

Project Call for America Makes Applied Research Projects

Open Project Call 2023 – Methods and Approaches for Sustainable Operations (Topics 1 through 6)



America Makes

Driven by



NCDMM
NATIONAL CENTER FOR DEFENSE
MANUFACTURING AND MACHINING

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1 EXECUTIVE SUMMARY

Funding Opportunity Title: Open Project Call 2023 – Methods and Approaches for Sustainable AM Operations (Topics 1 through 6)

Announcement Type: Open and Directed Project Call. Proposals for projects outside of this topic will not be considered at this time. The funding source for this project call is the Office of the Under Secretary of Defense, Research and Engineering Manufacturing Technology Office (OSD(R&E)) and Air Force Research Laboratory (AFRL). The effort will feature a total projected funding profile of **\$6,400,000**.

Dates: Proposal submissions must be submitted by e-mail to projectcall@americamakes.us and marked with “America Makes Open Project Call 2023 – Methods and Approaches for Sustainable AM Operations – Topic #”. Submissions in response to this RFP shall be received no later than 5 p.m. Eastern on Friday, August 25, 2023. Submissions received after the deadline will not be considered.

Submission Address: All proposals are to be submitted electronically to projectcall@americamakes.us. All submissions will be acknowledged with an email confirmation from NCDMM within 24 hours of receipt. If confirmation email is not received within 24 hours, please follow up to ensure delivery. NCDMM is not responsible for email system malfunctions or undeliverable email.

Funding Opportunity Description: NCDMM is soliciting competitive proposals supporting the America Makes mission of promoting and accelerating the development and deployment of innovative, cost effective, energy-efficient additive manufacturing (AM) technologies to meet defense and/or commercial needs. The Open Project Call focuses on advancement of AM technologies across the five swimlanes (Design, Material, Process, AM Genome, and Value Chain).

Proposals must demonstrate necessity and value for addressing topics listed within Section 2, a means of measurably substantiating success, and why the proposer believes the approach will exhibit a high probability of technical and programmatic success within the allotted maximum period of performance. Technology dissemination to America Makes members/stakeholders in an organized, reusable, and interoperable manner will be evaluated as described in Section 4.

Proposers shall describe how deliverables will be transferred to the membership and government stakeholders and readily integrated within the America Makes CORE (formerly known as Digital StoreFront). Project deliverable titles, file formats, and associated content (tangible artifacts) should be summarized in concise detail. America Makes CORE features the ability for America Makes members to upload data. Uploading, structuring, naming, and characterizing (metadata tagging) all data in CORE shall be the primary responsibility of the proposer to complete. An approach that outlines how data will be managed, curated, and regularly uploaded to CORE is required. **Approaches that detail a substantial level of effort for data upload in the later portion of the program are not favored and are highly discouraged.** Time, resources, and any expectation for NCDMM support for these tasks and efforts should be clear in all proposals.

Total Amount to be Awarded: NCDMM, OSD(R&E), and AFRL will conduct a competitive proposal process targeting to make available approximately **\$6,400,000**. Four awards are anticipated for topics 1 through 6. Proposals in response to topics 1 through 6 must not exceed **\$300,000** of federal funding. NCDMM, OSD(R&E), and AFRL reserve the right to select multiple awards, one, or no awards in the topics outlined in Section 2.

Proposers are welcome to submit multiple proposals. Each proposal is limited to addressing only one topic.

Proposer Eligibility: The lead proposer and any proposal team member receiving federal award funding must be an America Makes member. Non-America Makes members may contribute to contract execution via cost share. Any non-America Makes members contributing to the proposed effort execution are not permitted to participate in project team discussions until completing a fully executed America Makes Membership Agreement. Deadline for applicant members to establish a fully executed Membership Agreement is Thursday, August 10, 2023.

Information on how to join America Makes is available at www.americamakes.us/membership. Any non-America Makes members contributing to the proposed effort execution are not permitted to participate in project team discussions until completing a fully executed America Makes Membership Agreement. (Note: The foreign membership approval process requires a minimum of three weeks to complete.)

Any foreign persons conducting work on the project shall be declared within the Project Team Appendix. Any project activities occurring outside of the U.S. or by non-U.S. persons must be reported and approved in advance by the America Makes Program Management Office.

Cost Share Requirement: The Open Project Call requires a cost share of at least a 50% match and must be from non-Federal funding sources.

Period of Performance: The maximum allowable proposed period of performance in response to topics 1 through 6 is 5 months of execution followed by 2 months for final report development for a total period of performance of 7 months. **Contract extensions are expressly prohibited, so all offerors should carefully consider scope, risks, and necessary level of effort.** Shorter periods of performance are acceptable. Teams which are able to expedite contracting will be eligible to receive additional time for project execution but with a firm date of delivery of all deliverables and reports in their finalized condition by June 3, 2024.

2 PROPOSED RESEARCH PROGRAM

Program Description and Technical Requirements:

The Open Project Call topics are a result of the actions of the Institute and its membership. Efforts to establish these prioritized topics were initiated in 2021 at AM Technology Roadmap workshops hosted at the conclusion of the August Technical Review and Exchange (TRX) held at The Ohio State University (Columbus, OH). These workshops focused on needs prioritized for the Design, Materials, and AM Genome swimlanes. In March of 2022, AM Technology Roadmap workshops were hosted at the conclusion of

the TRX held at the Utah Advanced Materials and Manufacturing Initiative (UAMMI) in Clearfield, UT. These workshops focused on needs prioritized for the Process and Value Chain swimlanes. Several workshops have been conducted in recent history by America Makes and its members to address the needs of the domestic AM supply chain for education and workforce development.

Thanks to the efforts of these workshop participants, associated swimlane working groups, the Education and Workforce Development Advisory Group, Roadmap Advisory Group (RMAG), and America Makes membership, the topics which compose the 2023 Open Project Call utilize workshop outputs, member inputs, and working group and advisory group subject matter expertise to identify and formulate these topics for the benefit of the AM community. It is an example of how member input is leading to opportunities to execute and advance AM technologies and education and workforce development for the benefit of U.S. manufacturing competitiveness.

The America Makes Additive Manufacturing (AM) Technology Roadmap offers a means to assess the progress of prior and ongoing efforts of the institute and AM supply chain, identify technology gaps, and develop new goals/requirements to advance the state of the art for AM technology. The Open Project Call leverages collaboration and perspectives from the membership, working groups, Roadmap Advisory Group (RMAG), and prior America Makes AM Technology Roadmap workshop efforts to create actionable focus areas which should address the needs of the membership. Technical topic areas have been prioritized based on input gathered from the membership, Roadmap Advisory Group, and working groups. These topic areas span the five swimlanes of the AM Technology Roadmap (Design, Materials, Process, Value chain, and AM Genome). Concepts and proposals focused on education and workforce development will be considered as well.

The purpose of this RFP is to solicit competitive proposals for six (6) topics including:

Topic 1 – Design for Dimensional Inspection of Internal Features via In-Situ Process Monitoring

AM using lattice and generatively designed structures present unique mechanical and thermal performance benefits for a variety of applications including medical devices, heat exchangers, cold plates, combustion, and propulsion systems. The performance of these features can be challenging (cost and probability of detection) to inspect via ex-situ measurement techniques. In-situ monitoring offers a means to verify dimensional precision and accuracy.

Responses to topic 1 shall demonstrate a validated workflow to leverage in-situ process monitoring data for geometric verification of hard-to-inspect features or products. Approaches proposed in response to this topic shall verify and document any observed limitations relative to the design of complex end-use parts. Examples of hard-to-inspect features may include thick to thin transitions, curved surfaces, lattices, organic geometries, etc. The value and benefit of responses to this topic may be further demonstrated through various metal systems which present challenge with inspection

and reliable probability of detection. Responses to this topic shall be limited to metal powder bed fusion or direct energy deposition processes only.

Technical approaches in response to this topic shall consider all or some of the following:

- Experimental validation
- In-situ measurement method documentation
- Sensing framework design and protocol development
- Assessing sources of variation and limits of precision and accuracy
- Documented methods for assessing derivations of measurement methods and documented methods to foster replication
- Product definition guidance documentation for efficacy of various features readily analyzed using in-situ monitoring technologies

Topic 2 – Thermal Manipulations for Processing Improvements

Thermal manipulations in AM are possible using scanning strategies, multi-mode heat sources (e.g.-ring beams, beam shaping, rapid beam deflection, etc.), and other energy source modifications. These novel techniques provide possible enhancements to AM processing, microstructure and/or properties. Proposers should detail an experimental characterization plan that will create an understanding of the thermal manipulation's influence on the processing, material structure and/or properties. Responses to this topic are limited to metal AM technologies.

Technical approaches in response to this topic shall consider all or some of the following:

- Determination of the effects on microstructure, part properties, and/or part quality, including quantifying impact on anisotropic properties
- Increasing machine productivity to increase AM value proposition
- Providing the ability to build with difficult to process materials
- AM equipment calibration
- Feedstock material characterization
- Geometric dimensioning and tolerancing
- Surface roughness characterization
- Control of the processing window to avoid process induced flaws
- Testing of physical and mechanical properties
- Statistical analysis of material or product quality metrics
- Microstructure characterization
- Demonstration of advanced process control methods/schemes
- Documentation of AM platform-specific software and hardware designs for enabling advanced process control

Topic 3 – In-Process Sensor Calibration, Characterization Methods, and Operating Limits to Yield Reliable Process Data

Additive machines have sensors, but many of those sensors or in-process monitoring instruments don't have any standards for checking for accuracy and precision. There exists a lack of extensive knowledge of how often in-situ sensors should be calibrated or documented methods for sensor validation. Major subsystems on AM equipment, along with the monitoring sensors/instruments on the machine, need to have some calibration standardization to provide confidence to the data being collected from them, which in turn may provide confidence in assessing part quality. Responses to topic 3 shall demonstrate how in-process measurement techniques can verify or aid process repeatability, yield, or throughput. Various sources of experimental data shall be obtained to foster validation.

