M&S tools for predicting the performance of autonomous vehicles in a wide variety of weather and terrain conditions. These M&S technologies can be integrated across Army vehicle platforms as required.

Work in this Project complements Program Element (PE) 0603462A (Next Generation Combat Vehicle Advanced Technology) / Project BG3 (Modeling and Simulation for MUMT Advanced Tech).

The work cited is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Simulation Tools for Combat Vehicle Robotics (CoVeR)	6.228	3.345	-
Description: This effort develops M&S capabilities to evaluate hardware and software technologies enabling battlefield autonomy in complex environments and adaptive learning algorithms for predicting mobility performance in challenging environments. ***FY 2023 Plans:*** Validate high-fidelity M&S tools to support development of autonomous systems operating in mission-relevant environments; and mature tagged dataset of real and synthetic images for training autonomous algorithms through M&S. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding decrease reflects planned lifecycle conclusion of this effort with transition of technologies to Program Executive Office Ground Combat Systems.			
Title: Autonomous Vehicle/Terrain Interactions	-	2.246	5.526

Figure 2: An example of an RDT&E project as it appears in the PB request justification documents.

Introduction – Procurement

Procurement Structure

The structure for procurement is somewhat similar as shown in figure 4. Again, you will find the appropriation type, budget activity, as well as the name and alphanumeric unique identifier for the line item. Below that are the funding totals for the line item (called "Total Obligation Authority") and at the bottom are the constituent cost elements which shows the various systems being procured as well as their unit cost, quantity, and total cost.

Exhibit P-40, Budget Line Item Justification: PB 2024 Navy | **Date:** March 2023

Appropriation / Budget Activity / Budget Sub Activity: 1810N: Other Procurement, Navy / BA 01: Ships Support Equipment / BSA 15: Other Ship Support

P-1 Line Item Number / Title: 1611 / Small & Medium UUV

ID Code (A=Service Ready, B=Not Service Ready): A | **Program Elements for Code B Items:** 0604218N, 0604028N | **Other Related Program Elements:** N/A

Line Item MDAP/MAIS Code: N/A

Resource Summary	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	To Complete	Total
Procurement Quantity *(Units in Each)*	-	-	-	-	-	-	-	-	-	-	-	-
Gross/Weapon System Cost *($ in Millions)*	66.132	44.534	49.763	61.951	0.000	61.951	47.916	68.156	107.839	102.724	Continuing	Continuing
Less PY Advance Procurement *($ in Millions)*	-	-	-	-	-	-	-	-	-	-	-	-
Net Procurement (P-1) *($ in Millions)*	66.132	44.534	49.763	61.951	0.000	61.951	47.916	68.156	107.839	102.724	Continuing	Continuing
Plus CY Advance Procurement *($ in Millions)*	-	-	-	-	-	-	-	-	-	-	-	-
Total Obligation Authority *($ in Millions)*	**66.132**	**44.534**	**49.763**	**61.951**	**0.000**	**61.951**	**47.916**	**68.156**	**107.839**	**102.724**	**Continuing**	**Continuing**
(The following Resource Summary rows are for informational purposes only. The corresponding budget requests are documented elsewhere.)												
Initial Spares *($ in Millions)*	-	3.784	7.824	7.372	-	7.372	6.681	6.111	3.996	3.553	Continuing	Continuing
Flyaway Unit Cost *($ in Dollars)*	-	-	-	-	-	-	-	-	-	-	-	-
Gross/Weapon System Unit Cost *($ in Dollars)*	-	-	-	-	-	-	-	-	-	-	-	-

Note: Subtotals or Totals in this Exhibit P-5 may not be exact or sum exactly due to rounding.

