Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Office of the Secretary Of Defense	Date: April 2022
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 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	1,190.629	237.098	255.244	256.142	-	256.142	248.589	153.356	143.212	145.690	-	-
680: *Manufacturing Science and Technology Program*	309.291	85.376	88.154	121.165	-	121.165	137.512	35.215	35.953	36.672	-	-
350: *Manufacturing Innovation Institutes*	881.338	151.722	163.097	129.798	-	129.798	105.887	112.951	102.069	103.725	-	-
351: *Manufacturing Education and Workforce Development*	0.000	0.000	3.993	5.179	-	5.179	5.190	5.190	5.190	5.293	-	-

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 Join 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 three Program Element (PE) Project Codes: 680 - Manufacturing Science and Technology Program (MSTP), 350 - DoD Manufacturing Innovation Institutes (MIIs), and 351 - Manufacturing Education and Workforce Development (M-EWD).

Project Code 680, Manufacturing Science and Technology Program (MSTP):
MSTP projects focus on cross-cutting defense manufacturing advancements and stimulates early development of manufacturing processes and enterprise business practices.

Project Code 350, DoD MIIs:
This project supports nine DoD-led MIIs within the national Manufacturing USA network, in accordance with mission requirements. MII technology domain focus areas are: (1) additive manufacturing; (2) digital manufacturing, design, and manufacturing cybersecurity; (3) lightweight materials; (4) integrated photonics; (5) flexible hybrid electronics; (6) smart fibers and textiles; (7) advanced tissue biofabrication; (8) advanced robotics for manufacturing; and (9) bioindustrial manufacturing. Each MII

is a public/private partnership with members from industry, academia, and federal and state governments that together mature manufacturing processes, build out a supporting ecosystem, and provide manufacturing education and workforce development. The consortia match DoD funding at a one to one ratio (or greater). They include small and medium as well as large manufacturers and state-of-the-art pilot facilities.

Project Code 351, Manufacturing Education and Workforce Development (M-EWD):
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), (3) modernize manufacturing EWD by driving action within DIB-critical regional economies with a focus on Career & Technical Education (CTE).

B. Program Change Summary ($ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	245.757	134.022	0.000	-	0.000
Current President's Budget	237.098	255.244	256.142	-	256.142
Total Adjustments	-8.659	121.222	256.142	-	256.142
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	121.645			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-8.612	-			
• Other reprogramming	-0.047	-	-	-	-
• FFRDC	-	-0.423	-	-	-
• Adjustments to Budget Year	-	-	129.724	-	129.724
• Economic Assumption	-	-	4.634	-	4.634
• Distributed Manufacturing Enabled by Modular Bioindustrial and Reusable (MEMBR) Assets	-	-	2.000	-	2.000
• DoD Casting and Forging Supply Chain	-	-	15.500	-	15.500
• Diversity, Equity, Inclusion, and Accessibility	-	-	5.484	-	5.484
• Green Tech	-	-	11.300	-	11.300
• Defense Advanced Battery Supply Chain	-	-	0.500	-	0.500
• Hypersonic Weapons Components	-	-	87.000	-	87.000

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2021	FY 2022
Project: 680: *Manufacturing Science and Technology Program*		

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Office of the Secretary Of Defense	Date: April 2022
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Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2021	FY 2022
Congressional Add: *High Temperature Carbon Composites Manufacturing*	7.000	3.000
Congressional Add: *Advanced Structural Manufacturing (FY20 title was "Advanced Manufacturing")*	7.500	-
Congressional Add: *Carbon Hypersonics Materials Industrial Base*	5.000	-
Congressional Add: *HPC enabled advanced manufacturing*	17.000	25.000
Congressional Add: *Hypersonics Advanced Manufacturing Technology Center*	25.000	-
Congressional Add: *Automation Engineering Technology Program*	-	1.981
Congressional Add: *Difficult to Copy Manufacturing*	-	7.000
Congressional Add: *Carbon Composites for Hypersonics*	-	3.000
Congressional Add: *Advanced Materials and Materials Manufacturing*	-	6.000
Congressional Add: *Virtual Reality-Enabled Smart Installation Experimentation*	-	5.000
Congressional Add: *Natural Gas Pipeline Pilot Study*	-	5.000
Congressional Add Subtotals for Project: 680	61.500	55.981
Project: 350: *Manufacturing Innovation Institutes*		
Congressional Add: *Program Increase*	26.000	9.000
Congressional Add: *Flexible Hybrid Electronics (FHE) (FY20 title was "Manufacturing Innovation Institutes")*	10.000	-
Congressional Add: *Advanced Manufacturing*	14.000	2.000
Congressional Add: *Cyber Initiatives*	3.000	-
Congressional Add: *Digital Manufacturing*	7.000	-
Congressional Add: *Additive Manufacturing Training Insertion*	2.000	-
Congressional Add: *Hypersonics Enabling Additive Manufacturing*	10.000	10.000
Congressional Add: *5G Manufacturing Testbed*	5.000	-
Congressional Add: *Manufacturing USA Institutes*	5.000	-
Congressional Add: *Hypersonics and Thermal Management*	5.000	5.000
Congressional Add: *Arsenal Supply Chain Security Proof of Concept*	3.500	-
Congressional Add: *Cybersecurity Manufacturing Innovation Park*	-	1.000
Congressional Add: *El Paso Makes K Support for El Paso Manufacturers*	-	0.964

