Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Office of the Secretary Of Defense	Date: March 2024
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603680D8Z *I Defense Wide Manufacturing Science and Technology Program*

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
Total Program Element	251.105	720.631	252.965	190.557	-	190.557	190.238	201.229	190.537	193.797	Continuing	Continuing
350: *Manufacturing Innovation Institutes*	146.958	522.669	112.728	138.878	-	138.878	135.656	143.922	133.833	136.123	Continuing	Continuing
351: *Manufacturing Education and Workforce Development*	3.993	9.813	5.101	5.739	-	5.739	5.953	6.243	6.177	6.282	Continuing	Continuing
680: *Manufacturing Science and Technology Program*	100.154	188.149	135.136	38.943	-	38.943	41.239	43.247	42.790	43.522	Continuing	Continuing
681: *Technology Industrial Base*	0.000	0.000	0.000	6.997	-	6.997	7.390	7.817	7.737	7.870	Continuing	Continuing

Note

New Start (Y/N): No

A. Mission Description and Budget Item Justification

This program supports the Department's initiatives to Build Sustainable and Long-Term Advantage and Build a Resilient Joint Force Defense Ecosystem.

The Defense-wide Manufacturing Science and Technology (DMS&T) program is the joint, defense-wide component of the Department of Defense (DoD) Manufacturing Technology (ManTech) Program directed in Title 10 U.S.C. Section 2521. DMS&T addresses joint, cross-cutting, and high-risk/high payoff technologies; manufacturing challenges within the DoD critical technology areas; and many of the recommendations in the Executive Order Report “Assessing and Strengthening the Manufacturing and Defense Industrial Base and Supply Chain Resiliency of the United States” September 2018.

The DMS&T program objective is to increase the speed at which innovation, inventions, and scientific discoveries are turned into equipment and capabilities through advances in manufacturing technologies and processes. The DMS&T program created and is sustaining a manufacturing innovation ecosystem via activities within four Program Element (PE) Project Codes: 350 - DoD Manufacturing Innovation Institutes (MIIs), 351 - Manufacturing Education and Workforce Development (M-EWD), 680 – Manufacturing Science and Technology Program (MSTP), and 681 – Technology Industrial Base (TIB).

Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Office of the Secretary Of Defense	Date: March 2024
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603680D8Z *I Defense Wide Manufacturing Science and Technology Program*

B. Program Change Summary ($ in Millions)	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
Previous President's Budget	747.442	252.965	163.036	-	163.036
Current President's Budget	720.631	252.965	190.557	-	190.557
Total Adjustments	-26.811	0.000	27.521	-	27.521
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-26.736	-			
• Program Adjustments	-0.075	-	20.922	-	20.922
• Economic Assumptions	-	-	0.384	-	0.384
• Internal Realignments	-	-	6.215	-	6.215

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2023	FY 2024
Project: 350: *Manufacturing Innovation Institutes*		
Congressional Add: *Direct Ink Writing of Advanced Thermoset Materials*	4.821	-
Congressional Add: *Additive Manufacturing Sustainability*	9.642	-
Congressional Add: *Flexible Hybrid Electronics*	5.785	-
Congressional Add: *Scalable Comprehensive Workforce Readiness Initiatives in Bioindustrial Manufacturing*	4.821	-
Congressional Add: *Bioindustrial Manufacturing Institutes*	289.269	-
Congressional Add: *Bioindustrial Manufacturing Matrix Development*	6.750	-
Congressional Add: *Multifunctional Bioindustrial Database Capability*	9.257	-
Congressional Add: *Operational Technology (OT) and Internet of Things (IoT) Asset Identification and Management*	4.821	-
Congressional Add: *Cybersecurity Maturity Model Certification (CMMC) Compliance for Cybersecurity in Manufacturing*	5.785	-
Congressional Add: *Supply Chain Adaptation of Artificial Intelligence (AI) and Robotics*	12.053	-
Congressional Add: *Difficult to Copy Manufacturing*	6.750	-
Congressional Add: *Next Generation Textiles (formerly "Domestic Textile Manufacturing")*	9.642	-
Congressional Add: *Data Analytics and Visualization System*	11.571	-
Congressional Add: *Hypersonics Enabling Manufacturing*	11.571	-

Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Office of the Secretary Of Defense	Date: March 2024
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603680D8Z *I Defense Wide Manufacturing Science and Technology Program*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2023	FY 2024
Congressional Add: *Additive Manufacturing Training (formerly El Paso Makes Contract Support for El Paso Manufacturers)*	5.014	-
Congressional Add Subtotals for Project: 350	397.552	-
Project: 351: *Manufacturing Education and Workforce Development*		
Congressional Add: *Manufacturing Industrial 4.0 Training Program*	4.821	-
Congressional Add Subtotals for Project: 351	4.821	-
Project: 680: *Manufacturing Science and Technology Program*		
Congressional Add: *Advanced Composites for Hypersonics Aided by Digital Engineering (MACH-ADE)*	4.821	-
Congressional Add: *Automated Manufacturing Technologies for Very High Temperature Composites*	4.821	-
Congressional Add: *Custom Electrolytes for Military Lithium-Ion Batteries*	9.642	-
Congressional Add: *Engineered Resilient Systems*	9.642	-
Congressional Add: *Microelectromechanical Systems (MEMS) Mirror-Based LiDAR Sensor*	2.893	-
Congressional Add: *Advanced Materials and Materials Manufacturing Processes*	5.785	-
Congressional Add: *High Temperature Composite Material Manufacturing*	9.642	-
Congressional Add: *Large Scale Manufacturing (formerly High Performance Computing (HPC) Enabled Advanced Manufacturing)*	24.107	-
Congressional Add Subtotals for Project: 680	71.353	-
Congressional Add Totals for all Projects	473.726	-

Change Summary Explanation

Funding increase of $6.215 million in FY 2025 realigned from PE 0605797D8Z to support Technology Industrial Base. Funding increase of $39.900 million in FY 2025 added to support manufacturing integration. $18.978 million reduction in FY 2025 was applied to meet DoD overall funding reductions, which were spread to mitigate impact. Funding increase of $0.384 million in FY 2025 for Economic Assumptions.