Technical approaches in response to this topic shall consider all or some of the following:

- Analysis of various machine components including:
 - Laser characteristics
 - Optics
 - Scanning controls
 - Thermocouples
 - Load cells
 - Recoaters
 - Diodes
 - Cameras
- Examples of equipment subsystems relevant to this topic include:
 - Powder or feedstock distribution/feeding
 - Optics train components
 - Build plate controls
 - Power controls
 - Gas flow controls
 - Environmental sensors
- Documentation of AM platform subsystems and associated monitoring methods (sensors/instrumentation) and the physical phenomena which these signals correlate
- Documentation of sensor or measurement method time and spatial accuracy
- Validated measurement methods
- Documented practices, guidelines, and procedures
- Documented sources of variation
- AM equipment calibration
- Statistical evidence which supports measurement predictive confidence
- Measurement repeatability and reliability analysis
- Evidence demonstrating process stability and improvement in quality, productivity, and/or yield
- Draft standards
- Identification of critical sensors/instruments that need calibration methods
- Assessment of multiple AM processes

- Assessment of different material types – polymer, metal, ceramic, composites

Topic 4 – Frameworks for Utilizing Process Monitoring in Conjunction with Ex-situ Inspection for Qualification

There remain opportunities for promoting inspection efficiency for additively manufactured products. Topic 4 looks to advance the understanding of the AM community through establishing methods of in-situ process monitoring to foster conditional inspection practices. Responses to this topic shall demonstrate methods to bolster statistical confidence when correlating in-situ process monitoring or in-situ NDE of AM processes. Responses shall be limited to metal AM processes and there is a desire to focus on powder bed fusion or directed energy deposition processes.

Technical approaches in response to this topic shall consider all or some of the following:

- In-process monitoring or NDE validation
- Establishing documented practices and statistical methods for validation of in-process measurement techniques/methods
- Probability of detection along with documented methods for various anomalies, instabilities, and defects with AM materials and processes
- Assessment of alloy specific instabilities, anomalies, and defects using monitoring methods
- Documented sensor data thresholds or practices for confirmation of type I and type II errors along with true-positive and true-negative data
- Correlation, comparison, and validation of temporal and spatial sensor data from in-process monitoring methods with ex-situ measurement and inspection technologies
- Documented efficiency improvements in ex-situ inspection throughput using evidence gathered from in-situ monitoring methods
- Demonstration of how in-situ measurements may aid accuracy and throughput of ICME methods
- Correlation of in-situ process measurement defect detection and correlation with NDE and associated metallurgical properties (physical and mechanical)
- Demonstrated methods for data reduction using in-situ and ex-situ measurement and inspection technologies

Topic 5 – AM Process Pre-Qualification

Recent workshops conducted by America Makes provide guidance on AM process qualification and data management: (1) The 2023 workshop on “Empowering Small and Medium Size Enterprises Through Effective Additive Manufacturing Data Management” identifies AM process pre-qualification to address 80% of the qualification requirements by fusing model-based and measured data. (2) The 2022 workshop on “Data Enabled AM Process Qualification” identifies the current state, emerging state, and future state for AM process qualification, and identifies primary data elements that are important to accelerate the qualification and reduce costs related to non-recurring engineering. (3) The

2022 AMMO (AM for Maintenance Operations) workshop identifies AM machine qualification as a high priority to foster the development of datasets necessary for the publication of normative standards.

Technical approaches in response to this topic shall consider all or some of the following:

- Pre-qualification drawn from a framework for Laser Powder Bed Fusion (LPBF) process qualification such as NASA-STD-6030
- Select use cases to address data element gaps including:
 - Variability across the build platform for beam caustic/focus geometry and intensity distribution
 - Gas flow
 - Spatter
 - Melt pool size
 - Powder height distribution
 - Flaw state
 - Product (consolidated material) surface quality
 - Surface-connected and near-surface defect
- Well documented approaches which define model-based approach, material, machine, process, test specimen geometry, build layout, nondestructive inspection, statistical methods to characterize quality metrics
- Validation of methods which fuse model-based and measured data
- Documentation of benefits for data reduction, reduced testing, improved predictive confidence, and improved process stability and repeatability

Responses to this topic are encouraged to consider, but are not limited to, using the common data dictionary, common data model, and common data exchange format.

Topic 6 – “Should vs. Could” Tool and Training

Responses to this topic should outline an approach which develops and delivers an AM “Could vs. Should” training course and tool. Training should be able to be replicated via virtual or in-person settings. The training course must address the goal of learners building a business case scenario around additively created parts via a “Could vs. Should” tool. The course should include the creation of a set of guidelines and/order suggestions that will assist professionals and leaders in assessing the additive process for manufacturability of components. Some examples of the content and tools could include different material types, parts with complex geometry, scenarios where conventional process/equipment would be a barrier, various post processing methods, low volume production, various production demand volumes, customization as well as highlighting the agile nature of additive manufacturing. Additional considerations include facilities, labor, AM, and ancillary equipment costs. The training and tool should focus include a variety of seven technologies of additive manufacturing including specific examples and business case and case studies.

Proposers are required to address how training materials, contents, etc. can be shared in whole or in part via a royalty-free license which allows NCDMM to produce and distribute

micro-learning modules utilizing the outcomes of these efforts. Micro-learning modules are for the purpose of promoting the mission of America Makes, driving awareness in the community to the existence of the course content, and attracting workforce and educator engagement to foster enrollment in the actual full course offering.

Approaches in response to this topic shall address the following:

- Limited use of background IP – America Makes will make the outcomes of these efforts available to all members under the membership agreement at no cost
- Collaboration with the America Makes EWD team for integration into the inventory matrix along with the DoD modernization priorities and AM strategies

Deliverables for this topic shall include:

- Course/training content including presentations, workbooks, digital data/materials
- Instructor materials and guides in a reusable format
- Student handbook in a reusable format
- Demonstrated pilot (virtual or in-person) to include at least 25 participants (including pre-post surveys) with a mixed audience of industry and DoD participants preferred but optional
- A “Could vs Should” tool (this could be in the form of a PDF guide, excel spreadsheet, flow chart process, etc.)
 - Proposals are encouraged to consider existing technoeconomic or AM impact tools for reference at <https://energyefficiency.ornl.gov/tools-training/>

Approaches proposed in response to this topic shall address a wide variety of technologies and materials. The content/tool should focus on those most common and aligned with thrust areas such as but not limited to:

- Aviation
- Space
- Automotive
- Power generation and other propulsion systems
- Medical
- Defense

Proposers are required to provide key performance parameters (KPPs) which constitute an industrially relevant measure of success/acceptance and shall be aligned to the tasking, trials, experiments, or measurements within the project technical approach (scope). Key performance parameters should be measurable/quantifiable and shall include an explanation as to the methodology for successfully demonstrating these parameters. Responses shall propose key performance parameters using factors similar to common industry acceptance criteria. For example, tensile strength minimum, average, or standard deviation, maximum pore size, or other relevant quality metrics as a means of validating the outcomes of tasking in a manner conducive to technology or manufacturing readiness level assessments. For those unfamiliar with technology readiness level assessments, please see the following reference (<https://www.gao.gov/assets/710/706680.pdf>). Responses are required to use a threshold (minimum acceptable value) and objective (ideal or stretch goal) value

approach which aligns KPPs with tasking, data, and data types as well as how the KPP will be demonstrated. For example, verification of a not to exceed a certain maximum pore size KPP may be demonstrated using metallographic sectioning, microscopy, and image analysis over a 0.5 in cross section of cast material in the fully heat-treated condition.

Responses to the RFP are required to demonstrate impact through quantitative metrics which exhibit a threshold and objective value. For those unfamiliar with such approaches, please see the following reference (<https://acqnotes.com/acqnote/acquisitions/key-performance-parameter>). Examples of high-priority factors for consideration to successfully demonstrate meaningful progress in response to the topics outlined in Section 2 include all or some of the following:

- Qualification cycle time
- Qualification cost
- Correlation of a critical to quality metric with statistical confidence
- Reduction in testing costs or inspection costs
- Prediction statistical certainty and confidence
- Statistical process control
- Process capability analysis
- Lead time reduction
- Yield improvements
- Yield using statistical analysis (Cpk)

Responses are highly encouraged to include team members who will not only serve as a source of design authority but will also stand to directly benefit from these efforts. Design authority team members' presence and perception of the perceived value of any proposed effort shall be apparent from letters of support provided in Exhibit III. In addition, the significance and merit of proposed efforts should be evident from details provided in the Project Strategic Relevance Appendix.

Proposers shall maintain traceability and data management practices which facilitate dissemination and reuse of the findings in a manner which makes the proposed effort reproducible, transparent, and a well-posed and controlled technical approach. Effort and data gathering shall be conducted in a manner similar to common quality management practices standard to industry and leveraged as much as reasonably practical for ensuring data integrity and program relevancy and validity. Examples of this may include standards, specifications, certifications, calibration details, process control documentation, and verification of qualified material sources (precursors or feedstock, etc.), processes, post processes, inspection, testing, and quality control protocols. Data management not only promotes the long-term viability of America Makes research, but it also facilitates trust and reuse of the data generated by our efforts. Furthermore, it diminishes concern for unknown or unrecorded sources of variance within development activities.