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Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2021	FY 2022
Congressional Add: *Certification Based Workforce Training Programs for Manufacturing (Jobs of the Future)*	-	6.200
Congressional Add: *Silicon Based Lasers*	-	10.000
Congressional Add: *Domestic Textile Manufacturing*	-	7.500
Congressional Add: *Data Analytics and Visualization System*	-	12.000
Congressional Add: *Advanced Robotics and Automation Training*	-	2.000
Congressional Add Subtotals for Project: 350	90.500	65.664
Congressional Add Totals for all Projects	152.000	121.645

Change Summary Explanation

FY 2023 funding increase reflects the fact that the FY 2022 President's Budget request did not include out-year funding.

FY 2022 funding establishes multi-year funding for Manufacturing Education and Workforce Development initiatives under Project Code P351 and also fully funds the long-term strategic partnership with the Manufacturing Innovation Institutes across the Future Years Defense Program (FYDP).

Exhibit R-2A, RDT&E Project Justification: PB 2023 Office of the Secretary Of Defense			Date: April 2022
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 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
680: *Manufacturing Science and Technology Program*	309.291	85.376	88.154	121.165	-	121.165	137.512	35.215	35.953	36.672	-	-
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. 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 2021	FY 2022	FY 2023
Title: Advanced Electronics and Optics	8.879	8.750	11.341

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 2022 Plans:
Fund the final year of the Low-Cost Chip Scale Atomic Clock project and Year 2 of 4 of the Improved Photovoltaic Power for Space project. Utilize the annual project call to select and initiate projects that support the National Defense Strategy and DoD critical technology areas.

FY 2023 Plans:
Fund Year 3 of 4 for Improved Photovoltaic Power for Space Applications, Year 2 of 3 for High Power Magnetron and Advanced High Yield Infrared Focal Plane Arrays, and Year 2 of 5 for TRISoC project. Initiate foundational assessment of Defense Advanced Battery Supply Chain. Utilize the annual project call to select and initiate projects that support the National Defense Strategy and DoD critical technology areas.

FY 2022 to FY 2023 Increase/Decrease Statement:
Increase includes additional Advanced Electronics and Optics project investments begun in FY 2022 and an FY 2023 increase of $0.500 million to conduct manufacturing-specific assessments of the Defense Advanced Battery Supply Chain along with funding for DoD battery projects in PEs 0603342D8Z (Defense Innovation Unit (DIU)), 0605798D8Z (Defense Technology

Exhibit R-2A, RDT&E Project Justification: PB 2023 Office of the Secretary Of Defense		Date: April 2022
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 2021	FY 2022	FY 2023
Analysis), 0607210D8Z (Industrial Base Analysis and Sustainment Support), 0603724N (Navy Energy Program), 0603462A (Next Generation Combat Vehicle Advanced Technology), and 0901212N (Service-Wide Support (Not Otherwise Accounted For)).			
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 2022 Plans:*** Fund the MOC3HA initiative for Year 5 of 6 and the Hypersonic RF Seeker Window and Thermoplastic Composites projects will enter their final year of funding. Utilize the annual project call to select and initiate projects that support the National Defense Strategy and DoD critical technology areas. ***FY 2023 Plans:*** Fund final year of the Manufacturing of Carbon-Carbon Composites for Hypersonic Applications (MOC3HA) initiative, Year 2 of 5 for Self-Damping Structural Materials and Year 3 of 4 for Advanced Aeroshell Technology. Initiate non-recurring engineering (NRE) Research Development Test & Evaluation (RDT&E) in conjunction with existing propulsion Industrial Base, DoD Additive Manufacturing Working Groups, and Manufacturing Innovation Institutes to extrapolate hypersonics lessons-learned and scale to relevant hypersonic cruise missile (HCM) (e.g., Scramjet) propulsion production. Coupon production, Design of Experiments, and Integration activities will prove out design parameters and build techniques for reduced-complexity and improved performance Scramjet combustor componentry. This effort will set the stage for Year 2 scramjet RDT&E in FY 2024 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 2022 to FY 2023 Increase/Decrease Statement:*** Increase for assessment and strategy development for the hypersonics industrial base in conjunction with projects in Program Elements (PE) 0605518N (Conventional Prompt Strike (Navy)), 0607210D8Z (Industrial Base Analysis and Sustainment Support), 0603680F (Manufacturing Technology Program (Air Force)), and 0902199D8Z (Title III/Defense Production Act Purchases) to reduce the cost of hypersonics weapons materials and production in ongoing development programs.	6.725	12.755	99.112
Title: Advanced and Emerging Manufacturing Processes	4.594	6.550	6.481