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense			Date: March 2024
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*	Project (Number/Name) 350 / *Manufacturing Innovation Institutes*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
350: *Manufacturing Innovation Institutes*	146.958	522.669	112.728	138.878	-	138.878	135.656	143.922	133.833	136.123	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project supports nine Department of Defense (DoD) led Manufacturing Innovation Institutes (MIIs) within the national Manufacturing USA network. The MIIs are public/private partnerships with members from industry, academia, and federal and state governments - including small and medium as well as large manufacturers - that address both commercial and defense manufacturing needs within specific, defense-relevant technology areas to mature manufacturing processes, build out a supporting ecosystem, and provide for manufacturing education and workforce development. The MIIs' flexible business models and strong focus on enabling highly collaborative research and development (R&D) are catalyzing important new organizational relationships across government, industry, and academia. MIIs bring together both traditional defense and non-traditional sectors to accelerate key innovation cycles, expand U.S. industrial capability, and assist in creating resilient supply chains that will support innovative defense products. Each MII consortium attracts partner funding to match DoD investments at a one-to-one ratio (or greater) and some offer state-of-the-art pilot facilities. MIIs receive active participation and support from the military departments and defense agencies and their members. The nine MII technology domain focus areas are: (1) America Makes (for additive manufacturing); (2) MxD (Manufacturing times Digital, for digital manufacturing, design and manufacturing cybersecurity); (3) LIFT (Lightweight Innovations For Tomorrow, for innovative processes to lightweight materials); (4) AIM Photonics (American Institute for Manufacturing Integrated Photonics, for photonic device manufacturing and packaging); (5) NextFlex (for flexible hybrid electronics manufacturing); (6) AFFOA (Advanced Functional Fabrics of America, for smart fibers and textiles); (7) BioFabUSA (for advanced regenerative tissue biofabrication); (8) ARM (Advanced Robotics Manufacturing, for smart collaborative robotics for manufacturing); and (9) BioMADE (for bioindustrial manufacturing of non-medical materials and products).

MII funding is focused on:
• Conducting pre-competitive applied research and development projects to reduce the cost, time, and technical uncertainty related to new manufacturing technologies and to improve existing technologies, processes, and products.
• Developing and implementing education, training, and workforce recruitment courses, materials, and programs.
• Developing innovative methodologies and practices for supply chain integration and introduction of new technologies into supply chains.
• Engaging with small and mid-sized manufacturers, including women and minority-owned manufacturing enterprises, and larger-sized manufacturing firms.

Each MII has a different model, with the following core tenets:
• Each MII is a public/private partnership with representatives from industry, academia, state and local governments, and the DoD that co-invest in world-leading technologies and capabilities.
• Each MII provides facilities to allow collaborative, precompetitive development of promising technologies and to promote the creation of stable and sustainable innovation ecosystems for advanced manufacturing.
• The partnership forming the MII must commit non-federal resources that equal or exceed the federal commitment.
• Each institute participates in the national Manufacturing USA network.

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*	**Project (Number/Name)** 350 / *Manufacturing Innovation Institutes*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: America Makes (Additive Manufacturing)	26.095	20.004	20.049
Description: America Makes' mission is to accelerate the adoption of additive manufacturing (AM) in the United States industrial base. Additive manufacturing (i.e., 3D printing) is a process of joining materials to make objects from 3D model data, usually layer upon layer, as opposed to subtractive manufacturing methodologies such as traditional machining. Additive manufacturing benefits the DoD by enabling lifecycle cost savings and enhanced capabilities including: distributing supply chains to enable the right part in the right place at the right time; improving mission readiness by producing work aids for DoD depots; replacing long-lead time and out of production spares, and enhancing lethality through production of lighter weight and higher performing parts than could otherwise be achieved with traditional manufacturing. ***FY 2024 Plans:*** Expand application of additive manufacturing methods and standards to address critical defense advanced manufacturing requirements and expand the additive manufacturing workforce. Leverage lessons learned from the FY 2023 castings and forgings efforts. ***FY 2025 Plans:*** Expand application of additive manufacturing methods and standards to address critical defense advanced manufacturing requirements and expand the additive manufacturing workforce. Explore how Additive Manufacturing can be utilized to help meet the nations climate goals through lightweighting, distributed manufacturing, and manufacturing at the point of need. Fill previously identified technology gaps to continue to support the castings and forgings industrial supply base. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** The increase of $0.045 million between FY 2024 and FY 2025 is the result of expanding the scope of the castings and forgings research project requirement in FY 2025 over FY 2024 plans.			
Title: MxD – Manufacturing times Digital (Digital Manufacturing, Design and Cybersecurity)	10.263	8.623	11.424
Description: MxD focuses on implementation of the Digital Thread; the unencumbered flow of data across the lifecycle of a manufactured product encompassing data from design, production, supply, sourcing, inventory, assembly, quality, maintenance, and sustainment. It includes analysis of data to reduce the time and cost of bringing new products to market. MxD eliminates barriers between design, manufacturing, and sustainment by using both product data and process data in a way that is seamless and transparent. ***FY 2024 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*	**Project (Number/Name)** 350 / *Manufacturing Innovation Institutes*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Continue projects to support the adoption and application of advanced digital and cybersecurity manufacturing solutions across the defense industrial base and grow the digital manufacturing workforce. ***FY 2025 Plans:*** Continue R&D projects to support the adoption and application of advanced digital and cybersecurity manufacturing solutions across the defense industrial base and grow the digital manufacturing workforce. MxD will expand efforts into digital and cybersecurity solutions for cast and forging supply chain. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** The increase of $2.801 million between FY 2024 and FY 2025 reflects the addition of funding for cyber infrastructure to address castings and forgings supply chain projects and to address related readiness, posture, and logistics requirements.			
Title: LIFT – Lightweight Innovations for Tomorrow (Lightweight Innovations – materials and processes) ***Description:*** LIFT develops American manufacturing technology and talent at the intersection of materials research, manufacturing processes, and systems engineering. LIFT's technology pillars include Integrated Computational Materials Engineering (ICME), Computational Engineering, Agile and Smarter Manufacturing, Advanced alloy and Process Development, and Multi-materials Joining. In addition, LIFT is working across the education continuum to prepare the future advanced manufacturing workforce with the knowledge, skills, and abilities necessary to use the technologies emerging from the institute. The goal is to catalyze the development of an advanced lightweight materials, a U.S. supplier base, and a workforce to enable DoD Warfighter systems and benefit commercial applications. ***FY 2024 Plans:*** Continue advanced materials and materials manufacturing R&D and materials workforce development. Support defense, commercial, and dual-use technology development via specific activities including hypersonic materials manufacturing, lightweighting of defense and commercial systems/components, advanced materials development, and advanced fabrication and manufacturing methods. Sustain LIFT's Learning/Talent Development Lab, expand DEI, and continue workforce development projects while targeting K-12, university students, current workforce, and separating military personnel. ***FY 2025 Plans:*** Continue advanced materials and materials manufacturing R&D and workforce development efforts. Support defense, commercial, and dual-use technology development through strategic and technology roadmaps for the Integrated Computational Materials Engineering (ICME) and Computational Engineering, Advanced Materials and Process Development, Agile and Smarter Manufacturing, and Multi-material Joining technology pillars. Conduct member and institute led technology projects and maintain a collaborative ecosystem. Examples of specific activities include hypersonic materials, powder alloy, and cold spray development. Sustain LIFT's Learning/Talent development Lab, expanding DEI, and continue workforce development efforts targeting K-12, university and community college students, current workforce, and separating military personnel. LIFT will apply materials	10.619	8.942	11.744