Proposals outside of these topic(s) will not be considered at this time.

Proposals, which address the topic(s) outlined in Section 2 while closely considering the funding and period of performance limitations, are encouraged. It is vital to understand that no contract period of performance extensions will be made available for responses to topics 1 through 6. All efforts (tasks) and deliverables, including a **finalized** report, shall be submitted by no later than the proposed period of performance end date or June 3, 2024 (whichever occurs first).

Offerors are welcome to outline follow-on efforts which may occur beyond the time and financial scope of the RFP (**topics 1 through 6 only**) in the Project Strategic Relevance Appendix. Proposals shall conform to the page limits outlined Section 3. There is no guarantee of additional funding for any follow-on effort beyond the funding amounts and time periods outlined in Section 1. Responses may influence topic prioritization for future project calls. Offerors are encouraged to carefully review the proposal submission and review criteria outlined in Sections 3 and 4.

The America Makes membership continue to refine and expand the America Makes AM Technology Roadmap. Revision and curation of the AM Technology Roadmap is executed primarily through regular meetings of the swimlane working groups and Roadmap Advisory Group in conjunction with workshops to gather input from the broader membership. The AM Technology Roadmap not only describes the strategic interest and knowledge gaps of the technology landscape, but also serves as a history of prior efforts conducted by the membership. The merit and benefit of the roadmap arises from the collaboration of the membership which is responsible for its content. The membership is composed of small, medium, and large industry, non-profit organizations, academia, and government partners. The perspectives of the membership contained within the AM Technology Roadmap are representative of all tiers of the domestic AM supply chain. The AM Technology Roadmap offers a structure to align the interests of the AM community to within five strategic swimlanes including: Design, Materials, Process, Value Chain, and AM Genome. Within these swimlanes are various Critical Technology Elements (CTE's) and over four hundred requirements.

Execution of funded America Makes projects and programs address roadmap requirements (identified by the membership) which foster the advancement of AM technology readiness and industrialization. Hence, the continued engagement and participation of the membership in working groups, advisory groups, and workshops is vital to the value of the roadmap and describing the impact of America Makes funded activities. This RFP aligns with various requirements spanning the Design, Materials, Process, Value Chain, and AM Genome swimlanes including:

- **Design**
 - REQ-000293-Implementation of AM design tools and software across industry to fully enable the unique design capabilities of AM.
 - REQ-000300-Integration of material, process, and property data into design tools to improve design effectiveness.

- REQ-000304-Develop intelligent process design tools capable of determining optimal build parameters, orientations, and support structures
- REQ-000321-Development of multi-variable optimization and cellular structure generation tools
- REQ-000027-Develop design for manufacturability algorithms that improve cycle time required to perform CAD/CAD/CAE Analysis
- REQ-000029-Design Advisors that Recommend Rapid Qual/Cert Approaches
- REQ-000031-Design for Additive Manufacturing Criteria and Analysis Tools
- REQ-000033-Material Selection Process Design Advisors
- REQ-000035-Process Map Based Machine Set-Up and Programming Apps
- REQ-000039-Develop rule-based design for AM algorithms built-in to advanced design software
- REQ-000283-Maturation of hardware & software capabilities for 3D scan to enable efficient & effective reverse engineer process
- REQ-000288-Establishment AM design rules & guidelines based on design for additive manufacturing (DFAM) best practices and lessons learned
- REQ-000298-Develop digital design standards based on a set of comprehensive rules & standards to guide AM-focused design digital context

- **Materials**
 - REQ-000090-Metallic Alloy Process Variable to Process Outcome Maps
 - REQ-000161-Process Specific Defect & Instability Boundary Mapping
 - REQ-000183-Create verified material & process-specific boundary condition maps of known defects and instabilities using physics-based model
 - REQ-000218-Post-Processing Guidelines for Microstructure Optimization
 - REQ-000407-Populate repository with available datasets for use by the AM community
 - REQ-000412-Increase the availability of pedigreed datasets
 - REQ-000425-Creation of standard "material data" sets for use in model validation
 - REQ-000408-Analyze the effects of feedstock material properties and process parameters on end-item performance
 - REQ-000411-Establish Vendor Qualification and Encourage Expansion of Material Sources

- REQ-000415-Documentation of necessary powder properties for AM processes
- REQ-000417-Development of AM environment specific powder "spreadability" standard test methods
- REQ-000418-Link the influence of powder spreadability to other powder and bulk material properties
- REQ-000422-Physical characterization of precursor powder particles when the bulk powder source includes multiple materials/phases
- REQ-000423-Create refined standard test coupon models to match physical standard test coupons for material development (mech. and phys.)
- REQ-000432-Development of standardized feedstock specifications for alloys for use in AM systems
- REQ-000430-Develop AM materials to meet industry and government needs
- REQ-000435-Geometric features including locally varying properties

- **Process**
 - REQ-000287-Development of a knowledge base of multi-material process post-processing functions for powder bed fusion processes
 - REQ-000176-Multi-Laser Deposition & Thermal Management Systems
 - REQ-000177-Multi-Power Source Deposition & Thermal Management Systems
 - REQ-000360-Development of integrated onboard thermal simulation software enabling precise temperature gradient control of AM builds.
 - REQ-000361-Demonstration showing the onboard integration of performance feedback sensors and parameters in an AM system.
 - REQ-000368-Establishment of onboard closed loop process control technologies enabling precise temperature gradient control of AM builds.
 - REQ-000370-Precise temperature gradient control of AM builds
 - REQ-000446-Development of build chambers capable of environmental thermal control to allow full temp control while protecting instruments
 - REQ-000092-In-Situ Laser PBF Defect Monitoring Sensor Test Bed
 - REQ-000292-Development of sensors for in-situ process sensing/monitoring capabilities - Optimize current capabilities and develop new sensors
 - REQ-000310-Identification of key process variables with correlation to defects for all AM processes to ensure quality control.

- REQ-000313-Development of a control framework for AM machines enabling advanced data collection and analysis techniques to manage AM process
- REQ-000320-Demonstration of the developed in-situ sensing system and control framework integrated into AM machines
- REQ-000345-Development of integrated NDE inspection to ensure material/part quality using validated techniques post-process & during build
- REQ-000348-Development of a common interface (hardware and software) for AM machines enabling systems integration
- REQ-000350-Establish Equipment Certification and Calibration Procedures through hardware certification standards and calibration programs
- REQ-000353-Development of multiscale approaches that integrate processing for a range of sizes
- REQ-000354-Development of systems with non-proprietary and openly readable software
- REQ-000356-Development of automated methods to modify AM equipment process variables using onboard multi-physics modeling capabilities

- **Value Chain**
 - REQ-000390-Development of appropriate cost models
 - REQ-000391-Development of appropriate decision tools
 - REQ-000392-Documentation of risk of AM approaches
 - REQ-000393-Documentation of relevant AM technology capabilities
 - REQ-000278-Development of standards to support data mining, data analytics helping model validation, and AM system decision support systems
 - REQ-000351-Development of standards for logging all input conditions and process parameters
 - REQ-000094-Robust High Accuracy Fast Response Out-of-Build Quality Sensing
 - REQ-000106-QA Methods for High Volume Production (Powder Bed)
 - REQ-000130-3D Visualization Tools for Real-Time QA Monitoring
 - REQ-000132-NDE Post-Build Inspection of Laser PBF
 - REQ-000133-In-Situ Material/Platform Agnostic IPQA and Data Collection Methods
 - REQ-000134-3D Quality Certificate Based on Process Monitoring Data

- REQ-000149-Rapid, Automated 3D Visualization & Post-Process QA Methodologies to compare to CAD Model
- REQ-000152-Critical defect size-shape requirements
- REQ-000154-Rapid Automated NDE to Validate Parts
- REQ-000299-Development of data schema interfaces with inspection/non-destructive evaluation methods to ensure quality control
- REQ-000381-Development of NDE systems set-up procedures based on individual parts
- REQ-000383-Advancement in inspection penetration depth and resolution beyond baseline capabilities
- REQ-000384-Advancement in in-situ inspection capabilities providing improvement in measurement speed and defect identification
- REQ-000385-Advancement in NDE inspection software and hardware enabling improved use and portability while providing rapid inspection
- REQ-000387-Development of automated inspection system capable of running without an operator and available in a portable package.
- REQ-000075-Layer-by-Layer NDI/NDE Methods
- REQ-000079-Multi-Sensor Thermal Imaging Systems for EBM & LENS processes
- REQ-000087-3D Visualization Methods for Thermal Imaging Data
- REQ-000095-3D Melt Pool and Temperature Distribution Measurements
- REQ-000096-3D Visualization Tools for Real-Time Quality Assurance Monitoring
- REQ-000143-Develop/validate high-accuracy, fast response sensing systems for layer-by-layer measurements
- REQ-000146-In-situ 3D Sensing System-Measure & Monitor melt pool
- REQ-000147-3D Visualization & In-Process Quality Assurance
- REQ-000266-Development of sensor technology to diagnose, track and control process variables with process tailoring
- REQ-00026-Development of sensor calibration standard methods for AM systems and materials
- REQ-000268-Development of a reduced data model that links back to the original data while highlighting areas of interest
- REQ-000296-Development of methods of inspection for process defects in AM produced parts
- REQ-000297-Development of software algorithms for in-situ decision points on continuing or canceling a build based upon defect analysis