Exhibit R-2A, RDT&E Project Justification: PB 2023 Office of the Secretary Of Defense		Date: April 2022
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
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. ***FY 2022 Plans:*** Lightweight Hydrogen Fuel Cell project will enter the final year of funding and Deformable Mirrors for High Energy Lasers will enter funding Year 2 of 3. Utilize the annual project call to select and initiate projects that support the National Defense Strategy and DoD critical technology areas. ***FY 2023 Plans:*** Fund final year of Deformable Mirrors for High Energy Lasers and Year 2 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 2022 to FY 2023 Increase/Decrease Statement:*** There is no significant change between FY 2022 and FY 2023.			
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 2022 Plans:*** The Infrared Countermeasures project will be in the final year of execution in FY 2022. Utilize the annual project call to select and initiate projects that support the National Defense Strategy and DoD critical technology areas. ***FY 2023 Plans:*** Fund final year of DBX-1 project. Utilize the annual project call to select and initiate projects that support the National Defense Strategy and DoD critical technology areas. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** There is no significant change between FY 2022 and FY 2023.	3.678	4.118	4.231
Accomplishments/Planned Programs Subtotals	23.876	32.173	121.165

Exhibit R-2A, RDT&E Project Justification: PB 2023 Office of the Secretary Of Defense		Date: April 2022
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 2021	FY 2022
Congressional Add: High Temperature Carbon Composites Manufacturing ***FY 2021 Accomplishments:*** Reduce the cost of preform construction and densification processes for Carbon/Carbon and Carbon/Silicon Carbide materials through process automation including densification automation, pitch crush automation, and weaving automation. Reduce the cost of inspection through digital x-ray and automated x-ray reading and advancements to computer tomography (CT) scanning capabilities as well as incorporate vision systems and automated inspection techniques. ***FY 2022 Plans:*** Execution strategy is being formulated and will align to previously funded efforts.	7.000	3.000
Congressional Add: Advanced Structural Manufacturing (FY20 title was "Advanced Manufacturing") ***FY 2021 Accomplishments:*** Continue development of advanced powder supply for cold-spray specific applications. Create a DoD-wide framework for qualification data sets to facilitate accelerated cold-spray approvals within DoD. Streamline site-installation approvals for cold spray capabilities at organic repair facilities throughout DoD.	7.500	-
Congressional Add: Carbon Hypersonics Materials Industrial Base ***FY 2021 Accomplishments:*** Reduce the cost and process variability of 3D Polar weaving through full automation of the weaving process. Hypersonic boosters and thermal protection system (TPS) systems require a polar weave due to the size and pressures. Currently this is a manual weaving process.	5.000	-
Congressional Add: HPC enabled advanced manufacturing ***FY 2021 Accomplishments:*** Cyber-harden the High-Performance Computing (HPC) on the edge devices to reduce vulnerability to attacks. Investigate non-intrusive acoustic or electromagnetic (XRAY, CT) technologies during the print process to detect voids, bubbles, etc. Finite element model analysis with respect to the physics differences involved as prints move from small scale to large scale. ***FY 2022 Plans:*** Execution strategy is being formulated and will align to previously funded efforts.	17.000	25.000
Congressional Add: Hypersonics Advanced Manufacturing Technology Center ***FY 2021 Accomplishments:*** Establish a large-scale classified manufacturing space to demonstrate scalability of manufacturing capabilities & capacity within the hypersonics ecosystem, and reduce risk for transition to production with design for manufacturing. Naval Surface Warfare Center Crane will manage a coordinated effort that leverages Purdue University facilities (e.g., wind tunnels) to engage in development activities to advance materials and manufacturing processes required to meet hypersonics needs. Requirements include flow &	25.000	-

Exhibit R-2A, RDT&E Project Justification: PB 2023 Office of the Secretary Of Defense		Date: April 2022
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	FY 2021	FY 2022
design optimization of multi-material systems, additive manufacturing of disparate material systems, joining of multi-material systems and components, and sub-assembly performance testing.		
Congressional Add: Automation Engineering Technology Program ***FY 2022 Plans:*** Execution strategy is being formulated.	-	1.981
Congressional Add: Difficult to Copy Manufacturing ***FY 2022 Plans:*** TBD - Execution Strategy is being formulated.	-	7.000
Congressional Add: Carbon Composites for Hypersonics ***FY 2022 Plans:*** TBD - Execution Strategy is being formulated.	-	3.000
Congressional Add: Advanced Materials and Materials Manufacturing ***FY 2022 Plans:*** TBD - Execution Strategy is being formulated.	-	6.000
Congressional Add: Virtual Reality-Enabled Smart Installation Experimentation ***FY 2022 Plans:*** TBD - Execution Strategy is being formulated.	-	5.000
Congressional Add: Natural Gas Pipeline Pilot Study ***FY 2022 Plans:*** TBD - Execution Strategy is being formulated.	-	5.000
Congressional Adds Subtotals	61.500	55.981

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 2023 Office of the Secretary Of Defense											Date: April 2022	
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 2021**	**FY 2022**	**FY 2023 Base**	**FY 2023 OCO**	**FY 2023 Total**	**FY 2024**	**FY 2025**	**FY 2026**	**FY 2027**	**Cost To Complete**	**Total Cost**
350: *Manufacturing Innovation Institutes*	881.338	151.722	163.097	129.798	-	129.798	105.887	112.951	102.069	103.725	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Department of Defense (DoD) supports nine Manufacturing Innovation Institutes (MIIs), public/private partnerships that address both commercial and defense manufacturing needs within specific, defense-relevant technology areas. MIIs receive active participation and support from the military departments and defense agencies and their members. 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.