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*	**Project (Number/Name)** 350 / *Manufacturing Innovation Institutes*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
development and processing expertise through Integrated Computational Materials Engineering and materials development to improve the casting and forging supply chain. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** The increase of $2.802 million between FY 2024 and FY 2025 reflects addition of funding for Integrated Computational Materials Engineering (ICME) to address castings and forgings supply chain projects at LIFT and to address related readiness, posture, and logistics requirements.			
Title: AIM – American Institute for Manufacturing Photonics (Integrated Photonics Device Manufacturing and Packaging) ***Description:*** Integrated photonic circuit manufacturing advances the promise of unprecedented interconnection between electronics and photonics that will deliver world-class performance in speed, density, and power consumption. Photonics provides differentiating benefits for defense applications such as high-speed signal processing; electronic warfare; position, navigation, and timing; information transport and computation; sensing; imaging; and targeting. AIM Photonics has established an end-to-end U.S. 'ecosystem' for advancing domestic integrated photonics manufacturing, including access to a responsive integrated photonic circuit fabrication foundry. AIM Photonics provides the world's most accessible 300 mm silicon photonics multi-project wafer service, state-of-the-art process design, and a highly advanced test, assembly, and packaging (TAP), facility. ***FY 2024 Plans:*** Continue to advance integrated photonic circuit manufacturing R&D, photonic-microelectronics packaging solutions, and application design opportunities for the integrated photonics workforce. AIM will offer core capabilities including silicon photonics multi-project wafer runs, train new designers while seeking greater DEI, improve the use of its test, assembly, and packaging (TAP) facility, provide laser solutions to its members, advance low-loss platforms for sensing and quantum applications, and extend photonics-based climate change projects to strengthen the integrated photonic circuit ecosystem and workforce. ***FY 2025 Plans:*** Continue to develop and offer next-generation integrated photonic circuit fabrication and test, assembly, and packaging (TAP) capabilities to the U.S. ecosystem. Extend design and training opportunities to continue to grow the overall integrated photonic circuit ecosystem. Perform targeted work to mitigate climate change, improve the variety and performance of laser solutions, and expand accessibility to low-loss platforms for sensing and quantum applications. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** The increase of $2.089 million between FY 2024 and FY 2025 reflects addition of funding to extend design and training opportunities and increase the test, assembly, and packaging (TAP) facility capabilities and to address related readiness, posture, and logistics requirements.	20.298	17.858	19.948
Title: NextFlex Manufacturing Innovation Institute (Flexible Hybrid Electronics Manufacturing)	11.185	9.659	11.704

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*	**Project (Number/Name)** 350 / *Manufacturing Innovation Institutes*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Description: Flexible hybrid electronics manufacturing involves highly tailorable devices on non-traditional, compliant substrates that combine thinned components manufactured from traditional processes with components added via "printing" processes. NextFlex invests in prototyping and scale-up of manufacturing processes for high-speed pick-and-place, printed circuits, and hybrid fabrication to enable defense and commercial applications in wearable electronics, unattended sensors, integrated array antennas, medical devices, and soft robotics devices. NextFlex is also committed to continuous improvement in SWAPC (Size, Weight And Power plus Cost) for electronic systems. ***FY 2024 Plans:*** Continue to advance manufacturing methods for flexible hybrid electronics (FHE) to address defense critical technology areas and provide solutions to help grow the microelectronics workforce. NextFlex will adapt its roadmaps to improve manufacturing process reliability and performance standards, deliver DoD-relevant prototypes, expand FlexFactor education programs while leveraging diversity, equity, and inclusion (DEI), and continue pursuit of sustainable FHE to mitigate climate change. ***FY 2025 Plans:*** Expand advanced manufacturing for flexible hybrid electronics to align yield and reliability with standards and to meet critical technology areas and grow semiconductor workforce. NextFlex will address next roadmap gaps to deliver prototypes for DoD applications, improve flexible hybrid electronics manufacturing to refine standards, expand workforce programs supporting military industries, and conduct the next phase of climate mitigation projects to reduce printed circuit board waste and assist the domestic manufacturing base. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** The increase of $2.045 million between FY 2024 and FY 2025 reflects addition of funding to expand workforce programs supporting and deliver additional prototypes for DoD applications and to address related readiness, posture, and logistics requirements.			
Title: Advanced Functional Fabrics of America (Smart Fibers and Textiles) (AFFOA)	8.357	7.074	9.108
Description: AFFOA accelerates transformation of the manufacture of traditional fibers, yarns, and textiles into highly sophisticated, integrated, and networked devices and systems. It is helping to convert the domestic textile industry into one differentiated by Intellectual Property (IP) and value-added technology. AFFOA mission outcomes will lead to highly functional fabrics that provide valuable services: fabrics that see, hear, sense, communicate, store and convert energy, regulate temperature, monitor health, and change color. AFFOA is translating these outcomes into new and improved textiles that benefit the warfighter as well as the commercial consumer. ***FY 2024 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*	**Project (Number/Name)** 350 / *Manufacturing Innovation Institutes*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Continue to improve manufacturing methods for highly functional fabrics that benefit the warfighter and expand training opportunities for an advanced fiber and textile manufacturing workforce. AFFOA will continue to enable DoD and DIB partners increased access to AFFOA's organic fabric prototyping and advanced textile system integration capabilities; cultivate membership supply chains to support DoD capability needs; develop strategic university education, internships, and regional vocational training while leveraging DEI; and conduct select clothing and textile fiber projects to mitigate climate change. ***FY 2025 Plans:*** Continue to improve manufacturing methods for highly functional fabrics that benefit the warfighter and expand training opportunities for an advanced fiber and textile manufacturing workforce. Continue to enable DoD and DIB partners' increased access to AFFOA's organic prototyping and advanced textile system integration capabilities to de-risk technologies and increase manufacturing readiness. Technology projects and ecosystem development will focus on manufacturing modernization through digital engineering, prototype manufacturing of Warfighter enhancement and protective systems, and developing and scaling of sustainable materials and processes. Maintain and grow the ecosystem and advanced fibers and fabric (AFF) supply chain to support DoD capability needs. Expand EWD programs through development of AFF manufacturing curriculum across the educational continuum, including workforce training, while leveraging DEI. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** The increase of $2.034 million between FY 2024 and FY 2025 reflects addition of funding to expand EWD programs and increase prototyping capabilities and to address related readiness, posture, and logistics requirements.			
Title: BioFabUSA Manufacturing Innovation Institute (regenerative tissue manufacturing) ***Description:*** BioFabUSA advances state-of-the-art human tissue manufacturing innovations in cell and biomaterial processing, bioprinting, automation, and non-destructive testing technologies. BioFabUSA is establishing a collaboration to mature tissue-related technology across manufacturing readiness levels (MRL) 4-7, enabling post-delivery assurance of tissue identity, viability, function, and efficacy. This MII is assembling a diverse and currently fragmented collection of industry practices and institutional knowledge across many disciplines (e.g., cell biology, bioengineering, materials science, analytical chemistry, robotics, and quality assurance). ***FY 2024 Plans:*** Continue to improve manufacturing methods for tissue engineered medical products and expand certification and credentialing programs for the biomanufacturing workforce. BioFabUSA will add sensor and automation technologies to improve the manufacturing platform and fund technology, therapeutic development, and education and workforce development (EWD) projects. BioFabUSA will leverage DEI to expand the biomanufacturing workforce and accelerate emerging EWD certification and credentialing programs. ***FY 2025 Plans:***	10.472	10.077	12.136