- REQ-000309-Development of sensors for in-situ quality sensing of AM builds
- REQ-000312-Establish the use of data analytics for storage, mining, formatting and management of AM builds
- REQ-000366-Reduced Failures, Reduced inspection intervals, safety, reduced disassembly, health monitoring
- REQ-000103-Real-Time Processing Temperature Analysis Methodologies
- REQ-000104-Model-Based Closed Loop Feedback Control Algorithms
- REQ-000105-Real-Time In-Situ Defect Rework Control Algorithms
- REQ-000140-Process Map Microstructure Control Algorithms
- REQ-000259-Development of systems with non-proprietary and openly readable software
- REQ-000262-Development of NDI - Life models (minimum flaw size determines life, NDI determines min flaw size) for AM systems and material
- REQ-000282-Establishment of vendor qualification processes and encourage expansion of material sources.
- REQ-000380-Development of the minimum requirements for equipment qualification enabling rapid AM equipment qualification within the supply

- **AM Genome**
 - REQ-000043-Statistically-relevant property database data set
 - REQ-000046-Establish a systematic procedure and protocol for material characterization that is material, machine, and process agnostic.
 - REQ-000047-Establish a dataset to support predictive correlation between properties.
 - REQ-000048-Reference NDE Test Coupons for “As-Designed” Microstructure Control
 - REQ-000050-Develop technologies and processes that enable a substantial increase in the amount of in-process data collected during builds
 - REQ-000051-Establish methods for online monitoring of the process for better correlation of experimental results and physics-based models
 - REQ-000062-ICME & Data Repository Statistical Model Links
 - REQ-000066-Develop an experimental approach to calibrate the model with experimentally obtained ‘repeatable’ datasets
 - REQ-000074-Develop approach for integrating the experimental processing-structure-property with process models

- REQ-000077-Develop methodology for capturing relevant data obtained from models for rapid insertion and certification of new materials
- REQ-000336-Determination of the linkages between AM process parameters to property predictions across length scales
- REQ-000337-Demonstrate the ability to extract reduced order models from physics-based models at each length scale
- REQ-000295-Validation of process and quality assurance
- REQ-000326-Development of open architecture models for modeling and simulation with user friendly GUI focused on data reduction
- REQ-000327-Development of models that drive/ guide defect prediction and control (e.g. porosity, surface roughness, process map components)
- REQ-000328-Development and validation of microstructure through the use of property prediction models for AM systems and materials
- REQ-000329-Development of model-guided microstructure prediction and control for improved defect and structure property prediction
- REQ-000335-Demonstration and validation of model-based process simulation to enable model-based predictive process control
- REQ-000338-Development of empirical and physics-based models to ensure AM part quality
- REQ-000339-Maturation of approaches to reduce computation time using models to accelerate materials qualification and certification

Deliverables:

For each selected project, the selected team shall provide such deliverables as reports, data, presentations, training course materials, course content, experimental procedures, experimental hardware specifications, analytical methods, build files, CAD models, printed demonstration articles, list of relevant software, photos, video, meeting minutes, allowables, KPPs, software packages, samples, drawings, digital models, specifications and other project specific deliverables to appropriate AFRL transition partners and to America Makes for dissemination to members via the America Makes CORE.

Minimum deliverables for any proposal in response to the RFP include:

Minimum Deliverable	Timeline
Written Technical Progress Reports	Quarterly
Project update calls or virtual meetings between project team and America Makes/NCDMM PM	Monthly, or more as necessary

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Financial and man-hour reports	Monthly
Kickoff Meeting	1 month after award or sooner
Data Management Plan including at minimum: Any commercial software packages to be used, standards or data schemas to be used, and methodology for notating and labelling data to enable linking of various sample properties and characteristics, and plans for incremental delivery of data, and key performance parameters (KPP's)	Draft at time of proposal Final no later than 3 months after award
Data Persistence Plan (how will data be stored and accessed after project conclusion) – this is meant to address data storage by the project lead by means aside from America Makes CORE	Initial at proposal Final no later than 3 months after award
Planned project deliverables list with corresponding (existing/ new) Technology Roadmap Requirements	Draft at time of proposal Final no later than 3 months after award
Experimental, qualification, material, testing and inspection data (feedstock, process, material, post-process, property, etc.) available in a static format and in a database with property meta-data (including CAD models and build files); non-destructive inspection data and meta-data	Delivered or posted to America Makes CORE database regularly as available
Schema and Data Compliance Reviews Data shall: Be provided electronically, demonstrate pedigree and provenance, identify test apparatus/manufacturing/fabrication equipment and calibration, testing standards or processing specifications used to include sample preparation and/or manufacturing equipment configuration, experimental/characterization/manufacturing process conditions and procedures, raw mechanical test data, data reduction and statistical analysis procedures, and any uncertainty associated with data	Quarterly
Presentation at an America Makes meeting (MMX/TRX)	Once per calendar year

<p>Proposal lead organization shall participate on at least one swimlane working group (Design, Materials, Process, Value Chain, or AM Genome) relevant to subject matter of the project</p>	<p>Quarterly (via progress reporting)</p> <p>Effort performed (as well as hours) via working group participation shall be documented in progress reports and regular attendance should be maintained for all working group teleconferences/meetings.</p> <p>Minimum of one presentation outlining all deliverables (CDIP, associated tangible artifacts, and associated roadmap requirements), KPP's, and data management plan within 3 months of project start date.</p> <p>Minimum of one presentation of milestone achievements, KPP's, and lessons learned relevant to the fulfillment or creation of roadmap requirements no later than 60 days of the period of performance end date.</p>
<p>Written Final Project Report (minimum one round of revision completed with PM/NCDMM prior to final submission).</p> <p>At a minimum report will outline: application, approach, team members and roles, potential benefits of effort, motivations and reasoning for technical approach, KPPs, summary of tasking, methods, standards and specifications used, deviations to those standards or specifications, outcomes/results, summary and observations and analysis of data gathered, how data substantiated successful outcome of this effort, lessons learned, measurable impact(s) realized due to this effort, future opportunities for research and development realized through this effort</p>	<p>7 months after award</p> <p>Complete preliminary draft submission 5 months after award</p>
<p>Additional Deliverables specific to the proposed effort</p>	<p>"Deliver (upload to CORE) as you go" – As soon as data or deliverable is finalized for release</p>

3 PROPOSAL AND SUBMISSION INFORMATION

3.1 RFP Process

Project Proposal: Proposing project teams responding to topics 1 through 6 will develop a full project proposal and will have approximately 47 days to submit their full proposal to NCDMM. Proposals are due on Friday, August 25, 2023, prior to 5 p.m. eastern time.

Note: In previous America Makes request for proposals (RFP), a white paper was requested prior to full project proposal submission. This RFP **is not** utilizing a white paper phase and white papers **will not be accepted**.

3.2 Project Proposal Submission

Award of contract resulting from this RFP will be based upon the response to the Proposed Research Program Topics under Section 2 with the final decision based on the evaluation by NCDMM, OSD(R&E), and AFRL on the viability, efficiency, and value of the proposal.

NCDMM, OSD(R&E), and AFRL reserve the right to:

- Reject any or all offers and discontinue this RFP process without obligation or liability to any potential Proposer
- Accept other than the lowest priced offer
- Award a contract on the basis of initial offers received, without discussions or requests for best and final offers
- Award more or less than one contract for any topic described in Section 1 under the Total Amount to be Awarded

Project Proposals shall be submitted in several parts as set forth below. The Proposer will confine its submission to those matters sufficient to define its proposal and to provide an adequate basis for NCDMM's evaluation of the proposal.

Proposers are welcome to submit multiple proposals. Each proposal is limited to addressing only one topic.

3.3 Project Proposer Eligibility

NCDMM will recognize the integrity and validity of Proposer provided that:

- **All team members receiving federal award funding for proposals in response to topics 1 through 6 are current members of America Makes** and in good standing by Thursday, August 10, 2023.
- Information on how to join America Makes is available at www.americamakes.us/membership. Any non-America Makes members contributing to proposed effort execution are not permitted to participate in project team discussions until completing a fully executed America Makes Membership Agreement. (Note: The foreign membership approval process requires a minimum of three weeks to complete.)
- Cost share accrued in this project may also be applied towards membership, as with other project calls. However, cost-share proposed on a future project cannot

be counted towards a new America Makes membership. To become a member by the deadline, organizations shall commit to a cash payment and / or complete an @Program MOU.

- A 50% cost share is required for each project submittal. Example: If \$1.00 of funding is requested from America Makes, \$0.50 in cost share must be committed against that \$1.00 for a total scope of \$1.50
- The lead Proposer is fully responsible for all project and subcontract performance
- The lead Proposer shall be registered in U.S. System for Award Management (SAM) and have a cage code and UEI number before submitting a proposal
- Proposal team acknowledges that information from this project will be shared with America Makes members in accordance with the membership agreement
- Proposal team arrangements are identified and relationships are fully disclosed

All project team members must have a signed sub-agreement with the lead proposer, obligating them to their agreed project role, cost share, and the flow-down requirements of the overarching contract between the lead proposer and NCDMM before any funds will be made available from NCDMM to the lead proposer for the project.

Proposals in response to this RFP will be incorporated into a final agreement between NCDMM and the selected Proposer(s).