Cost Elements	Prior Years			FY 2022			FY 2023			FY 2024 Base			FY 2024 OCO			FY 2024 Total		
	Unit Cost ($)	Qty (Each)	Total Cost ($ M)	Unit Cost ($)	Qty (Each)	Total Cost ($ M)	Unit Cost ($)	Qty (Each)	Total Cost ($ M)	Unit Cost ($)	Qty (Each)	Total Cost ($ M)	Unit Cost ($)	Qty (Each)	Total Cost ($ M)	Unit Cost ($)	Qty (Each)	Total Cost ($ M)
2.1.4) MK 18 MOD 2 Advanced Sensor Kits (ATLAS)[7] [4]	425,000.00	5	2.125	-	-	0.000	-	-	0.000	-	-	0.000	-	-	0.000	-	-	0.000
2.1.5) MK 18 Advanced Sensor Package (FLS)[7] [5]	-	-	0.000	1,080K	10	10.800	-	-	0.000	883,320.00	11	9.717	-	-	0.000	883,320.00	11	9.717
2.1.6) MK 18 Advanced Sensor Package (SAS)[7] [6]	-	-	0.000	1,612K	4	6.448	1,612K	5	8.060	-	-	0.000	-	-	0.000	-	-	0.000
2.1.7) MK 18 Advanced Sensor Package (VCM Kits)[7] [7]	-	-	0.000	150,000.00	18	2.700	-	-	0.000	-	-	0.000	-	-	0.000	-	-	0.000
2.1.8) MK 18 MOD 2 Retrofit Kits (Inc II)[7] [8]	1,258K	2	2.517	1,258K	3	3.775	-	-	0.000	-	-	0.000	-	-	0.000	-	-	0.000
2.1.9) MK 18 Family of Systems Production Engineering [9]	-	-	1.673	-	-	1.145	-	-	1.62	-	-	1.375	-	-	0.000	-	-	1.375
2.1.10) MK 18 MOD FoS OCO Reset [10]	-	-	2.946	-	-	0.000	-	-	0.000	-	-	0.000	-	-	0.000	-	-	0.000
2.1.11) MK18 Advanced Sensors Package Commercialization Transition Maturation [11]	-	-	0.000	-	-	3.224	-	-	1.61	-	-	0.000	-	-	0.000	-	-	0.000
Subtotal: Recurring Cost	-	-	*32.550*	-	-	*28.092*	-	-	*11.29*	-	-	*11.092*	-	-	*0.000*	-	-	*11.092*
Subtotal: Hardware - SN200 MK 18 UUV FAMILY OF SYSTEMS Cost	-	-	***32.550***	-	-	***28.092***	-	-	***11.29***	-	-	***11.092***	-	-	***0.000***	-	-	***11.092***

Figure 3: Example of a Procurement line item as it appears in the PB request justification documents.

Introduction – NDAA and Appropriations

NDAA and Appropriations Structure

The last budgetary document that will be investigated with regard to structure is the changes that are established through the NDAA and Consolidated Appropriations Act. When changes are made to any of the original PB requests, these will be noted as shown in Figure 5. The (1) in red shows a change made to the MQ-1 UAV program with the bold text above indicating a requested amount of $0 from the PB and a final funding of $350 million. If no changes to the PB request are made, they will appear like the box labeled with the red (2) with the same amount in the budget request and the final bill.

EXPLANATION OF PROJECT LEVEL ADJUSTMENTS
[In thousands of dollars]

	P-1		Budget Request	Final Bill
	2	**MQ-1 UAV**	**0**	**350,000**
1		Program increase - 12 MQ-1C Gray Eagle Extended Range for the National Guard		350,000
2	5	**SMALL UNMANNED AIRCRAFT SYSTEMS**	**10,598**	**10,598**
	7	**AH-64 APACHE BLOCK IIIA REMAN**	**524,661**	**524,661**
	8	**AH-64 APACHE BLOCK IIIA REMAN (AP-CY)**	**169,218**	**169,218**
	10	**UH-60 BLACKHAWK M MODEL (MYP)**	**650,406**	**923,406**
		Program increase - ten UH-60M for the National Guard		273,000
	11	**UH-60 BLACKHAWK M MODEL (MYP) (AP-CY)**	**68,147**	**68,147**