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Continue to enhance manufacturing methods and capabilities for tissue engineered medical products and expand certification and credentialing programs for the biomedical manufacturing workforce. BioFabUSA will increase automation and data collection of manufacturing processes, allowing enhanced abilities to evaluate the safety and efficacy of tissue engineered medical products. BioFabUSA will increase engagements with the Food & Drug Administration (FDA) to speed the transition of critical medical technologies to the clinic and commercial marketplace. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** The increase of $2.059 million between FY 2024 and FY 2025 reflects addition of funding to expand certification and credentialing programs and increase coordination with the Food & Drug Administration (FDA) and to address related readiness, posture, and logistics requirements.			
Title: Advanced Robotics Manufacturing (Smart Collaborative Robotics for Manufacturing)	4.739	8.991	12.289
Description: Improve U.S. manufacturing competitiveness through advancements in the smart collaborative robotics field. Technologies developed via Advanced Robotics Manufacturing (ARM) support advanced robotics capabilities to address DoD requirements and improve U.S. manufacturer competitiveness with robotics. ARM is focusing on technologies enabling human robot interaction, and perfecting robotic adaption, learning, manipulation, autonomy, mobility, and perception. ***FY 2024 Plans:*** Continue R&D investments in advanced robotics manufacturing that support defense critical technology areas and develop a competent robotics workforce. ARM will invest in technical projects to improve automated manufacturing capabilities and facilitate adoption by the organic and industrial base. ARM will also develop robotic competencies, credentialing, apprenticeships, and tools for the robotics manufacturing workforce while seeking to expand DEI. ***FY 2025 Plans:*** Continue R&D investments in advanced robotics and associated artificial intelligence (AI) technologies for manufacturing that support defense critical technology areas and develop/sustain a competent robotics workforce. Technology projects and ecosystem development will focus in the DoD modernization areas of AI, Autonomy, Hypersonics, and Space. Additional planned technology projects target implementation of advanced robotics for casting and forging, and energetics manufacturing for both the Defense Industrial Base (DIB) and the Organic Industrial Base (OIB). Education and workforce development projects will further enhance the roboticscareer.org virtual toolset, and conduct analytical studies to address the needs of the DIB and the OIB. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** The increase of $3.298 million between FY 2024 and FY 2025 reflects the addition of funding for robotics and automation to address casting and forging supply projects, projects addressing automation for energetics manufacturing, and additional studies/ projects in workforce development for Organic Industrial Base (OIB) modernization activities related to advanced robotics			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
and artificial intelligence (AI) necessary competencies. The increase also addresses related readiness, posture, and logistics requirements.			
Title: BioMADE Manufacturing Innovation Institute ***Description:*** : The BioMADE MII promises to deliver a new class of manufacturing with domestic capabilities to manufacture critical resources with increased supply chain security. Bioindustrial manufacturing also has the potential to create entirely new classes of products with primary defense applications, such as chemicals and materials with advanced properties for use in austere environments. Bioindustrial manufacturing addresses defense priorities and offers commercial potential for innovations in food, agriculture, fuels, industrial chemicals, and other consumer products that will create new opportunities for U.S. manufacturers. ***FY 2024 Plans:*** Increase bioindustrial technical project calls to overcome scale-up, commercialization, and deployment challenges for bio-manufactured products. Continue maturing defense applicable biomanufactured products which could align with future distributed manufacturing enabled by modular bioindustrial and reusable (MEMBR) assets to prepare for the construction and operation of regional facilities to demonstrate bioindustrial solutions for defense critical products. ***FY 2025 Plans:*** Continue progress on infrastructure investments for bioindustrial manufacturing, conduct project calls to address bioindustrial technical challenges as well as workforce development and biosafety, biosecurity, sustainability, and social responsibility. Execute Bioindustrial Innovations to Mitigate Climate Change & Secure Critical Supply Chains and conduct Distributed Manufacturing. Enabled by Modular Bioindustrial & Reusable (MEMBR) Assets - Piloting, Analysis, and Challenge projects. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** The increase of $8.694 million between FY 2024 and FY 2025 is for Distributed Manufacturing Enabled by Modular Bioindustrial & Reusable (MEMBR) Assets - Piloting, Analysis, and Challenge projects and .addresses related readiness, posture, and logistics requirements.	23.089	21.500	30.476
Accomplishments/Planned Programs Subtotals	125.117	112.728	138.878

	FY 2023	FY 2024
Congressional Add: Direct Ink Writing of Advanced Thermoset Materials	4.821	-
FY 2023 Accomplishments: America Makes partner JuggerBot 3D LLC, located in Youngstown Ohio, has developed an innovative industrial 3D printing solution with proprietary programming that incorporates a state-of-the-art ink extrusion method known as Direct Ink Write. This technology is uniquely capable of processing		

	FY 2023	FY 2024
advanced thermoset materials like epoxies, polyurethanes, polyesters, silicones, and can vary the printed part composition to suit the functional need of the design (e.g., softer sealing material on a hard cover). The program to be executed via the America Makes MII will focus on achieving an efficient and stable production with thermoset materials and equipment at scale, integrating automation to mitigate operator interference and enable smart manufacturing. By optimizing the process and materials for Direct Ink Write 3D printing, the project will facilitate a more streamlined process for transferring technology and knowledge to commercial users.		
Congressional Add: Additive Manufacturing Sustainability ***FY 2023 Accomplishments:*** The additive manufacturing ecosystem enabled by the America Makes Manufacturing Innovation Institute (MII) will lead a multi-phased effort to develop statistically relevant materials data sets for the top three materials which exhibit the greatest impact for aerospace, automotive, defense, energy and medical sectors. In addition, this ecosystem will address additive manufacturing process repeatability and product transferability leveraging a parallel multi-pronged approach.	9.642	-
Congressional Add: Flexible Hybrid Electronics ***FY 2023 Accomplishments:*** The NextFlex Manufacturing Innovation Institute (MII) will execute additional projects to enhance technology at the intersection of flexible hybrid electronics (FHE), semiconductor packaging, and electronics assembly. The projects will include increased support for the NextFlex Regional Nodes (including in New York and Massachusetts). NextFlex will share results and manufacturing know-how with the U.S. FHE ecosystem through its consortium activities, including transitioning manufacturing processes from developers and the NextFlex Technology Hub to U.S. manufacturers. To support workforce development, NextFlex will build FHE curriculum modules and execute hands-on workshops (in collaboration with university partners) targeted at training incumbent workers to accelerate adoption and deployment of the technology.	5.785	-
Congressional Add: Scalable Comprehensive Workforce Readiness Initiatives in Bioindustrial Manufacturing ***FY 2023 Accomplishments:*** Address the skilled technical labor required for a growing biomanufacturing industrial base by using a modular and scalable approach executable across multiple regions. It includes: (1) Design, development, and expansion of skilled technical workforce training programs in biomass, upstream, and downstream bioprocessing. These will capitalize on existing instructional facilities, resources, and capabilities of BioMADE members in target regions to enhance existing programs in upstream and downstream bioprocessing. Support instructional content creation, reagents, supplies, teaching, and support staff to create and assess instruction for technical education and programming in bioindustrial manufacturing. (2) Soldier to Scientist: Develop instructional modules covering bioprocessing topics such as extraction, fermentation, upstream, downstream, and instrumentation. (3) Community-to-Career tiered-mentoring in science and technology (S&T)	4.821	-