3.4 Required Forms and Documents

- **Technical Proposal.** The technical proposal (technical volume) should respond to the program description and shall contain the following information:
 - 1) **Executive Summary.** A concise synopsis of the Proposer's response to the Project Call **and not exceeding two (2) single-sided pages** in accordance with evaluation criterion 1 (See Section 4.1 (1) of this Project Call). All content in the executive summary shall be publicly releasable, non-proprietary, unlimited distribution information. The executive summary information will be used in the instance a proposal is selected for an award to communicate key information regarding the selected response as part of a public release or other public communication.
 - 2) **Technical Approach and Methodology.** A description sufficient to permit evaluation of the proposal in accordance with evaluation criterion 2 (See Section 4.1 (2) of this Project Call).
 - 3) **Data Management Plan.** A description sufficient to permit evaluation of the proposal in accordance with evaluation criterion 3 in (See Section 4.1 (3) of this Project call) **and not exceeding three (3) single-sided pages.**

Data management planning should be an integral part of research planning. A data management plan is a document that describes data generated through the course of the proposed research that will be shared and preserved, how it will be done, or explains why data sharing or preservation is not possible or scientifically appropriate, or why the costs of sharing or

preservation are incommensurate with the value of doing so. See also: DoD Instruction 3200.12.

<https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/320012p.pdf?ver=2019-04-30-073122-220>

The data management plan should conform to a format established by the relevant research discipline or a format that is similar to common industry (quality management system structures for example) data management practices and shall include at a minimum:

1. The types of data, software, and other materials to be produced
 2. How the data will be acquired
 3. Time and location of data acquisition, if scientifically pertinent
 4. How the data will be processed
 5. The file formats and naming conventions that will be used
 6. A description of the quality assurance and quality control measures during collection, analysis, and processing
 7. A description of dataset origin when existing data sources are used
 8. A description of the standards to be used for data and metadata format and content
 9. Appropriate time frame for preservation
 10. The plan may consider the balance between the relative value of data preservation and other factors such as the associated cost and administrative burden. The plan will provide a justification for such decisions.
- 4) **Technology Dissemination to America Makes Members, Impact to OSD(R&E), AFRL, and Likelihood of Impact to DoD Broader Supply Chain Partners.** A description sufficient to permit evaluation of the proposal in accordance with evaluation criterion 4 (See Section 4.1 (4) of this Project Call)
- 5) **Project Management Approach.** A description sufficient to permit evaluation of the proposal in accordance with evaluation criterion 5 (See Section 4.1 (5) of this Project Call).
- Any use of assets (equipment or personnel) based outside of the United States needs to be clearly identified in your proposal. Please provide the description, location, and utilization (number of hours or percentage of total effort) for any such assets.**
- 6) **Exhibit I.** Identification of Background Intellectual Property using the form included in this project call.
- 7) **Exhibit II.** Multiple Submissions Summary using the form included in this project call.

- 8) **Exhibit III.** Letters of Commitment, detailing the organization name, point of contact, phone, email, summary of the agreed role, dollar value and description of proposed cost share from the team member
 - 9) **Exhibit IV.** Publication of Consortium Developed Intellectual Property agreement using the form included in this project call
 - 10) **Exhibit V.** Identification of project Consortium Developed Intellectual Property, owning organization(s), and acknowledgement of any deliverable ITAR restrictions using the form included in this project call
- **Cost Volume.** The Cost Volume shall contain the following information:
 - 1) Include a cost breakdown by project phase and estimates of expenses. Other Federal funding (non-America Makes) may be identified as leveraged funds but is ineligible to be counted as recipient cost share. The Proposer shall submit a cost proposal in a separate volume marked "Proprietary Cost Proposal," clearly identifying requested funding and cost share. NCDMM requires the Proposer to provide detailed, itemized pricing for proposals utilizing the provided cost template. The NCDMM will be awarding a cost reimbursable **no fee** type contract under this RFP.
 - 2) **Exhibit VI:** Proposal Cost Summary
 - 3) **Guidelines for America Makes Cost Proposal Budget Justification**
 - America Makes Subrecipient Agreements will be Cost Reimbursable type agreements.
 - The cost proposal will include total project cost by task, by month, by government fiscal year. The offeror will also provide a detailed cost breakdown of the total project costs. Offerors are required to include costs that are in accordance with 2 CFR 200. The total cost of each major cost element and the make-up of those costs should be presented in the offeror's proposal. A statement related to the latest DCAA audit and whether the offeror's accounting system has been approved by the DCAA should be included in the cost proposal. Please provide a DCAA approval letter for currently negotiated DCAA rates and factors being used in the proposal.
 - Cost proposal is to be in Excel file format.
 - Detailed breakdown of costs by cost category by month and task include:
 - Direct Labor - Individual labor categories or personnel with associated labor hours and unburdened direct labor rates with support on how the rates were developed.
 - Indirect Costs - Fringe benefits, Overhead, G&A, Cost of Money, etc. (must show base amount and rate) If approved rates available, please provide documentation.

- Travel - Number of trips, number of travelers, destinations, duration of each trip, airfare, car rental and miscellaneous travel costs. Travel is to be priced based on the GSA Per Diem Rates <https://www.gsa.gov/travel/plan-book/per-diem-rates>. A specific and direct relationship to the technical requirement must be documented.
 - Materials - An itemized listing of all items proposed with the associated direct cost is required. Items that exceed \$10,000 are required to have supporting documentation supplied. The supporting documentation may be in the form of a vendor quote, prior purchase order or prior invoice (preferably no more than six months old), catalogue price, or an engineering basis of estimate.
 - Subcontracts - An itemized listing of all items proposed with the associated direct cost is required. Items that exceed \$10,000 are required to have supporting documentation supplied. The supporting documentation may be in the form of a vendor quote, prior purchase order or prior invoice (preferably no more than six months old), catalogue price, or an engineering basis of estimate. Should the value of an individual subcontract exceed \$2M, please supply the associated cost analysis that evaluates the reasonableness and realism of the proposed subcontractor's costs.
 - Equipment - An itemized listing of all items proposed with the associated direct cost is required. Items that exceed \$10,000 are required to have supporting documentation supplied. The supporting documentation may be in the form of a vendor quote, prior purchase order or prior invoice (preferably no more than six months old), catalogue price, or an engineering basis of estimate.
 - Other Direct Costs - Costs that do not fall in any of the above categories but are direct costs. An itemized listing of all items proposed with the associated direct cost is required. Items that exceed \$10,000 are required to have supporting documentation supplied. The supporting documentation may be in the form of a vendor quote, prior purchase order or prior invoice (preferably no more than six months old), catalogue price, or an engineering basis of estimate.
 - Cost Share - Cost Share is required to be at the same level of detail as the proposed costs.
- For all proposed costs, sufficient information should be provided in supporting documents to evaluate the reasonableness and realism of these proposed costs.

- Additional company overview information required:
 - Official registered name (Corporate, D.B.A., Partnership, etc.),
 - Address
 - Unique Entity ID (UEI) number and CAGE code.
 - Telephone number and Fax number (if available)
 - Technical Point of Contact, title, address (if different from above address), direct telephone and fax numbers.
 - Contractual Point of Contact (authorized to contractually bind the organization for any proposal regarding this RFP), title address (if different from above address), direct telephone and fax numbers.
- If the subrecipient prefers not to disclose any portion of the requested proposed supporting documentation directly to the prime (NCDMM/America Makes), the subrecipient may submit directly to the US Government. A written notification of this election must be supplied with the subrecipient's proposal submission. After the prime has submitted the entire proposal to the US Government, the requisite Points of Contacts will be provided to the subrecipient and the subrecipient will be responsible for submitting all the supporting documentation not already submitted to the prime directly to the government. The subrecipient will be responsible to respond to any questions that arise from information submitted by the subrecipient or by the prime with regard to the subrecipient's proposal.

Project Team Appendix. The Project Team Appendix shall contain biographies and relevant experience of key team staff and management personnel. Describe the qualifications and relevant experience of the types of staff that would be assigned to this project by providing biographies for those staff members.

Any foreign persons conducting work on the project shall be declared within the Project Team Appendix. Any project activities occurring outside of the U.S. or by non-U.S. persons must be reported and approved in advance by the America Makes Program Management Office.

Project Strategic Relevance Appendix (considered for responses to topics 1 through 6 only): The Project Strategic Relevance Appendix shall contain explicit examples of how the proposed work is integral to the vested interests of the proposing team. In addition, how the successful outcomes of the proposed project will integrate into potential follow-on efforts. There is no guarantee of follow-on funding. Details should be included which highlight the follow-on approach, milestones, deliverables, approximate timeline to achieve TRL 7, and associated relevant KPPs.

3.5 Project Proposal Format

- 1. Cover Page:** The lead Proposer shall include their cage code and UEI number on the cover page.