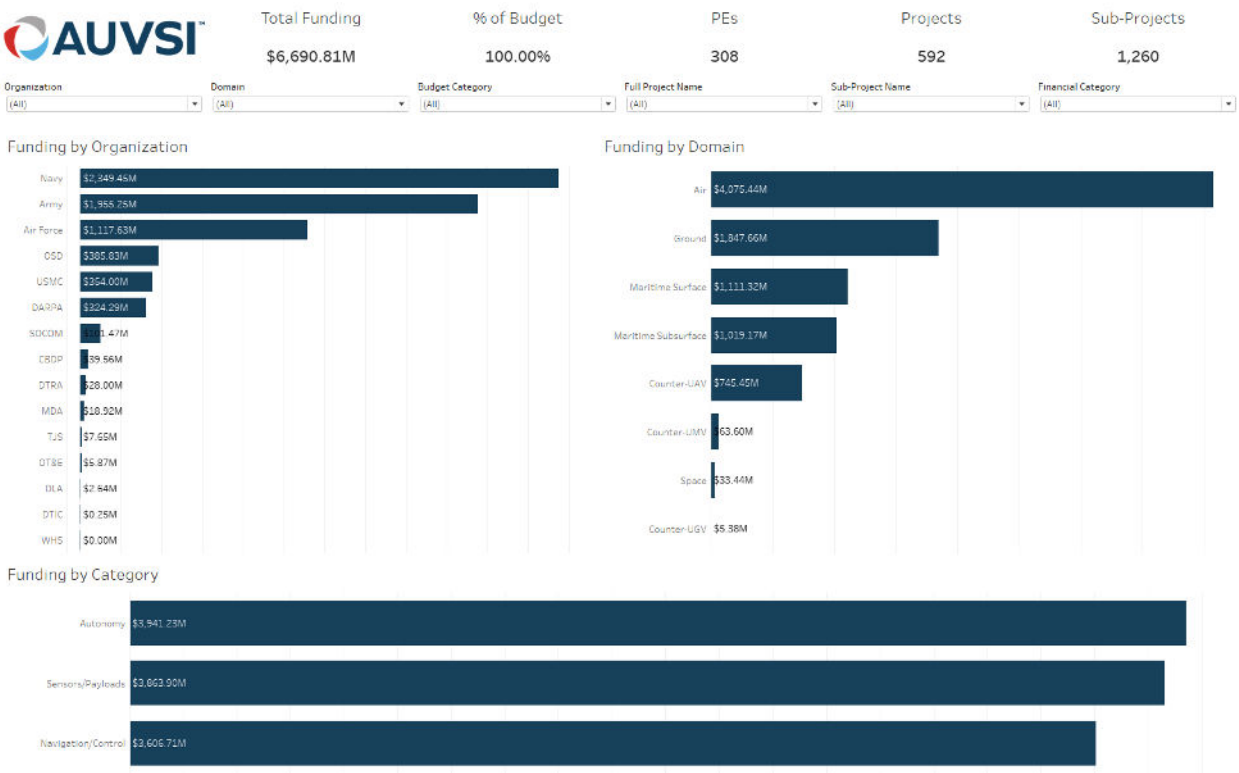
Figure 4: Congressional changes to the budget as they appear in the appropriation and authorization bills

Dashboard Descriptions

RDT&E Funding by Category

This dashboard represents the total FY 2024 RDT&E funding requested relative to the organization in the DoD; the domains being supported; and by specific categories associated with the systems and technologies being funded. At the top of this dashboard, you will find the total funding, the percentage of the overall RDT&E budget for UxV technologies, and the total number of program elements, projects, and sub-projects based on the filters applied. Below that are the range of filters that can be used. And finally. you will see the total UxV funding for each of the three primary categories (organizations, domains, and technologies).

Reference the "Notes" section provided on the first page of this workbook to understand what these totals represent for domains and technology categories.