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*	**Project (Number/Name)** 350 / *Manufacturing Innovation Institutes*

	FY 2023	FY 2024
for a resilient and sustainable workforce in bioindustrial manufacturing. Build a network of community-based organizations, educators, scientists, industry representatives, and other subject matter experts to guide science and technology-interested students towards careers in the bioindustrial manufacturing sector. Includes regional partners from the Engineering Biology Research Consortium and other stakeholders actively engaged in cross-disciplinary science, technology, engineering, and mathematics (STEM) education and mentoring. (4) Professional Development biomanufacturing training programs for workforce educators, incumbent, and adult learners. These efforts support equipment acquisition for training educators (train-the-trainer) for incumbent and adult learners. Instruction in the biomanufacturing lab will offer hands-on training and real-world exposure to operational procedures and technical skills development through retraining, retooling, and upskilling.		
Congressional Add: Bioindustrial Manufacturing Institutes	289.269	-
FY 2023 Accomplishments: The BioMADE Manufacturing Innovation Institute (MII) will initiate the development of a network of pilot-scale industrial biomanufacturing facilities to conduct research and development to improve the ability of the industrial base to assess, validate, and scale new, innovative bioindustrial manufacturing processes for the production of chemicals, materials, and other products necessary to support national security or secure fragile supply chains, thereby implementing Section 215 of the NDAA for FY 2023. Conduct an industry analysis to refine specific biomanufacturing infrastructure gaps (e.g., fermentation capacity, feedstock development, and downstream processing). Concurrently, establish multiple pilot-scale industrial biomanufacturing facilities across the United States to begin to resolve critical infrastructure shortages and to facilitate the transition from laboratory scale research to pilot-scale production of biomanufactured materials. Facilities will be available to the Department and the nation's bioindustrial manufacturing network – industry partners, their suppliers/customers, and the academic community – all with an eye towards hardening the defense industrial base, and further, catalyzing innovation and investment in this sector of the economy.		
Congressional Add: Bioindustrial Manufacturing Matrix Development	6.750	-
FY 2023 Accomplishments: Develop and pilot a bioindustrial product supply chain database and analysis system to enable BioMADE and its members to fully leverage domestic supply chains. The system portal will enable ad-hoc searches of a database representing the current and relevant capabilities, projects, and partners of all BioMADE members across local, state, and national scales. By enhancing the visibility of key capabilities within the ecosystem, the portal will facilitate collaborations between BioMADE members to strengthen bioindustrial manufacturing innovation and workforce development. Once BioMADE firmly establishes its value, this multi-sourced pilot portal can be enhanced with additional features including resiliency gap identification,		

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*	**Project (Number/Name)** 350 / *Manufacturing Innovation Institutes*

	FY 2023	FY 2024
cybersecurity self-assessment, compliance tracking, and customized opportunity identification. Subsequently it could be expanded to the other eight DoD Manufacturing Innovation Institutes.		
Congressional Add: Multifunctional Bioindustrial Database Capability	9.257	-
FY 2023 Accomplishments: Establish a secure, digital ecosystem for collaborative data exchange across the bioindustrial manufacturing community (industry, research and development labs, and DoD). The system will feature a flexible data core specialized to address the diverse data sharing, analysis, and search needs of the bioindustrial manufacturing community. Core database capabilities are (1) Secure data exchange (between industry, academia, and military service labs), (2) data warehousing (including chemical, biological, process data, and associated metadata), and (3) advanced analytics (artificial intelligence (AI) and machine learning (ML)), omics, biological and biomanufacturing models, techno-economic analysis, asset tracking, unit operation analysis, etc.). Phase 1 includes a functional data store with a secure application programming interface (API) to serve the diversity of data exchange and data storage needs expressed by the bioindustrial manufacturing community. Phase 2 establishes compute pipelines, automated data ingestion, user web interfaces, and analytical algorithms to produce a fully-featured data exchange solution for the industry. This enables International Organization for Standardization (ISO)-27001 certification to help foster adoption, and supports DoD and Service laboratory requirements for quality assured and sustainable access to a bioindustrial manufacturing ecosystem with capabilities to support critical national security needs.		
Congressional Add: Operational Technology (OT) and Internet of Things (IoT) Asset Identification and Management	4.821	-
FY 2023 Accomplishments: Operational Technology (OT) and Internet of Things (IoT) devices lack sufficiently rich fingerprint databases that can be used to support asset identification and management. While large databases exist to identify operating systems and even enumerate services running over Transmission Control Protocol/Internet Protocol. (TCP/IP), a common communications protocol, they do not offer the level of granularity needed to identify OT/IoT devices that may be running partial implementations of a TCP/IP stack or not even running an operating system. As OT and IoT environments proliferate, these assets may create a significant vulnerability to broader cyber attacks. The University of Tulsa, in cooperation with the Army Engineer Research and Development Center (ERDC), will develop a new hydro-electric testbed connected to the existing scaled electric power substation located the University of Tulsa's Critical Infrastructure Protection Lab to evaluate tools for asset identification in a combined electric power generation (new hydro-electric testbed) and distribution network (substation) environment over a wide range of use-cases. The project will investigate		

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*	**Project (Number/Name)** 350 / *Manufacturing Innovation Institutes*

	FY 2023	FY 2024
methods to detect, identify, and inventory components and services in a networked system and evaluate existing databases (e.g., nmap) to determine their accuracy in fingerprinting OT/IoT devices.		
Congressional Add: Cybersecurity Maturity Model Certification (CMMC) Compliance for Cybersecurity in Manufacturing ***FY 2023 Accomplishments:*** MxD, as the DoD-designated National Center for Cybersecurity in Manufacturing (NCCM), will create impactful, easy-to-acquire CMMC compliance resources to help small and medium-sized manufacturers (SMMs) achieve appropriate CMMC status, evaluate their current cyber posture by identifying opportunities to improve cyber hygiene, and provide appropriate tools to react to additional requirements from DoD and the Cyber Accreditation Body (formerly the CMMC-AB). MxD will provide a suite of resources for free to Small and Medium Manufacturers (SMMs) and Small and Medium Enterprises (SMEs) to help them comprehensively achieve and maintain all levels of CMMC compliance. MxD will work with the DoD, Department of Homeland Security, and Department of Commerce help SMMs and SMEs across the nation's industrial base to navigate cybersecurity compliance requirements.	5.785	-
Congressional Add: Supply Chain Adaptation of Artificial Intelligence (AI) and Robotics ***FY 2023 Accomplishments:*** Advanced Robotics for Manufacturing (ARM) Manufacturing Innovation Institute (MII), ARM members, and Carnegie Mellon University (CMU) will develop a new, core competency for identifying and extracting key data sets and developing in-depth, high quality, relevant abstractions of data across multiple robotics platforms that can be used as a service to advance the intelligence of machines. They will establish a Learning Laboratory in the Hazelwood Green Mill 19 facility operated by the CMU Manufacturing Futures Institute (MFI) and ARM. Catalyst Connection will work with project partners to establish the business model, equipment list, training programs, and communications and recruitment strategies for Small and Medium Manufacturers (SMMs) and their workers to take advantage of and utilize the learning lab. MFI and ARM will purchase and install equipment, hire staff to operate the learning laboratory, and provide trainers and related support.	12.053	-
Congressional Add: Difficult to Copy Manufacturing ***FY 2023 Accomplishments:*** Funds are being applied to projects to address manufacturing challenges across the supply chain including digital approaches to protect methods and improve processes at aging arsenals and depots; biomanufacturing projects to develop automated remote animal protein production workstreams and plan expansion of domestic bioindustrial manufacturing infrastructure; and application of additive manufacturing methods at larger scale to address Joint Additive Manufacturing Working Group priorities.	6.750	-
Congressional Add: Next Generation Textiles (formerly "Domestic Textile Manufacturing")	9.642	-