DoD's nine MIIs are: (1) America Makes (for additive manufacturing); (2) MxD (Manufacturing times Digital, for digital manufacturing, design and 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 regenerative tissue manufacturing); (8) ARM (Advanced Robotics Manufacturing, for smart collaborative robotics for manufacturing); and (9) BioMADE (for biomanufacturing 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.

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: America Makes (Additive Manufacturing)	5.727	7.755	26.616
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 2022 Plans:*** Continue the long-term strategic partnership with America Makes to include additional project calls with America Makes members; education and workforce development activities, and support to DoD joint additive manufacturing activities. ***FY 2023 Plans:*** America Makes will continue to execute its mission by strategically advancing the development of AM design, material, process, and value chain technology, will secure human capital to deploy additive manufacturing, and will expand and support the AM ecosystem through standards development and targeted networking opportunities. Key new initiatives include a project for sustainable AM to mitigate climate change by improving engine thermal management, eliminating toxic, long-lead, and expensive materials like Beryllium in the production of optical components, or exploring novel application of AM technologies; Diversity, Equity, and Inclusion (DEI) in the AM workforce; and orientation of institute activity to increase support to Space, Power, and Energy sector stakeholder needs. Advance AM for castings by creating a castings roadmap and executing a certification-focused direct to metal AM for casting replacement project, studying effects of hybrid manufacturing adoption on casting capacity and cost, and demonstrating AM as an alternative to casting select parts. Explore AM for forging applications by creating a forgings roadmap, collecting data for AM state of practice, and maturing AM processes as an alternative to forging select parts. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** A $15.5 million increase funds castings and forgings research and a $1.5 million increase funds climate/green technology manufacturing projects. The increase also contributes to MII Diversity, Equity and Inclusion (DEI) projects for the manufacturing workforce and increases support for industry cost-matched initiatives for new projects.			
Title: MxD – Manufacturing times Digital (Digital Manufacturing, Design and Cybersecurity)	6.466	8.579	10.783
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			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
barriers between design, manufacturing, and sustainment by using both product data and process data in a way that is seamless and transparent. ***FY 2022 Plans:*** Continue the long-term strategic partnership with MxD by executing the recently awarded FY 2021 projects with the goal of advancing the cybersecurity of the manufacturing supply chain and driving new digital manufacturing technologies and capabilities across the U.S. manufacturing base. ***FY 2023 Plans:*** MxD will conduct proposal calls approximately every other month resulting in 5 new projects with a planned value of $10 million including cost share. MxD will conduct proposal workshops for each call and award projects in the technology thrust areas identified in the 2021-2023 Strategic Investment Plan. MxD plans to announce the commercialization of new digital manufacturing and design technologies and industry capabilities. MxD will significantly scale up commercialization, skill improvement, and workforce development efforts and expand DEI via research projects and relationships with other government agencies. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** The increase contributes to MII Diversity, Equity and Inclusion (DEI) projects for the manufacturing workforce, supports several new digital manufacturing and cyber initiatives, and continues investment in efforts initiated in FY 2022.			
Title: LIFT – Lightweight Innovations for Tomorrow (Lightweight Innovations – materials and processes) ***Description:*** Advanced lightweight material can retain properties comparable to heavier, traditional materials, and can enable weight reduction in a variety of components and products with significant energy savings and increased payloads. Scale-up research across multiple areas to accelerate market expansion by applying an integrated materials and manufacturing approach, will address a lack of design guides and certifications as well as affordability and scale-up challenges. The goal is to catalyze the development of an advanced lightweight material U.S. supplier base and to enable DoD to realize greater speed and agility of manned, unmanned, and Warfighter systems as well as benefits for commercial applications. ***FY 2022 Plans:*** Continue the long-term strategic partnership with LIFT by executing FY 2021 initiatives such as Hypersonics and Cold Spray work. Accelerate deployment of advanced manufacturing technologies such as linear friction welding; design and manufacturing methods for promising high strength alloys; optimized ultra-fast heat treatment and quenching techniques for thin-walled casting applied to components for military vehicles. ***FY 2023 Plans:*** LIFT will continue its focus on advanced R&D/insertion of materials and manufacturing technologies, growing capability within the structural manufacturing ecosystem, and education and workforce development. Efforts will support defense, commercial,	6.696	8.883	11.139