RDT&E Funding by Category Cross-Section

This dashboard represents a cross-tabulation of the information displayed on the previous sheet. Using the three primary categories (domains, organization, and technology), we now see the funding under each cross-section. The first chart plots the funding for each organization relative to technology category, the second includes the technology category by domain, and the third shows the funding for each domain by organization. If you mouse over any of these values, it will show the further breakdown by the category not shown in the base chart. So, for technologies by organization, the breakdown by domain is displayed in the mouseover. Again, at the top of the page you will see the filters that can be applied, and the funding totals / program counts based on the filters used.

Reference the "Notes" section provided on the first page of this workbook to understand what these totals represent for domains and technology categories.

Funding Tech by Organizations

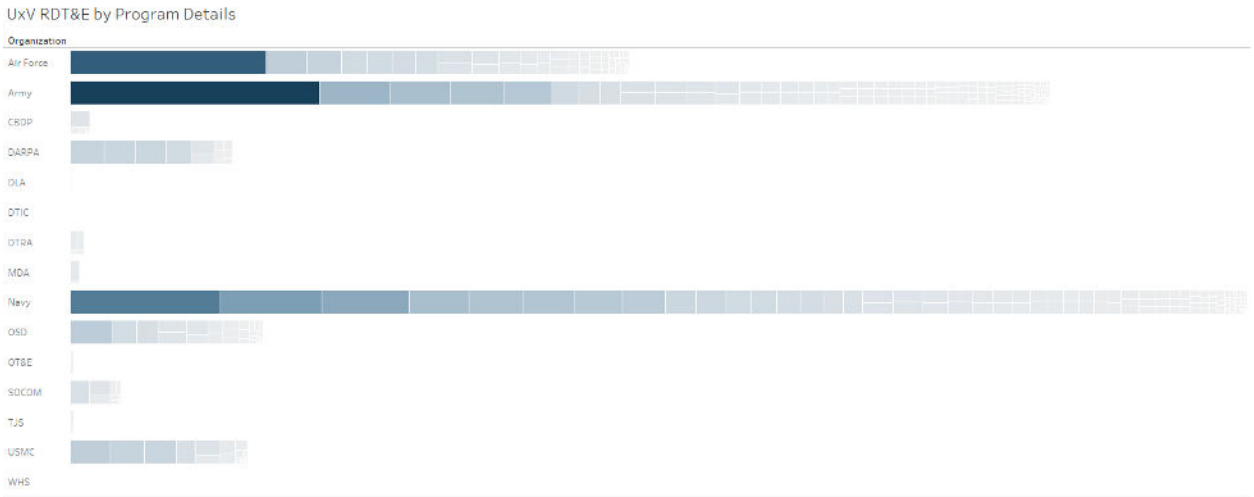
	Air Force	Army	CBDP	DARPA	DLA	DTIC	DTRA	MDA	Navy	OSD	OT&E	SOCOM	TJS	USMC	WHS
Autonomy	$926.1M	$1,183.2M	$4.2M	$210.5M	$2.6M		$10.1M		$1,122.4M	$237.3M	$5.9M	$30.2M		$209.8M	
Communications/Data Management	$753.9M	$370.9M		$57.7M					$1,013.5M	$141.2M		$18.5M	$0.4M	$113.3M	
Cyber	$11.8M	$154.6M				$0.3M			$429.2M	$29.1M	$5.9M	$13.1M	$4.6M	$30.8M	
Electronic Warfare	$140.3M	$138.5M							$247.8M	$75.8M		$2.2M	$4.6M	$37.0M	
Mobility		$186.5M		$49.7M					$36.3M	$9.9M		$13.1M		$69.0M	
MUM-T	$28.1M	$223.8M		$28.5M					$148.7M	$121.4M		$13.1M		$108.4M	
Navigation/Control	$832.2M	$1,023.0M	$1.6M	$169.3M	$2.6M		$6.0M		$1,191.4M	$168.5M		$72.8M	$0.0M	$185.3M	
Other Support	$44.3M	$131.6M	$0.6M	$2.9M		$0.3M		$2.1M	$345.1M	$41.9M		$6.2M		$16.3M	
Platform	$633.2M	$310.1M		$172.9M		$0.3M			$947.7M	$58.6M		$5.4M		$180.0M	
Propulsion/Energy	$134.9M	$70.1M		$95.5M					$301.2M	$58.9M		$14.4M		$38.2M	
Sensors/Payloads	$737.0M	$1,118.1M	$37.3M	$146.2M	$2.6M		$28.0M	$18.9M	$1,647.7M	$291.2M	$5.9M	$85.9M	$2.7M	$242.3M	$0.0M
Simulation	$113.7M	$746.4M	$2.3M	$142.4M					$318.0M	$109.1M	$5.9M		$5.4M	$3.5M	
Training	$175.9M	$2.3M							$268.7M	$20.5M		$42.6M	$0.8M	$13.1M	
Weapons	$614.9M	$449.1M		$62.7M				$18.9M	$368.2M	$48.9M	$5.9M	$61.1M	$2.7M	$218.7M	$0.0M