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*	**Project (Number/Name)** 350 / *Manufacturing Innovation Institutes*

	FY 2023	FY 2024
FY 2023 Accomplishments: During the second year of the ETIF project, in FY 2023 AFFOA will prototype and field test fabric shelter systems and a warfighter ensemble kit with fabric-integrated power, data, and environmental sensors with demonstrated low radio frequency (RF) signatures. Members of the AFFOA ecosystem will prototype and field test underwater tether systems with embedded sensors (temperature, pressure, salinity) for improved undersea situational awareness in support of critical Navy missions. The third ETIF project activity for FY 2023 will identify the technical specification of other high-temperature materials applications, such as hypersonics, to access further cost savings and utility of silica fabric technology.		
Congressional Add: Data Analytics and Visualization System ***FY 2023 Accomplishments:*** The FY 2023 Data Analytics and Visualization System program is expanding on FY 2022 project goals. The program is executing in three research focus areas with an overall objective of developing an automated intelligence-based quality assurance framework for advanced and additive manufacturing of metal components, new innovative high performance data analytics technologies to discover knowledge and gain insight into advanced manufacturing equipment performance and demonstrating those technologies for predicting future performance of advanced manufacturing equipment.	11.571	-
Congressional Add: Hypersonics Enabling Manufacturing ***FY 2023 Accomplishments:*** Advanced Manufacturing and Applied Research Innovation Institute (AMARII) plans to advance enabling technologies for hypersonic activities by providing prototype development of various elements required for hypersonic missions by establishing a prototyping facility for hypersonic applications. This facility would concentrate on developing and testing new enabling technologies for various elements of a hypersonic vehicle. The proposed effort would also seek to expand curriculum for undergraduate and postgraduate courses for hypersonic-related technologies. AMARII has assembled the National Center for Defense Manufacturing and Machining (NCDMM)/America Makes; the National Additive Manufacturing Innovation Institute; Youngstown State University (YSU) for additive manufacturing assistance and potential support of educational aspects; Ursa Major Technologies, the developer of an additively manufactured rocket engine that has already been successfully implemented on the X-60A hypersonic test vehicle; NASA Glenn, to provide wind tunnel capabilities; and University of Texas at El Paso (UTEP), to provide expertise in additive manufacturing of refractory materials and research efforts in other material systems. The Army's Long Range Precision Fires group will support in an advisory capacity and as a transition partner. They have recommended that future research topics include thermal management solutions for high-speed trajectories, affordable high temperature capable structural materials, modeling of material solutions in demanding environments and highly integrated, conformal sensor systems. The Army has also requested the program investigate potential additional topics including material modeling, analysis for air-breathing missile systems, ultra-high temperature insulation	11.571	-

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*	**Project (Number/Name)** 350 / *Manufacturing Innovation Institutes*

	FY 2023	FY 2024
materials, affordable ceramic matrix composites (CMCs), joining of CMC structures with functionally graded refractory high entropy alloys, complex thermal management solutions, printable electronics and radio frequency structures for highly integrated array sensor systems, reconfigurable antennas enabling multi-frequency operation, and Carbon/Silicon-Carbide (C/SiC) pre-impregnated (pre-preg) material development.		
Congressional Add: Additive Manufacturing Training (formerly El Paso Makes Contract Support for El Paso Manufacturers) ***FY 2023 Accomplishments:*** Driving Research, Innovation, and Value through Education in Additive Manufacturing (DRIVE AM) Youngstown, a partnership between the Youngstown State University (YSU), the University of Texas at El Paso (UTEP), Open Additive, LLC and the Youngstown Business Incubator (YBI), will be an extension of an established UTEP program created and implemented to produce a superior AM-educated military, domestic manufacturing workforce, and defense supply chain. DRIVE AM training offerings have varying levels of proficiency, each targeting soldiers, technicians, operators, engineers, Department of Defense (DoD) support personnel, personnel transitioning from the military, or veterans that are in active roles in the military or DoD, or in support of DoD through the defense manufacturing supply chain. DRIVE AM courses to be delivered under this project include: Introduction to Industrial Additive Manufacturing, Introduction to Additive Manufacturing Workflow, Laser Powder Bed Fusion Foundation, and Material Extrusion Foundation.	5.014	-
Congressional Adds Subtotals	397.552	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Each Manufacturing USA institute is established through a competitive selection process. The executing military department or agency, in close and continuous coordination with Office of the Under Secretary of Defense for Research and Engineering Manufacturing Technology Office (ManTech), publishes a formal solicitation (funding opportunity announcement) for proposals describing the scope of required activities and extensive proposal evaluation criteria. Non-Profit Organizations (including universities) are eligible to bid, and each bidder forms a broad consortium of industry and academic partners. The executing military department or agency, in close coordination with the Office of the Secretary of Defense (OSD), uses a team of government experts to evaluate each proposal against the evaluation criteria and selects a winning consortium. The final terms of the cooperative agreement/technology investment agreement between the selectee and the federal government are then negotiated and the Cooperative Agreement (CA) or Technology Investment Agreement (TIA) is signed. Throughout and after completion of this process, the federal government makes clear that members of non-selected teams are encouraged to join the selected consortium as conditions permit.