Exhibit R-2A, RDT&E Project Justification: PB 2023 Office of the Secretary Of Defense		Date: April 2022
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 2021	FY 2022	FY 2023
and dual-use, priorities. Specific technology activities include hypersonic materials/manufacturing; lightweighting of defense and commercial systems/ components; advanced materials development; advanced fabrication and manufacturing methods such as cold spray and large-scale, wire-assisted additive manufacturing; and integrated computational materials engineering. LIFT will maintain and operate its Learning/Talent Development Lab, which includes benchtop equipment for training in key manufacturing competencies. LIFT will continue workforce development projects, expanding Diversity, Equity and Inclusion (DEI) while targeting K-12, university students, current workforce, and separating military personnel. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** The increase contributes to MII Diversity, Equity and Inclusion (DEI) projects for the manufacturing workforce.			
Title: AIM – American Institute for Manufacturing Photonics (Integrated Photonics Device Manufacturing and Packaging)	10.622	14.121	20.818
Description: Integrated photonics 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 photonics fabrication foundry. AIM Photonics provides the world's only 300 mm silicon photonics multi-project wafer service, state-of-the-art photonics-electronics integrated design tools, and a highly advanced packaging, assembly, and testing user facility. ***FY 2022 Plans:*** Continue the long-term strategic partnership with AIM. Develop new sets of components targeted at non-standard wavelengths, which are of particular interest to the DoD. Align capabilities with other special DoD needs such as chemical/ biological sensors. Continue to support efforts aligned to OUSD(R&E) critical technology areas. Maintain a robust education and workforce development program for integrated photonics. ***FY 2023 Plans:*** AIM will continue to offer its core capabilities including silicon photonics multi-project wafer runs. These runs are enabling AIM Photonics to grow the U.S.-based integrated photonic circuit ecosystem and simultaneously offer a low risk opportunity to train new designers (which speaks to educating new talent). AIM will also continue to grow its packaging capabilities in the Rochester, NY-based test, assembly, and packaging facility and will offer services that include attaching optical fibers to their integrated photonic circuits. AIM will continue to improve integrated photonic circuit components and the process design kit that enables a diversified set of would-be users to rapidly adopt new components offering improved and/or different performance. This work will also target providing a packaging design kit to enable designers to develop prototype systems within this MII and reduce overall prototyping costs while cutting development times. AIM will expand Diversity, Equity and Inclusion (DEI) in its manufacturing workforce development efforts. An Integrated Photonic Circuits climate change mitigation project will improve silicon photonics			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Office of the Secretary Of Defense		Date: April 2022
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
packaging, develop and demonstrate efficient digital transceivers for communications applications to pave the way to reduce input-output power consumption in data centers by ~30%, and develop and demonstrate highly efficient optical switches for data communications applications to reduce power consumption in data centers by as much as 50% by reducing system idle time and mitigating system architecture inefficiencies. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** FY 2022 funding reflects anticipated 'steady- state' funding that meets threshold requirements of this technology ecosystem as part of a new follow-on Cooperative Agreement. An FY 2023 increase of $3.5 million supports climate/green technology manufacturing projects and additional funding contributes to MII Diversity, Equity and Inclusion (DEI) projects for the manufacturing workforce.			
Title: NextFlex Manufacturing Innovation Institute (Flexible Hybrid Electronics Manufacturing) ***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 2022 Plans:*** Continue the long-term strategic partnership with NextFlex by continuing to mature flexible, stretchable hybrid electronics including advanced packaging and additive manufacturing technologies within their world-class pilot manufacturing line. Several R&D projects initiated in FY 2021 will continue execution in FY 2022. ***FY 2023 Plans:*** NextFlex will continue expanding the US hybrid electronics manufacturing industrial base executing 14 ecosystem-funded projects with an increased focus on reliability and yield enhanced manufacturing. NextFlex will update its manufacturing and technical roadmaps based on reliability performance of manufacturing processes leading to commercial standards. The program will deliver DoD-relevant prototypes such as large area electronics on UAVs, wearable sensor for organic industrial base, and integrated manufacturing robotic sensors for sustainment manufacturing. The workforce development programs will expand Diversity, Equity and Inclusion (DEI) as they continue their six regional FlexFactor education programs and expand Flex Pro, the professional training program, to involve 300 engineers. NextFlex is pursuing environmentally sustainable FHE device development and a project to develop a cold chain monitor as a demonstrator focused on climate change and environmental sustainability. The technology could support environmentally-friendly production and monitoring of shipping packages. ***FY 2022 to FY 2023 Increase/Decrease Statement:***	5.911	7.855	11.705

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
An increase of $1.8 million funds climate/green technology manufacturing projects and additional funding contributes to MII Diversity, Equity and Inclusion (DEI) projects for the manufacturing workforce.			
Title: Advanced Functional Fabrics of America (Smart Fibers and Textiles) (AFFOA) ***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 2022 Plans:*** Enter into a new follow-on 5-7 years Assistance Instrument to continue the long-term strategic partnership with AFFOA. This agreement will involve a reduced but still significant strategic investment of federal funds in recognition of the 'steady-state' of AFFOA's maturity and the value it provides to the DoD. DoD critical technology area 'Quick Start' projects are likely to be part of the FY 2022 award. ***FY 2023 Plans:*** AFFOA will advance R&D efforts focused on integrating member and/or DoD technologies into functional prototypes for dual use DoD and commercial applications, with project calls focused on manufacturing and commercialization. AFFOA will expand it innovation and manufacturing ecosystem to enable small companies, DoD labs, and Defense Industrial Base partners increased access to AFFOA's organic fabric prototyping and advanced textile system integration capabilities. It will cultivate membership supply chains to support the DoD capability needs and critical technology areas. Education and Workforce Development (EWD) efforts will expand Diversity, Equity and Inclusion (DEI) and include developing strategic workforce development training, internships, and other activities with domestic universities and regional vocational training centers. To mitigate climate change, AFFOA will explore and select clothing and textile fibers (organic and synthetic) that meet military uniform performance criteria and can be disposed of or recycled without negative ecological impacts such as clogging waterways, contaminating soil, or polluting the air. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** FY 2022 funding provides limited funding for a new agreement to continue DoD strategic engagement in the public/private partnership with AFFOA. An increase of $1.0 million funds climate/green technology manufacturing projects and additional funding contributes to MII Diversity, Equity and Inclusion (DEI) projects for the manufacturing workforce.	6.000	6.155	8.877
Title: BioFabUSA Manufacturing Innovation Institute (regenerative tissue manufacturing)	0.000	16.300	10.992