RDT&E Funding (PB) by Program

ThisThis dashboard shows the funding for each of the RDT&E initiatives supporting UxV technologies in FY 2024. The dashboard organizes this information in two ways:

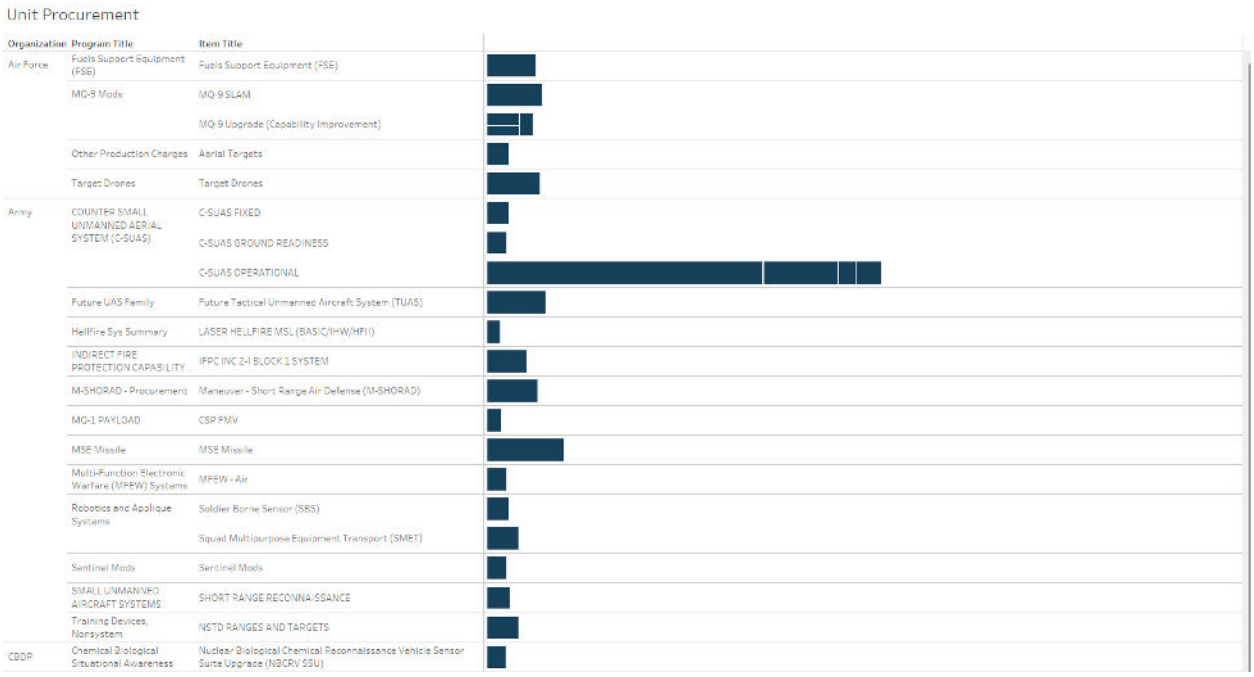
The first chart shows the organization that will receive funding and the boxes to the right are the programs supported by that organization. The boxes are sized and colored based on the funding amount (with the larger, darker boxes representing more funding compared to other boxes). Mousing over each box will show the breakdown of projects under each program and their requested funding in FY 2024.