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense			Date: March 2024
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*	Project (Number/Name) 351 / *Manufacturing Education and Workforce Development*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
351: *Manufacturing Education and Workforce Development*	3.993	9.813	5.101	5.739	-	5.739	5.953	6.243	6.177	6.282	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Manufacturing Education and Workforce Development (M-EWD) provides strategic leadership of advanced manufacturing talent development within the Defense Industrial Base (DIB) with three mission objectives: (1) invest in strategic education and workforce development capabilities, (2) expand the talent acquisition pool to promote diversity equity and inclusion (DEI) in manufacturing careers, (3) modernize manufacturing EWD by driving action within DIB-critical regional economies with a focus on Career & Technical Education (CTE). The M-EWD project drives regional action to modernize manufacturing CTE for the U.S. and organic DIB, invests in strategic education and workforce development capabilities, and expands strategic leadership of advanced manufacturing human capital development.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Manufacturing Education and Workforce Development	4.992	5.101	5.739
Description: The Manufacturing Education and Workforce Development (M-EWD) project provides a strategic framework for DoD leadership of advanced manufacturing talent development and includes MII-led regional initiatives informed by labor market data profiles of regional economies, a pilot effort to develop an automated real-time labor market data portal, and launch of ManufacturingWorkforce.org, a dual-use digital learning platform with advanced manufacturing course offerings. ***FY 2024 Plans:*** Support development of whole-of-government EWD solutions applicable to the defense advanced manufacturing workforce. Expand Diversity, Equity, and Inclusion (DEI) in the manufacturing workforce by developing and adapting tailored curricula to expand participation opportunities and increasing the availability of instructional platforms and materials. ***FY 2025 Plans:*** Continue whole-of-government solutions in partnership with Interagency partners to tailor curricula for defense manufacturing, identify project successes within the Manufacturing Innovation Institutes (MII) ecosystems for replication and scale across the Manufacturing USA network, and establish ecosystem structures to meet defense manufacturing Career Technical Education (CTE) needs and scale to adjacent sectors. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** The increase of $0.627 million between FY 2024 and FY 2025 is a minor year-to-year variance and addresses related readiness, posture, and logistics requirements.			
Accomplishments/Planned Programs Subtotals	4.992	5.101	5.739

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*	**Project (Number/Name)** 351 / *Manufacturing Education and Workforce Development*

	FY 2023	FY 2024
Congressional Add: Manufacturing Industrial 4.0 Training Program	4.821	-
FY 2023 Accomplishments: This project will be executed across the DoD Manufacturing Innovation Insittute (MII) network, identifying targeted high-impact projects to increase fidelity of manufacturing training available to Industry 4.0 growth sectors. Projects will be executed via existing contractual arrangements with DoD MIIs and progress assessed quarterly to ensure timely impact to the growing field of Industry 4.0.		
Congressional Adds Subtotals	4.821	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense			Date: March 2024
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*	Project (Number/Name) 680 / *Manufacturing Science and Technology Program*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
680: *Manufacturing Science and Technology Program*	100.154	188.149	135.136	38.943	-	38.943	41.239	43.247	42.790	43.522	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Office of the Secretary Defense (OSD) Manufacturing Science and Technology Program (MSTP) concentrates on cross-cutting defense manufacturing needs that are beyond the ability of a single service to address. MSTP projects focus on cross-cutting defense manufacturing advancements and stimulate early development of manufacturing processes and enterprise business practices. The MSTP invests in broad technology initiatives within Advanced Electronics and Optics, Advanced Materials and Composites, Advanced and Emerging Manufacturing Processes, and Advanced Energetics Manufacturing.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Advanced Electronics and Optics	10.932	10.650	21.589

Description: Advanced Electronics and Optics is a series of efforts addressing advanced manufacturing technologies for a wide range of applications such as sensors, radars, power generation, switches, and optics for defense applications. Focal points are productivity and efficiency gains in the defense manufacturing base to accelerate delivery of technical capabilities to impact current warfighting operations, and manufacturing technologies to reduce the cost, acquisition time and risk to our major defense acquisition programs. Future efforts will focus on advances in fuel cells, lasers, enhanced acuity micro-displays, and transparent ceramics for opto-mechanical and armor applications.

FY 2024 Plans:

Fund Year 4 of 4 for Improved Photovoltaic Power for Space Applications, Year 3 of 3 for High Power Magnetron and Advanced High Yield Infrared Focal Plane Arrays, and Year 3 of 5 for TRISoC project. Utilize the annual project call to select and initiate projects that support the National Defense Strategy and DoD critical technology areas.

FY 2025 Plans:

Fund year 4 of 5 for Transmit/Receive Integrated System on a Chip (TRISoC) and Direct-Write Manufacturing for Conformal Antennas, Year 3 of 3 for CEPSIS, High Voltage Materials for Thermal Batteries, CMOS Signal for Hypersonic Platforms, BLADE, Year 2 of 2 for Focal Plane Array Output, Year 2 of 3 for Advanced Pulse Power Solutions, and Year 1 of 3 for Optically Based Enhancements for Accurate Mechanical Sensors (O-Beams) and Automated Manufacturing of Small Format Liquid Reserve Batteries.

FY 2024 to FY 2025 Increase/Decrease Statement:

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*	**Project (Number/Name)** 680 / *Manufacturing Science and Technology Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
The increase of $11.209 million between FY 2024 and FY 2025 reflects a significant re-phasing of Advanced Electronics and Optics projects that are supporting Directed Energy requirements and addresses related readiness, posture, and logistics requirements and funding for Economic Assumptions.			
Title: Advanced Materials and Composites ***Description:*** Advanced Materials and Composites is a series of efforts addressing advanced manufacturing technologies for a wide range of materials such as composites, metals, ceramics, nanomaterials, and metamaterials. Through productivity and efficiency gains, these manufacturing technologies will accelerate delivery of technical capabilities to impact current warfighting operations, while reducing the cost, acquisition time and risk of our major defense acquisition programs. Advanced materials manufacturing technologies undergoing development include materials for ballistic survivability and ballistic protection, survivability and rapid fabrication of structural components. ***FY 2024 Plans:*** Fund Year 3 of 5 for Self-Damping Structural Materials and Year 4 of 4 for Advanced Aeroshell Technology. Continue NRE RDT&E with existing propulsion Industrial Base, DoD Additive Manufacturing Working Groups, and MIIs to extrapolate hypersonics lessons-learned and scale to relevant HCM propulsion production. Extend coupon production, design of experiments, and integration activities for promising design parameters and build techniques for less complex but improved performance Scramjet combustor componentry. Fund Year 2 scramjet RDT&E to install and provide for the maintenance of large-format printers to meet capacity requirements. Utilize the annual project call to select and initiate projects that support the National Defense Strategy and DoD critical technology areas. ***FY 2025 Plans:*** Fund Year 3 of 3 for Self-Damping Structural Materials, Lightweight Hydrogen Fuel Cell Separator Plate Manufacturing, Year 3 of 4 for Mobile Fabrication and Repair, and Year 1 of 2 for Carbon Nanotube Fiber Cathodes for High Power Microwave Weapons for DoD. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** The decrease of $104.892 million reflects completion of the initial assessment and strategy development for the hypersonics industrial base conducted and accelerated significantly over FY 2023 and FY 2024.	95.539	114.227	9.029
Title: Advanced and Emerging Manufacturing Processes ***Description:*** Advanced and Emerging Manufacturing addresses advanced manufacturing technologies and business practices for defense applications. Key focus areas include direct digital (or additive) manufacturing, advanced manufacturing enterprise, machining, robotics, assembly, and joining. Projects selected will accelerate delivery of technical capabilities to impact current warfighting operations while reducing cost, acquisition time, and risk of major defense acquisition programs.	6.247	6.167	8.325