2. **Email:** The Proposer shall submit one (1) electronic copy in response to this Project Call.
3. **Paper copies and facsimile (fax) submission.** Paper and fax submissions will not be accepted.
4. **Figures, graphs, images, and pictures.** Figures and tables must be numbered and referenced in the text by that number. They should be of a size that is easily readable and may be in landscape orientation. They must be formatted to print on an 8.5 x 11-inch paper size.
5. **Font.** Proposals are to be prepared with easy-to-read font such as Times New Roman or Arial (11 point minimum), single-spaced. Smaller font may be used in figures and tables but must be legible.
6. **Page Layout.** The Technical Volume must be in portrait orientation except for figures, graphs, images, and pictures. Pages shall be single-spaced, 8.5 by 11 inches, with at least one-inch margins on both sides, top, and bottom.
7. **Page Limit. Page limit for the Proposal shall be:**
 - a. The Technical Volume is limited to 20 pages. Information beyond 20 pages will not be considered. The page limit includes a table of contents (if included) and the required sections within the technical volume. The page limit **DOES NOT** include the Cover Page, Executive Summary, or Exhibit I, Exhibit II, Exhibit III, Exhibit IV, Exhibit V, and Reference Page.
 - b. The Cost Volume is limited to 5 pages. Information beyond 5 pages will not be considered. The page limit includes a table of contents (if included) and the required sections within the cost volume. The page limit does not include spreadsheets containing detailed cost information and Exhibit VI.
 - c. The Project Team Appendix is limited to 10 pages. Information beyond 10 pages will not be considered. The page limit includes a table of contents (if included). Page limit does not include the Cover Page.
 - d. The Project Strategic Relevance Appendix is limited to 3 pages. Information beyond 3 pages will not be considered. The page limit includes a table of contents (if included). Page limit does not include the Cover Page.
8. **Page Numbering.** Number pages sequentially within each section of the proposal showing proposal section and page number.
9. **Proposal Language.** English

3.6 Submission Dates

All full project proposals in response to this RFP are due by **Friday, August 25, 2023, 5 p.m. Eastern time**. Any Project Proposal received after the time and date specified for

receipt shall be considered late and non-responsive. Any late submissions will not be evaluated for award. NCDMM is not responsible for email system malfunctions or undeliverable email. Project Proposal submissions must be submitted by email marked with “America Makes Open Project Call 2023 – Methods and Approaches for Sustainable AM Operations – Topic #”

Proposers are welcome to submit multiple proposals. Each proposal is limited to addressing only one topic.

Send submissions to:

Jason Thomas
 Program Coordinator, America Makes
 National Center for Defense Manufacturing and Machining
projectcall@americamakes.us

Important Dates:

Event	Date
1. Project Call Announcement and Posting	7/10/2023
2. Webinar at America Makes Virtual TRX (registration required)	7/27/2023
3. Questions from Proposers about Scope or Approach Due	7/28/2023
4. Responses to Proposers about Scope or Approach Due (All questions and responses will be shared with all proposers on www.americamakes.us)	8/2/2023
5. Fully Executed NDA with NCDMM (only if proposal contains proprietary information)	8/10/2023
6. Deadline for all proposal team members receiving federal funding (topics 1 through 6) to complete a fully executed America Makes Membership Agreement	8/10/2023
7. Full Project Proposal Submission Due Date	8/25/2023
8. Anticipated decision and notification to project proposal teams	9/25/2023
9. Anticipated Date to have ALL Projects on Contract	11/1/2023
10. All project finalized reports and deliverables (topics 1 through 6 only) received no later than	6/3/2024

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4 PROJECT PROPOSAL REVIEW INFORMATION

4.1 Evaluation Criteria

The elements used in evaluating submitted proposals and assigned weights are as follows:

1. **Executive Summary** (Executive summary is not scored but will be considered as part of the overall value proposition of the proposal.)
 - The degree to which the proposer provides a concise synopsis of the response addressing the related topic in Section 2, the team members, merit/necessity of proposed effort, value to membership from outcomes of the proposed effort, the proposed timeline to complete said effort, a rough order magnitude of award amount requested (whole dollars) and corresponding total industry cost share, and a listing of key deliverables/outcomes.
2. **Technical Approach and Methodology (40%)**
 - The degree to which the proposal provides a clear, concise statement of the problem(s), and identified need being addressed.
 - The degree to which the proposal clearly explains why funding is required, including a discussion of other sources that have been obtained or are being pursued and how this funding will provide specific benefits and measurable (quantifiable) impact to the defense industrial base, OSD(R&E), AFRL, and America Makes members.
 - The degree to which the proposal describes in detail the project's scope of work and the approach used to achieve the results.
 - The degree to which the proposal describes how barriers (that have prevented the identified problem or need from being addressed and/or resolved in the past) will be overcome by the proposed effort.
 - The degree to which the proposal demonstrates awareness of competing and emerging technologies and identifies how the proposed concept provides significant improvements over other solutions to the USAF needs being addressed.
 - The degree to which the proposal identifies, quantifies, and explains Key Performance Parameters (KPPs) for demonstrating progress of the technology compared to a baseline and validating the outcomes of tasking in a manner conducive to technology or manufacturing readiness level assessments. This criterion should not be confused as a metric for project execution progress, task completion, or tracking the number of tests conducted. **Responses of such nature are highly discouraged.**
 - The degree to which the proposal demonstrates alignment of tasks to KPPs and the America Makes AM Technology Roadmap and explicitly defines

how progress may be significant, quantitatively demonstrated/measured, and documented for addressing KPPs and roadmap requirements.

- The degree to which the proposal demonstrates how tasks will facilitate the development, discovery, and documentation of new requirements (not yet detailed within the roadmap) through research, deliverables, KPP's, presentations, reports, and working group participation.
- The degree to which the project plans to obtain or leverage additional or external resources, and the credibility of that plan.
- The strength of the proposal team including the capabilities, facilities, experience, and ability of the team to successfully complete the project.

3. Data Management Plan (10%)

- The degree to which the proposal articulates a plan to transition the project results (including methods/procedures, decision making rationale, reports, raw data, allowable, KPP's, presentations, meeting minutes, software, samples, hardware, drawings, digital models, specifications, and other project specific deliverables) to the Air Force, OSD(R&E), and America Makes members in an organized, reusable and interoperable manner.
- The degree to which the data management plan clearly and concisely describes data generation and data types in regards to proposed tasking, efforts, activities, etc.
- The degree to which the data management plan clearly outlines the minimum criteria introduced in Section 3.4.
- The degree to which the data management plan demonstrates an approach which ensures data integrity, data pedigree, and provenance (traceability) is maintained and explicitly addresses team member roles and responsibilities for certain data types, sources, and a commitment to compliance reviews on a regular cadence.
- The degree to which a clear plan to establish data/file storage structures that are maintained as data is gathered, analyzed, and transferred to America Makes CORE
- The degree to which the team outlines a clear plan for ensuring data integrity and reuse through quality assurance and quality control measures during collection, analysis, and processing.
- The degree to which an approach is described where data is managed, curated, and regularly uploaded to CORE so a substantial level of effort in the later portion of the program is avoided, or such risks are actively mitigated.

4. Technology Dissemination to America Makes Members, Impact to OSD(R&E), AFRL, and Likelihood of Impact to DoD Broader Supply Chain Partners (30%)

- The degree to which the proposal articulates a plan for furthering the mission of the institute through working group (Design, Material, Process, Value Chain, or AM Genome) participation including presentation of milestone achievements or lessons learned relevant to the fulfillment or creation of roadmap requirements, requesting subject matter expertise support, and consultation for project steering group purposes or as necessary.
- The degree to which the proposal articulates the potential widespread usage of the transitioned technology, its impact (in a manner as outlined in Section 2) on the defense industrial base, and the merits of the sources of information used to establish the validity and significance of such impact.
- The degree to which the proposal will likely impact the OSD(R&E), USAF, and broader DoD supply chain regarding:
 - outlining potential to increase U.S. manufacturing competitiveness;
 - ensuring transferable data exchange of project deliverables within the America Makes member community;
 - outlining the current maturity level of the technology and the target maturity needed for successful transition;
 - identifying key transition decision points; and
 - determining transition milestones and anticipated transition schedule.

5. Program Management Approach (20%)

- The degree to which the proposal clearly described the project tasks in narrative form and the practicality of achieving the project goals as planned and on time.
- The degree to which the proposal provides a description of the organizational structure for the project, clearly identifying the role and responsibilities of each participant, including subcontractors.
- The degree to which the proposal describes the project work breakdown structure using a Gantt chart to show tasks, subordinate tasks, team member roles/task, detailed deliverable definition, and critical milestones / deliverables dates.
- Past cost and schedule management, and technical performance on America Makes projects.
- The degree to which the proposal describes project risks in terms of probability and consequence to delivery and corresponding plans for risk monitoring and mitigation with details for specific associated tasking as necessary.

6. Cost (Cost and cost share are not scored but will be considered as part of the overall value proposition of the proposal.)

- The reasonableness, realism, and affordability of the proposed costs.
- The quality and quantity of the project team's cost share.
- The degree to which any proposed cost share was of high value in terms of source, quality and applicability of any cost share to the performance of the project.
- The degree to which letters of commitment are provided, and the value and credibility of the commitments (federal funding is not eligible to be counted as cost share, however, consideration will be provided in the evaluation regarding the extent that other Federal funding is leveraged).

4.2 Review and Selection Process

1. Initial Screening of All Proposals for Compliance with Proposal Requirements. All proposals will receive an administrative review for adherence to the RFP requirements. Ineligible and/or incomplete proposals are subject to elimination from further review.
2. Proposal Evaluation and Peer Review. Proposals determined eligible and/or complete will proceed for a full evaluation by evaluators who are independent of all teams submitting proposals. Proposals will be selected based on score, and how they contribute to the balance (technologies addressed, risk, cost, etc.) in the overall Technology Investment Portfolio.