The second chart again shows the organization that will receive funding but now includes columns for each Program Element > Project > Sub-Project and the funding at the sub-project level from FY 2019 – FY 2024. Hovering your mouse over the funding values in this chart will show notes captured from the last three President's budget requests and the UxV Relevance Coefficient that was used.



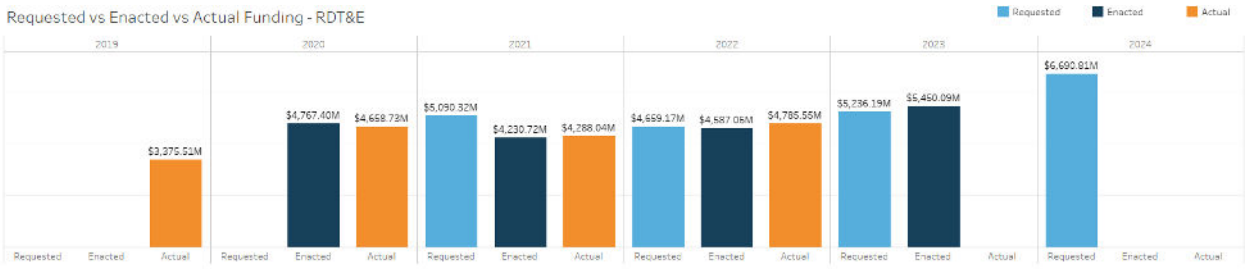
UxV Procurement by Program

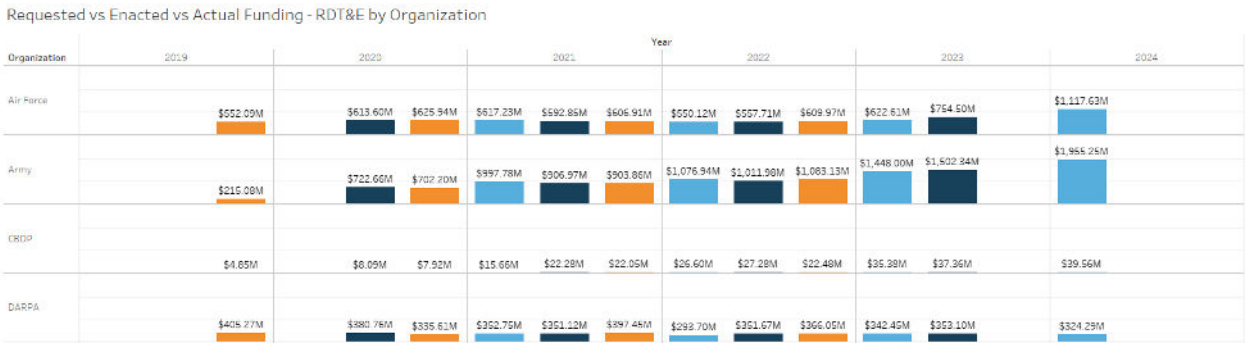
This dashboard shows FY 2024 procurement amounts for each overarching line item (referred to as a program) broken down into specific items and units under each item. The boxes in this table are sized relative to the unit value with the larger boxes representing a larger funding value relative to other boxes. The chart is sectioned by Organization > Program (Line Item) > Item Title > Unit. Hover your mouse over the Unit boxes for some additional information on requested acquisitions for FY 2024 including the unit cost, the number of units, and when provided, the contractors associated with the procurement and any comments regarding the procurement.