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*	**Project (Number/Name)** 680 / *Manufacturing Science and Technology Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
FY 2024 Plans: Fund Year 3 of 5 for Direct-Write Manufacturing for Conformal Antennas. Utilize the annual project call to select and initiate projects that support the National Defense Strategy and DoD critical technology areas. ***FY 2025 Plans:*** Fund Year 3 of 3 for Joint Clothing and Textile Manufacturing Initiative, Year 2 of 3 for Nutritionally Tailored Food at the Point of Need, Precision Optical Wind Sensor, and Year 1 of 5 for Harnessing Microbe-Sourced Cellulose for Advanced Fiber Manufacturing. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** The increase of $2.158 million between FY 2024 and FY 2025 reflects a minor re-phasing of Advanced and Emerging Manufacturing Processes projects and addresses related readiness, posture, and logistics requirements.			
Title: Advanced Energetics Manufacturing ***Description:*** Advanced Energetics Manufacturing develops improved manufacturing capabilities for safer, low cost, high quality production of existing and newly developed ingredients and composites used in energetic materials production. Develops techniques such as additive manufacturing, microfluidics, continuous processing, resonant acoustic mixing, robotics, etc. for production of critical energetics and supporting ingredients to ensure Department access to these materials and enable development of new, highly advanced energetic systems for improved range and performance. ***FY 2024 Plans:*** Identify advanced manufacturing RDT&E solutions for energetics community manufacturing challenges informed by DBX-1 project outcomes. Utilize the annual project call to select and initiate projects that support the National Defense Strategy and DoD critical technology areas. ***FY 2025 Plans:*** No planned efforts for Advanced Energetics Manufacturing in FY 2025. New proposals demonstrating technical merit may be considered in future subject to budget availability. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** The decrease of $4.092 million between FY 2024 and FY 2025 reflects completion of Advanced Energetics Manufacturing projects.	4.078	4.092	0.000
Accomplishments/Planned Programs Subtotals	116.796	135.136	38.943

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*	**Project (Number/Name)** 680 / *Manufacturing Science and Technology Program*

	FY 2023	FY 2024
Congressional Add: Advanced Composites for Hypersonics Aided by Digital Engineering (MACH-ADE) ***FY 2023 Accomplishments:*** Execution plan is being formulated in tandem with other hypersonic investments.	4.821	-
Congressional Add: Automated Manufacturing Technologies for Very High Temperature Composites ***FY 2023 Accomplishments:*** Execution plan is being formulated in tandem with other hypersonic investments.	4.821	-
Congressional Add: Custom Electrolytes for Military Lithium-Ion Batteries ***FY 2023 Accomplishments:*** Support the development of domestic manufacturing for Lithium-Ion battery electrolytes to remove reliance on foreign sources.	9.642	-
Congressional Add: Engineered Resilient Systems ***FY 2023 Accomplishments:*** Support the development of manufacturing systems with inherent durability in the face of supply chain disruptions through the implementation of advanced manufacturing techniques and fortified access to raw materials and manufacturing talent.	9.642	-
Congressional Add: Microelectromechanical Systems (MEMS) Mirror-Based LiDAR Sensor ***FY 2023 Accomplishments:*** Implement advanced manufacturing techniques and processes into manned and unmanned systems. Effort will allow cost-effective, high-resolution LiDAR systems to be provided throughout the DoD community.	2.893	-
Congressional Add: Advanced Materials and Materials Manufacturing Processes ***FY 2023 Accomplishments:*** Continue efforts initiated in FY 2022 and work through development and implementation of Cold Spray technologies within the Department of Defense.	5.785	-
Congressional Add: High Temperature Composite Material Manufacturing ***FY 2023 Accomplishments:*** Address manufacturability and scalability of carbon/carbon and other high temperature materials to meet requirements developed from Hypersonic platforms.	9.642	-
Congressional Add: Large Scale Manufacturing (formerly High Performance Computing (HPC) Enabled Advanced Manufacturing) ***FY 2023 Accomplishments:*** Continue efforts already underway with previous year funding. Effort being performed with support from Army ERDC and University of Maine. Use HPC in the additive manufacturing processes to avoid material mismatch over long-period printing.	24.107	-
Congressional Adds Subtotals	71.353	-

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*	**Project (Number/Name)** 680 / *Manufacturing Science and Technology Program*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

N/A

D. Acquisition Strategy

ManTech projects are awarded competitively through the DoD Service Laboratories. Approximately 1/3 of the total active topics are awarded to new initiatives annually.

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense			Date: March 2024
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*	Project (Number/Name) 681 / *Technology Industrial Base*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
681: *Technology Industrial Base*	0.000	0.000	0.000	6.997	-	6.997	7.390	7.817	7.737	7.870	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Realignment from PE 0605797D8Z P043 effective FY 2025

A. Mission Description and Budget Item Justification

Technology Industrial Base (TIB) provides support to technology leaders in identifying industrial innovation base needs; characterizing and assessing priority technology investments, identifying and mitigating issues and risks impacting the industrial innovation base, and exploiting opportunities to advance technology development, testing, and manufacturing. TIB efforts develop near- and long-term strategies and employ mechanisms to retain the U.S. advantage in current and emerging modernization technology priorities by addressing the capabilities of the industrial innovation base to develop, test, manufacture, and sustain them. One of TIB's main objectives is to create balance between promotion of the industrial innovation base while protecting the technology from interference or exploitation by competitors. This balance will aid the Department's advancing critical and emergent technologies ahead of competitor nations and actors while sustaining a healthy, resilient, and globally competitive industrial innovation base. This portfolio of activity extends efforts initiated in response to FY 2019 National Defense Authorization Act (NDAA) Section 1793.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Technology Industrial Innovation Base (TIB)	0.000	0.000	6.997
Description: This project uses a three-step approach: (1) Assess, (2) Protect/Promote; and (3) Monitor. In the first step, TIB uses emerging technology assessments to translate technology needs to manufacturing and industrial innovation base requirements to identify industrial innovation base issues, risks, and opportunities. TIB created an assessment methodology that incorporates four types of studies to provide a full overview of the technology from a manufacturing and industrial innovation base point of view. The results of the assessments are used to generate industrial-innovation-base inputs to technology roadmaps, develop an investment plan addressing the needs of the industrial innovation base, and create technology and industrial innovation base protection and promotion strategies (second step of the approach). TIB leverages DoD and Federal Government tools and initiatives to implement the strategies. In the third step, TIB uses data analytics to measure the success of mitigation and exploitation strategies, establish trends in the markets, and identify the need for additional assessments or changes in investments and strategies.			
FY 2024 Plans: FY 2024 projects were funded and executed via PE 0605797D8Z, Maintaining Technology Advantage, under P043, at a level of $6.685M			
FY 2025 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Office of the Secretary Of Defense		Date: March 2024
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*	**Project (Number/Name)** 681 / *Technology Industrial Base*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Continue to identify and execute industrial base assessments in support of priority technology areas across the DoD, ensuring industrial base support of next-generation capabilities. Assessments will identify opportunities for additional Research and Engineering investments to ensure a robust industrial base in advanced manufacturing for critical technology areas. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** The increase of $6.983 million between FY 2024 and FY 2025 is due to the transfer of P043 in PE 0605797D8Z / Maintaining Technology Advantage to better align the efforts within OUSD(R&E) in support of implementing the 2023 National Defense S&T Strategy and the 2022 National Defense Strategy. This also addresses related readiness, posture, and logistics requirements.			
Accomplishments/Planned Programs Subtotals	0.000	0.000	6.997

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A