4.3 Reporting Requirements

In addition to reporting requirements that are part of the sub-recipient agreement between NCDMM and the proposer, the following are required:

1. Technical progress reports
2. Kickoff meeting
3. Virtual teleconferences with project team
4. Program Review Meetings as applicable
5. Financial and man-hour reports
6. Man-hour reports for attending working group meetings and supporting working group activities
7. Data management plan
8. Data persistence plan
9. Presentations at national meetings/conferences as applicable
10. LAYERS manuscripts as applicable

11. Project briefings annually at America Makes Members Meeting (TRX or MMX)
12. Reports, presentations, or teleconferences upon request by NCDMM, OSD(R&E), or AFRL
13. Working group, advisory group, or steering committee participation shall include presentation of deliverables, KPP's, data management plan, milestone achievements or lessons learned relevant to the fulfillment or creation of roadmap requirements, requesting subject matter expertise support, and consultation for project steering group purposes or as necessary.
14. Finalized, written report (minimum one round of revision with NCDMM required before final submission)

5 ADMINISTRATIVE INFORMATION

All questions concerning this RFP must be presented by email to projectcall@americamakes.us to the technical contact below. Questions regarding the RFP received in any other manner will not receive a response. Frequently asked questions and responses will be posted to the America Makes website at americamakes.us for clarification if received during the Question and Answers period. All responses to the questions received during the Q&A period will be posted simultaneously on the Q&A section of the Project Call website.

5.1 Contact Information

- Questions concerning technical specifications must be directed to:

Name	Jason Thomas, Portfolio Manager
Address	America Makes 236 West Boardman Street Youngstown, OH 44503
Phone	330-409-9160
Email	projectcall@americamakes.us

- Questions concerning contractual terms and conditions, or proposal format must be directed to:

Name	Gene Berkebile, Vice President and Chief Financial Officer
Address	National Center for Defense Manufacturing and Machining 486 Cornell Road Blairsville, PA 15717
Phone	724-539-5743

Email	gene.berkebile@ncdmm.org
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5.2 Responsibility for Compliance with Legal Requirements

The Proposer's products, services, and facilities shall be in full compliance with all applicable Federal, state, and local laws, regulations, codes, standards, and ordinances regardless of whether or not they are referred to by NCDMM.

5.3 Proposer Rights

Upon delivery, all materials submitted in response to this RFP may be appended to any formal documentation, establishing a contractual relationship between NCDMM and the Proposer.

NCDMM and potential Proposer will sign a non-disclosure agreement (NDA) to protect corporate intellectual property if contained in the proposal. Information contained in proposals shall be unclassified. If a project proposal contains export control and/or proprietary information, this must be identified on the cover page of the proposal and identified within the proposal.

5.4 Proposer Incurred Costs

The Proposer shall be responsible for all costs incurred in preparing or responding to this RFP. Materials and documents submitted in response to the RFP will not be returned.

5.5 Proposer Errors or Omissions

NCDMM is not responsible for any Proposer errors or omissions concerning the RFP process.

5.6 Modification or Withdrawal of a Proposal

The Proposer agrees in submitting a proposal that the proposal may not be modified, withdrawn, or cancelled by the Proposer, unless agreed upon with NCDMM, for 90 calendar days following the submittal date. Proposer's proposal will be valid for a period of 90 calendar days following the submittal date.

5.7 Reservation of Rights

This RFP does not commit NCDMM to award a contract, to pay any costs incurred in the preparation of a proposal to this request, or to procure or contract for services or supplies. NCDMM may require the Proposer to participate in negotiations and to submit such monetary, technical, or other revisions of its proposals that may result from preliminary review and negotiations.

5.8 Anticipated Number of Projects

The number of applied research project awards and Federal funding amount allocated to this RFP will be determined based on the quality and quantity of proposals received.

5.9 Notice on the NCDMM Sub-Recipient Agreement

The purpose of this notice is to advise Lead Proposers that per the America Makes Sub-Recipient Agreement, Article 7 Intellectual Property and Article 9 Publications are non-negotiable and by submitting a proposal for this RFP you and your team agree to the language as outlined below and found in the sub-recipient agreement. Please note that Article 7 and Article 9 in the sub-recipient agreement mirrors Section 4 and Section 6 of

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the America Makes membership agreement. The Lead Proposer on winning proposals should be expected to sign the sub-recipient agreement within 60 days, if the Lead Proposer fails to sign the sub-recipient agreement within 120 days the NCDMM/America Makes reserves the right to cancel the award. The Lead Proposer should review the sub-recipient agreement internally and with the project team prior to proposal submission in order to assure the contract can be negotiated within the required timeline. Any requested changes to the sub-recipient agreement (exclusive of Article 7 and Article 9) should be sent with your proposal using track changes. By submitting a proposal without any requested changes to the sub-recipient agreement you hereby agree to the language as is and will sign immediately upon any eventual award.

ARTICLE 7. INTELLECTUAL PROPERTY

7.1 Background Intellectual Property. Each Sub-Recipient/Sub-Recipient/Member shall retain all rights to its Background Intellectual Property; and the decision to make available any such Background Intellectual Property for use in a Sub-Recipient/Member's sub award project shall be at the sole discretion of each Sub-Recipient/Member and in accordance with DOD regulations with respect to identification of all such Background Intellectual Property. No license or rights are granted to a Sub-Recipient/Member's Background Intellectual Property under this Agreement.

7.1.1 In the event that one Sub-Recipient/Member may require use of another Sub-Recipient/Member's Background Intellectual Property that has been disclosed by a Sub-Recipient/Member as part of the Consortium Research in order to successfully commercialize any CDIP then the Sub-Recipient/Members agree to discuss potential licensing terms and conditions in a separate legally binding agreement between the Sub-Recipient/Members, separate from this Agreement. Sub-Recipient/Member(s) are not required to license any such originating Sub-Recipient/Member(s) Background Intellectual Property.

7.2 Consortium Developed IP shall be owned by the respective inventing or creating organizations, subject to any government rights and/or any pre-existing rights of any third party and subject to the following conditions:

7.2.1 If a Party solely or jointly creates CDIP, the Party must disclose the creation of such CDIP to its technology transfer office, licensing office or other similar department ("Party's TechTransfer Office"). A non-confidential summary of the CDIP disclosed to the Party's TechTransfer Office shall be sent to NCDMM as soon as practicable so that NCDMM can maintain a list of CDIP. Sub-Recipient/Members owning CDIP shall grant upon request to NCDMM and Sub-Recipient/Members-In-Good-Standing at the time of creation a limited, non-exclusive, royalty-free license to use the CDIP for the Sub-Recipient/Member's internal procedures, research or development purposes (but not to make, use, or sell products or external processes for commercial purposes, with the exception of licenses granted pursuant to Section 7.2.3) Such licenses shall be granted to interested Sub-Recipient/Members upon request in a separate legally binding mutually agreeable license agreement between the Sub-Recipient/Members. Payment of patent expenses may be required of Parties granted non-exclusive, royalty-free commercial licenses by universities and other non-profit institutions. Such licenses for Sub-Recipient/Members shall be without the right to grant sublicenses to third parties, except for any Sub-Recipient/Member-designated agents, contractors and non-employee students ("Permitted Third Parties") performing work for the benefit of such Sub-Recipient/Member. Under these circumstances the Sub-Recipient/Member is responsible for having any and all appropriate written agreements with such Permitted Third Parties to enable Sub-Recipient/Member's compliance with this Agreement and is responsible for such parties' use of the CDIP in the same manner Sub-Recipient/Member is responsible for its own use of such CDIP (e.g., violation of the license parameters set forth in this section by a Sub-Recipient/Member's Permitted

Third Parties shall be considered a breach of this Agreement by Sub-Recipient/Member).

7.2.2 Sub-Recipient/Members are strongly encouraged to seek legal protection in the form of patents as soon as is reasonably possible following disclosure of all CDIP to NCDMM. Protection of a Sub-Recipient/Member's solely developed CDIP shall be done at Sub-Recipient/Member's own expense and through use of their respective Party's TechTransfer Office. Each Sub-Recipient/Member agrees to notify in writing NCDMM in a timely manner of all such actions in which legal protection is or has been sought so that NCDMM can enter such information in its invention disclosure database. With respect to jointly developed CDIP the relevant Sub-Recipient/Members agree to negotiate a separate legally binding agreement encompassing those terms and conditions to be used to govern the manner in which jointly developed CDIP will be owned, administered, protected, and licensed. NCDMM will be notified in writing in a timely manner of the existence of these agreements between Sub-Recipient/Members and NCDMM shall maintain pertinent information in its invention disclosure database. In the event that a single Sub-Recipient/Member for solely developed CDIP, or all Sub-Recipient/Members with an ownership right for jointly developed CDIP choose not to seek legal protection and thereby elect not to file a patent application on any CDIP, then Sub-Recipient/Member(s) agree to notify NCDMM in writing of its intent and must report any pending publication or presentation to NCDMM at the time of this notification. NCDMM may negotiate to obtain such protection at its own expense where Sub-Recipient/Member(s) choose not to seek legal protection. Ownership of CDIP shall remain with the originating Sub-Recipient/Member(s).