UxV Funding Trends (FY19-24)

This dashboard provides estimated UxV funding from FY 2019 to FY 2024 relative to the type of funding and the organization receiving funding. Each year shows the amount that was requested in the PB (starting in FY 2021) relative to the amount that was enacted in the final Appropriations bill. One note on this page, the requested funding will not match the totals on the previous dashboards because congressional additions established in the final Appropriations Act are not included in the requested funding. This data will be added during the next budget cycle once funding totals have been confirmed. For this budget cycle, changes from the original requested amounts are detailed in the next two dashboards.





Budget Changes Over Time

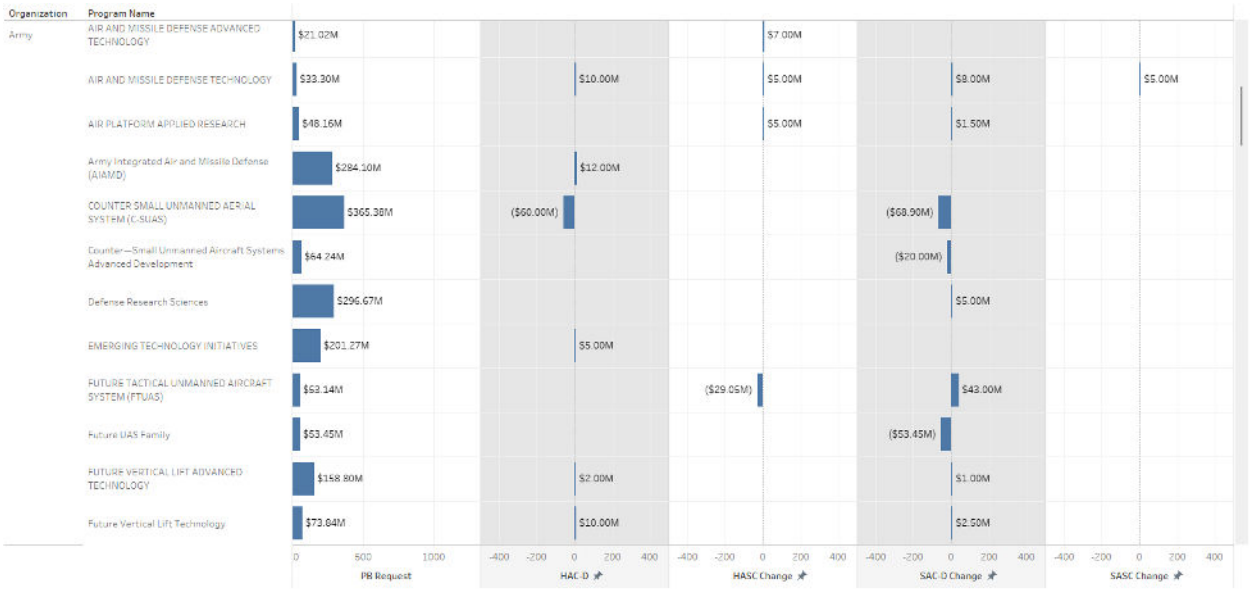
This dashboard shows each program supporting UxV RDT&E and procurement along with the requested funding from FY 2021 – 2024, the actual funding from FY 2019 – 2022, the enacted funding from FY 2020 – 2023, the difference between the requested/enacted/actual amounts, and the percent by which the funding was changed. A new filter has been added to this page called "Congressional Adjustment" which indicates whether congressional changes represent an increase, decrease, or cut/realignment from the originally requested amount. The FY 2024 enacted amounts will be populated with the next budget cycle for FY 2025.