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
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 2022 Plans:*** BioFabUSA will be in year six of a seven-year stand-up phase. BioFabUSA will continue to improve the tissue foundry prototype line. As BioFabUSA develops supported tools and enabling technologies through institute projects, they will begin to replace off-the-shelf tools used to establish the initial prototype line with the newly developed technologies. ***FY 2023 Plans:*** BioFabUSA will focus on expanding manufacturing process development of institute member-derived tissue engineered medical products. BioFabUSA will integrate additional sensor and automation technologies into current versions of the manufacturing platform. BioFabUSA will fund technology projects, therapeutic development projects, and education and workforce development (EWD) projects that expand DEI in the biomanufacturing workforce.. BioFabUSA will roll out pilot-phase EWD certification and credentialing programs regionally and nationally. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Completes internal funding re-phasing to address execution issues and fulfills the government-committed funding profile for the initial standup phase agreement for this institute. Additional funding contributes to MII Diversity, Equity and Inclusion (DEI) projects for the manufacturing workforce.			
Title: Advanced Robotics Manufacturing (Smart Collaborative Robotics for Manufacturing) ***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 2022 Plans:*** ARM will be in year six of a seven-year stand-up phase. Develop (1) methods and tools for adoption, integration, and readiness to include virtual modeling and simulation and testing; (2) user-friendly interfaces, natural language communication, and human-robot trust/safety; (3) Plug-and-play hardware and software, utilizing open source and open architectures; (4) Modular designs,	5.800	10.785	5.259

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
smart flexible end-effectors and sensors, automated path planning/mobility; and (5) collaborative, self-aware, machine learning/ artificial intelligence techniques, and advanced computing. ***FY 2023 Plans:*** ARM will continue technical project-level investments to advanced industrial robotic technologies for the development of novel automated manufacturing capabilities. Specific technical areas will include intelligent robotics, human-robot interaction, autonomous operation, dexterous manipulation, and rapid system development/configurability. Other investments will produce education and workforce initiatives to develop robotic competencies, credentialing, apprenticeships, and a nationwide training identification toolset while seeking to expand Diversity, Equity and Inclusion (DEI) in the robotics manufacturing workforce. Target transitions are for OUSD(R&E) S&T priorities, Service-level Organic Industrial Base, and the related Defense Industrial Base. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** FY 2022 is the final year of the DoD initial multi-year contract commitment to the ARM MII. In the follow-on phase beginning in FY 2023, the DoD strategic investment is reduced to a lower level for a more narrow focus on Department objectives while ARM leverages other investments from industry and other partners brought in during the establishment phase.			
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, fuel, pharmaceuticals, and other consumer products that will create new opportunities for U.S. manufacturers. ***FY 2022 Plans:*** BioMADE will be in year two of a seven-year stand-up phase. Mature the emerging manufacturing innovation ecosystem for bioindustrial technologies. Establish pilot lines for downstream processing. Conduct road-mapping activities to inform and initiate the first project calls. Make subrecipient awards for each cost-shared project. ***FY 2023 Plans:*** BioMADE intends to spur biomanufacturing innovation by investing in technical project calls to reduce barriers to scale-up and commercialization of bio-manufactured products, accelerate technology deployment, investigate novel downstream processing techniques, and de-risk the process of bringing new products to market. BioMADE will accelerate the DoD biotechnology critical technology areas by promoting biotechnology innovation and securing the domestic bioindustrial base. BioMADE will initiate planning and technology development for distributed manufacturing enabled by modular bioindustrial and reusable (MEMBR) assets. Education and workforce development project calls will build awareness of bioindustrial manufacturing careers and address workforce gaps through innovative educational strategies that increase DEI to expand the workforce. Ethical, Legal, and	14.000	17.000	23.609

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Social Implications (ELSI) programs will guide bioethics, biosecurity, biosafety, and other ELSI topics. BioMADE will continue the Domestic Production of Latex Rubber project, a 5-year effort initially funded in FY21, to address supply chain security concerns with latex rubber production. Latex rubber is required for DoD and domestic aircraft tires; synthetic rubbers cannot meet the demanding performance requirements. BioMADE seeks to establish a domestic source for latex rubber by determining if dandelion rubber can be scaled to produce sufficient latex rubber to meet DoD requirements. BioMADE will conduct an open project call to positively impact climate change through de-risking innovative green bioindustrial techniques and harnessing fermentation as an environmentally friendly method for producing chemicals of interest and whole cell biomass for food security. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Increase establishes the second full increment of the government's funding profile to invest in the standup phase of this institute. Includes a $3.5 million increase for climate/green technology manufacturing projects. Additional funding contributes to MII Diversity, Equity and Inclusion (DEI) projects for the manufacturing workforce. Also includes $2.0 million for a university design challenge for the Modular Manufacturing Center which supports the Manufacturing Enabled by Modular Bioindustrial and Reusable (MEMBR) assets initiative funded in PEs 0603680D8Z (Defense Wide Manufacturing Science and Technology Program), 0605797D8Z (Maintaining Technology Advantage), 0902199D8Z (Title III/Defense Production Act Purchases), and 00602128D8Z (Promotion and Protection Strategies).			
Accomplishments/Planned Programs Subtotals	61.222	97.433	129.798

	FY 2021	FY 2022
Congressional Add: Program Increase	26.000	9.000
FY 2021 Accomplishments: Initiate projects supporting manufacturing requirements for DoD critical technology areas including 5G, microelectronics, hypersonics, directed energy, and fully networked command, control, and communications (FNC3). Enable additive manufacturing decision-making and life cycle data management. Increase the DoD strategic investment in the MIIs to improve their ability to advance research and technology, expand associated manufacturing ecosystems, and secure human capital through technology-related education and workforce development activities. ***FY 2022 Plans:*** Execution strategy is being formulated and will align to previously funded efforts.		
Congressional Add: Flexible Hybrid Electronics (FHE) (FY20 title was "Manufacturing Innovation Institutes")	10.000	-
FY 2021 Accomplishments: Conduct open calls for FHE manufacturing projects relevant to commercial and DoD critical technology areas. Address FHE manufacturing, reliability, and scale-up for Connected Soldier Devices (C3), Human Monitoring, Harsh Environments (Hypersonics and Munitions), Autonomy and Communications for Unmanned Aerial Vehicles (UAVs). Improve NextFlex hub tools and capabilities to		

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	FY 2021	FY 2022
support prototyping of increasingly sophisticated FHE systems. Expand collaboration to address manufacturing development and supply chain bottlenecks. Create workforce education digital technical training course/ modules.		
Congressional Add: Advanced Manufacturing ***FY 2021 Accomplishments:*** Extend University of Texas at El Paso (UTEP) Driving Research, Innovation, and Value through the (Driving Research, Innovation, and Value through Education in Additive Manufacturing) DRIVE AM program to produce a superior additive manufacturing educated military, domestic manufacturing workforce, and defense supply chain. Provide a K-PhD science, technology, engineering, and mathematics (STEM) education pipeline and business creation ecosystem using a holistic approach for developing proficiency in AM while growing local and national economies. ***FY 2022 Plans:*** Execution strategy is being formulated and will align to previously funded efforts.	14.000	2.000
Congressional Add: Cyber Initiatives ***FY 2021 Accomplishments:*** Issue a competitive call for cyber manufacturing research to develop self-adapting, resilient Operational Technology (OT) threat analysis technologies to recognize, in real-time, new threat vectors and craft novel security responses. Mature OT cyber resilience analytics leveraging high-performance data analytics resources while maintaining functional and security assurances. Perform reverse engineering of network protocols and controllers to expand the adaptability of OT threat analysis technologies.	3.000	-
Congressional Add: Digital Manufacturing ***FY 2021 Accomplishments:*** Support the DoD Digital Engineering Strategy and use of digital representations of systems and components and digital artifacts to design and sustain national defense systems.	7.000	-
Congressional Add: Additive Manufacturing Training Insertion ***FY 2021 Accomplishments:*** Continue the University of Texas at El Paso (UTEP) – America Makes Driving Research, Innovation, and Value through Education in Additive Manufacturing (“DRIVE AM”) program to develop and deliver additive manufacturing training to service members. Training includes virtual interactive, hands on implementation of 3D printers for high impact training opportunities at the Foundational, Specialty, and Authority levels.	2.000	-
Congressional Add: Hypersonics Enabling Additive Manufacturing ***FY 2021 Accomplishments:*** Conduct research on candidate geometries/ applications and materials for development of air breathing hypersonic systems. Enable additive manufacturing (AM) development efforts anchored by Ursa Major, a part of the hypersonics industrial base, which is establishing a manufacturing	10.000	10.000