Project Funding by Year

Organization	Funding Type	Project Name	Sub Project Name	Year o..	Requested	Enacted	Actual	Enacted Diffe..	Difference %	Difference Ca..
Air Force	RDT&E	ACQ and Command Support Integration	USAF Artificial Intelligence Accelerator at MIT	2024	$1.11M					
				2023	$1.50M	$1.35M		($0.15M)	-9.91%	($0.15M)
				2022	$0.00M	$1.50M	$1.50M	$1.50M		$1.50M
		Advanced Aerospace Sensors Technology	Surface Targets Sense-Making	2024	$15.00M					
		Aeromechanics	Aerodynamic Systems Technologies	2024	$5.07M					
				2023	$4.87M	$4.87M		$0.00M	0.00%	$0.00M
				2022	$3.37M	$3.37M	$1.88M	$0.00M	-44.12%	($1.49M)
				2021	$0.00M	$0.00M	$0.83M	$0.00M		$0.83M
				2020		$3.20M	$3.20M		0.00%	$0.00M
		Aerospace Power & Flight Control Technology	Advanced Flight Control Technologies	2021	$7.38M	$2.62M	$3.39M	($4.76M)	-54.05%	($3.99M)
			Flight Controls Technologies Modeling and Simulation	2021	$2.62M	$1.00M	$1.30M	($1.62M)	-54.09%	($1.53M)
			High Power System Technologies	2021	$4.04M	$0.80M	$1.08M	($3.24M)	-74.44%	($3.01M)
			Manned and Unmanned Teaming Technologies	2021	$19.18M	$6.82M	$8.81M	($12.36M)	-54.07%	($10.37M)
		Aerospace Power Technology	High Power System Technologies	2024	$19.80M					
				2023	$19.10M	$19.10M		$0.00M	0.00%	$0.00M
				2022	$18.78M	$18.78M	$20.05M	$0.00M	6.79%	$1.27M
				2021	$0.00M	$28.56M	$24.82M	$28.56M		$24.82M
				2020		$18.61M	$18.61M		0.00%	$0.00M
		AF Test Investments	Autonomy	2024	$1.50M					
				2023	$0.20M	$0.20M		$0.00M	0.00%	$0.00M
				2022	$0.20M	$0.20M	$0.20M	$0.00M	0.00%	$0.00M
				2021	$0.20M	$0.20M	$0.20M	$0.00M	0.00%	$0.00M
				2020		$0.20M	$0.20M		0.00%	$0.00M
			Directed Energy/Electronic Combat	2024	$2.00M					
				2023	$2.12M	$0.35M		($1.77M)	-83.47%	($1.77M)
				2022	$31.73M	$31.73M	$31.73M	$0.00M	0.00%	$0.00M
				2021	$44.52M	$44.52M	$44.52M	$0.00M	0.00%	$0.00M
				2020		$16.70M	$16.70M		0.00%	$0.00M
			T&E Range and Test Asset Modernization	2024	$0.87M					
				2023	$1.53M	$1.31M		($0.22M)	-14.19%	($0.22M)
				2022	$2.66M	$2.66M	$2.56M	$0.00M	-3.86%	($0.10M)
				2021	$3.19M	$3.17M	$3.11M	($0.01M)	-2.35%	($0.07M)
				2020		$1.79M	$1.77M		-1.44%	($0.03M)
		AFWERX Operations and Support	AFWERX Prime	2023	$0.00M	$36.98M		$36.98M		$36.98M
		AFWERX Prime	AFWERX Prime	2024	$35.17M					
			AFWERX Prime (formerly Agility Prime)	2023	$36.98M	$0.00M		($36.98M)	-100.00%	($36.98M)
				2022	$28.73M	$28.73M	$30.09M	$0.00M	4.71%	$1.35M
			Rapid Defense Experimentation Reserve	2024	$15.43M					

NDAA Committee Changes

This dashboard shows the changes that were made to the original PB request in two ways. The first chart titled "NDAA Process" shows the changes made by SASC, HASC, HAC-D, and SAC-D relative to the PB request. This comparison is made at the Program level (RDT&E) and Line Item level (procurement). The second chart, "NDAA Process – Subs," shows the same information but details the specific changes being made.



The Association for Uncrewed Vehicle Systems International, the world's largest nonprofit organization dedicated to the advancement of uncrewed systems and robotics, represents corporations and professionals from more than 60 countries involved in industry, government and academia. AUVSI members work in the defense, civil and commercial markets.

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