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	FY 2021	FY 2022
presence at the America Makes Youngstown campus. Focus on AM for rocket motors / propulsion components, with lines of effort in active cooling and high temperature sensor integration; modified AM machines capable of larger build volumes to reduce/eliminate joining; and collaboration with University of Texas at El Paso (UTEP) heat flux modeling and sensor integration. Efforts will expand training opportunities in connection with DRIVE AM. Articles to be prototyped with outside vendors with testing in partnership with NASA Glenn. ***FY 2022 Plans:*** Execution strategy is being formulated and will align to previously funded efforts.		
Congressional Add: 5G Manufacturing Testbed ***FY 2021 Accomplishments:*** Expand existing MxD Manufacturing Innovation Institute dual-use testbed with additional 5G infrastructure using an open call for RD&D manufacturing use project(s) relevant to commercial and DoD critical technology areas, including Real-Time 5G Logistics with In-Transit Visibility and Manufacturing Cognitive Readiness Training and Skills Capture. Conduct programming/training to educate manufacturers, industry, and government and demonstrate 5G Future Factory Connectivity.	5.000	-
Congressional Add: Manufacturing USA Institutes ***FY 2021 Accomplishments:*** Increase the DoD strategic investment in the MIIs to improve their ability to advance research and technology, expand associated manufacturing ecosystems, and secure human capital through technology-related education and workforce development activities.	5.000	-
Congressional Add: Hypersonics and Thermal Management ***FY 2021 Accomplishments:*** Build on results of the LIFT Manufacturing Innovation Institute FY 2020 Hypersonics Challenge investment to increase development of hypersonic powders for manufacturing to meet DoD requirements for cross-platform system development. Coordinate requirements with the Hypersonics Working Group. ***FY 2022 Plans:*** Execution strategy is being formulated and will align to previously funded efforts.	5.000	5.000
Congressional Add: Arsenal Supply Chain Security Proof of Concept ***FY 2021 Accomplishments:*** Engage Army arsenals (e.g., Rock Island) to establish supply chain security pilot(s) to improve DoD Organic Industrial base supply chain resiliency. The MxD Manufacturing Innovation Institute will conduct outreach activities (e.g., workshops, roadshows, assessments) to determine priorities for pilots, then issue an open call for projects to establish pilots to address the priorities identified.	3.500	-
Congressional Add: Cybersecurity Manufacturing Innovation Park	-	1.000

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	FY 2021	FY 2022
FY 2022 Plans: TBD - Execution strategy is being formulated.		
Congressional Add: El Paso Makes K Support for El Paso Manufacturers ***FY 2022 Plans:*** TBD - Execution strategy is being formulated to complement previously funded related efforts.	-	0.964
Congressional Add: Certification Based Workforce Training Programs for Manufacturing (Jobs of the Future) ***FY 2022 Plans:*** TBD - Execution strategy is being formulated.	-	6.200
Congressional Add: Silicon Based Lasers ***FY 2022 Plans:*** TBD - Execution strategy is being formulated to complement previously funded related efforts (FY 2020).	-	10.000
Congressional Add: Domestic Textile Manufacturing ***FY 2022 Plans:*** TBD - Execution strategy is being formulated.	-	7.500
Congressional Add: Data Analytics and Visualization System ***FY 2022 Plans:*** TBD - Execution strategy is being formulated.	-	12.000
Congressional Add: Advanced Robotics and Automation Training ***FY 2022 Plans:*** TBD - Execution strategy is being formulated.	-	2.000
Congressional Adds Subtotals	90.500	65.664

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 OSD 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 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 CA or 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 2023 Office of the Secretary Of Defense			Date: April 2022
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COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
351: *Manufacturing Education and Workforce Development*	0.000	0.000	3.993	5.179	-	5.179	5.190	5.190	5.190	5.293	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Office of the Secretary Defense (OSD) promotes equity and inclusion in manufacturing careers, drives regional action to modernize manufacturing Career & Technical Education (CTE) for the U.S. industrial base, 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 2021	FY 2022	FY 2023
Title: Manufacturing Education and Workforce Development	-	3.993	5.179

Description: The Manufacturing Education and Workforce Development (M-EWD) program builds on activities from FY 2019-2021 resourced by Project Code 350 and congressional interest items including the Manufacturing Engineering Program. Key M-EWD accomplishments include development of a strategic framework for DoD leadership of advanced manufacturing talent development, eight MII-led regional initiatives informed by labor market data profiles of regional economies, start of 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 2022 Plans:

The primary M-EWD effort will be a pilot project to expand the pool of talent and promote equity and inclusion in manufacturing careers by building upon Minority-Serving Institution (MSI) and Historically Black Colleges and Universities (HBCU) partnerships developed beginning in FY 2021. The secondary effort is a pilot project to build regional economic and talent development alliances. The initial alliance project will address skill shortages and gaps in the shipbuilding industry in southeast Virginia.

FY 2023 Plans:

The M-EWD program will sponsor a project to expand the pool of talent and promote equity and inclusion in manufacturing careers by building upon Minority-Serving Institution (MSI) and Historically Black Colleges and Universities (HBCU) partnerships developed beginning in FY 2021. A second key effort will be a pilot project to build regional economic and talent development alliances. The program will also continue to sustain and enhance the Open edX digital learning platform for industry and DoD personnel, as well as the labor market data portal projects.

FY 2022 to FY 2023 Increase/Decrease Statement:

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
New Project Code 351 established with $4.000 million in FY 2022 and additional out-year funding to promote a diverse and inclusive manufacturing workforce. The increase will allow for expansion of manufacturing-related education and workforce programs.			
Accomplishments/Planned Programs Subtotals	-	3.993	5.179

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A