7.2.3 It is anticipated that one of the outcomes of an active IP licensing and commercialization plan is the generation of royalty income by a respective Sub-Recipient/Member. It is acknowledged that Sub-Recipient/Members of academic, government, and industry sectors will manage the disposition and reporting requirements of all royalties received in accordance with their institution's existing policies, through their Party's TechTransfer Office. To the extent it may legally do so, Sub-Recipient/Members owning CDIP shall grant NCDMM and Lead Sub-Recipient/Members-In-Good-Standing a limited, non-exclusive, royalty-free license to use the CDIP for commercial purposes and Full Sub-Recipient/Members-In-Good-Standing shall be granted such licenses at a fair market value royalty rate. Such licenses shall be granted to interested Sub-Recipient/Members upon request in a separate legally binding mutually agreeable agreement between the Sub-Recipient/Members. Such licenses for Sub-Recipient/Members shall be without the right to grant sublicenses to third parties, except for any Sub-Recipient/Member-designated agents, contractors and non-employee students performing work for the benefit of such Sub-Recipient/Member, provided, however, the Sub-Recipient/Member is responsible for having any and all appropriate written agreements with such parties to enable Sub-Recipient/Member's compliance with this Agreement and is responsible for such parties' use of the CDIP in the same manner Sub-Recipient/Member is responsible for its own use of such CDIP (e.g., violation of the license parameters set forth in this section by a Sub-Recipient/Member's contractor shall be considered a

breach of this Agreement by Sub-Recipient/Member). In addition, sublicensing shall be permitted to the licensee's direct customers.

7.3 Licenses granted under this Section 7 shall be subject to these additional terms:

Any licenses granted to a Sub-Recipient/Member through a separate document as specified in this Section 7 shall become a royalty bearing license at fair market value for such a Sub-Recipient/Member who is designated a Withdrawn Sub-Recipient/Member.

It is understood that the United States Government (through any of its agencies or otherwise) may provide use of its facilities or equipment and / or may provide funds for Consortium Research. As a result this Agreement, any and all rights and obligations of the Sub-Recipient/Members to any CDIP resulting from use of any United States Government's facilities, equipment or funds are subject to any and all applicable rights of the United States Government.

Notwithstanding anything to the contrary in this Agreement, certain laws, regulations and/or policies may prevent and/or limit certain Sub-Recipient/Members' ability to offer royalty-bearing licenses to CDIP that has previously been licensed by such Sub-Recipient/Members on a royalty-free basis. Therefore, the ability to charge royalties to Full Sub-Recipient/Members, Supporting Sub-Recipient/Members, and/or third parties is subject to the granting Sub-Recipient/Member's ability to do so in light of then-existing contractual obligations, legal and regulatory requirements, and policies of the granting Sub-Recipient/Member.

ARTICLE 9. PUBLICATIONS

9.1 The Parties agree and expect that results of Consortium Research associated with this agreement shall be published or otherwise made publicly available and that Parties engaged in Consortium Research shall be permitted to present at symposia, national or regional professional meetings and to publish in journals, theses or dissertations, or by other means of their own choosing, the results of their research, provided that nothing will be done which could bar the availability of patent protection with respect to CDIP of a Sub-Recipient/Member or America Makes (NAMII) invention or which would disclose Proprietary Information of any Sub-Recipient/Member or of America Makes (NAMII) or disclose information in violation of the applicable U.S. laws and regulations (e.g., the International Traffic in Arms Regulations ("ITAR") and the Export Administration Regulations ("EAR") that govern the export of specific technical data and technologies, including software, prototypes and other intellectual property, to foreign countries and foreign nationals ("Export Control Laws").

9.1.1 A Party will not make a public disclosure without a review of the full text of the proposed publication, presentation or other form of public disclosure by the Sub-Recipient/Member(s) involved, the America Makes (NAMII) Director and Government PM as described below. The Sub-Recipient/Member(s) involved, the America Makes (NAMII) Director and Government PM shall be provided a copy of the proposed public disclosure at least sixty-five (65) days in advance of the submission of such proposed

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public disclosure and shall have two (2) weeks after receipt of said proposed disclosure to respond in writing to the submitting Party to identify Proprietary Information and/or to identify any potentially patentable CDIP and/or to identify any CDIP in which the submitting Party does not have an ownership interest. A submitting Party agrees to remove any identified Proprietary Information, potentially patentable CDIP and/or CDIP in which the submitting Party does not have an ownership prior to public disclosure (or, for potentially patentable CDIP in which the submitting Party does have an ownership interest, delay public disclosure for a period of sixty (60) days from the date of the response).

9.1.2 Notwithstanding anything to the contrary above, student theses and dissertations shall be subject to a separate review and comment process wherein the student shall submit such student thesis or dissertation in draft form at least sixty (60) days in advance of the date of their final defense in order to afford an opportunity to identify Proprietary Information and/or identify any potentially patentable CDIP and/or any CDIP in which the Party's student does not have an ownership interest.

9.1.3 America Makes (NAMII) and/or America Makes (NAMII) Sub-Recipient/Members may negotiate and implement a more restrictive public disclosure agreement than defined in paragraphs 9.1.1 and 9.1.2 for a specific America Makes (NAMII) project based on the need for extended non-disclosure of CDIP by the project participants.

9.1.4 An acknowledgment of funding and a disclaimer shall appear in the publication of any material, whether copyrighted or not, resulting from an America Makes (NAMII) project incorporating U.S. Government funds granted in support of the America Makes (NAMII) Consortium.

The acknowledgement shall read:

"This material is based on research sponsored by Air Force Research Laboratory under agreement number FA8650-20-2-5700. The U.S. Government is authorized to reproduce and distribute reprints for Governmental purposes notwithstanding any copyright notation thereon."

The disclaimer shall read:

"The views and conclusions contained herein are those of the authors and should not be interpreted as necessarily representing the official policies or endorsements, either expressed or implied, of Air Force Research Laboratory or the U.S. Government."

6 EXHIBITS

The exhibits are required as part of the proposal submittal and do not count toward the page limit.

6.1 Exhibit I. Identification of Background Intellectual Property

Project Title	
Organization	
Principal Investigator	

List all known background intellectual property to be used in the conduct of this project or for which access may be required to implement project results:

Inventor / Owner	Title	Patent or Disclosure I.D.

If controlled by a project participant, I understand that a “good faith” commitment to enter into negotiations for a license of this background intellectual property to America Makes or the project partners may be required.

OR

I am unaware of any background intellectual property to be used in the conduct of this project or that may be required for implementation of project results.

Intellectual Property Rights Policy & Confidentiality Statement

As the Principal Investigator at _____ (Member) participating in this project, I agree to accept and abide by the Intellectual Property Rights Requirements of the America Makes Membership Agreement, as approved by the Governance Board, dated _____. I understand that I may be the recipient from time to time of information of a confidential and proprietary nature belonging to another America Makes participating organization. I have read and explicitly agree to abide by the provisions Section 5 of the America Makes Membership Agreement with respect to proprietary information.

I further agree to assist the project participants in their obligation of implementing America Makes’ intellectual property requirements for funded projects. I will do this by encouraging the timely submission of invention disclosures by project participants to their appropriate Intellectual Property Office, clearly identifying such disclosures as relating to this project, and by providing any supporting documentation and information that may be requested from time to time for the purpose of filing patent applications under America Makes and/or the Inventing Organization(s).

Principal Investigator

Signature	
Printed Name	DATE:

6.2 Exhibit II. Multiple Submissions Summary

America Makes recognizes that projects may be submitted to multiple sources of funding.

America Makes must be informed if other funding is secured and will work with the Principle Investigator (PI) to modify this project scope, as appropriate.

List all planned or submitted requests for additional funding of work in this project area from sources other than America Makes.

Date Submitted or Planned Submittal Date	Organization	Decision Date

Principal Investigator

Signature	
Printed Name	
Date	

6.3 Exhibit III. Letters of Commitment

6.4 Exhibit IV. Acknowledgement of Consortium Developed Intellectual Property and Disclosure of Planned Publications

As the Principal Investigator at _____ (Member), I agree that results from this project will be considered consortium-developed intellectual property (CDIP) and will be shared amongst the membership according to the consortium-developed intellectual property (CDIP) structure in the Membership Agreement, with exceptions made for any ITAR/Export Control information.

As the Principal Investigator at _____ (Member) participating in a funded Project, I project the following publications of the results from this project. In addition, I agree that all publications will be approved through the AFRL Technical POC 45 days prior to public dissemination.

Summary of Planned Publications from Project Team

Principal Investigator

Signature	
Printed Name	DATE:

6.5 Exhibit V. Identification of Consortium Developed Intellectual Property

List all Consortium Developed Intellectual Property that will be delivered at the end of this project:

List of project CDIP and associated tangible artifacts, completion dates, background IP, and AM Technology Roadmap requirements (examples including, but not limited to best practices, cost-benefit analyses, COTS Capability, benchmark datasets, demonstration study, equipment specs, process parameters, raw data, component/design models, hardware, material & process specs, performance evaluations, procedures/guidelines/tutorials, process windows, quality assurance methods, reference test coupons, software/algorithms, and validated models). Add pages to the Exhibit V table as needed.

Organization Name / Responsible Party	Consortium Developed Intellectual Property	Detail Specific Tangible Artifacts to be Delivered to Membership	Expected Delivery Date to Membership	Associated Background Intellectual Property	Associated AM Technology Roadmap Requirement	ITAR Restricted (yes/no)

Principal Investigator

Signature	
Printed Name	
Date	

6.6 Exhibit VI. Proposal Cost Summary

Project Title	
Organization	
Address	
Principal Investigator	

Overall Requested Funding

America Makes	\$	Duration	(in months)
Cost Share	\$		
Project Total	\$		

Lead Organization

Name		Phone	
Address		Fax	
Cost Share (\$)		Email	

Partner (Please identify additional partners using the same format)

Name		Phone	
Address		Fax	
Cost Share (\$)		Email	

Also, please include an Excel spreadsheet (not pdf) of the proposed costs in a form similar to the example shown below:

	GRAND TOTAL	Task 1	Task 2	Task 3
REQUESTED AMERICA MAKES FEDERAL FUNDING				
LABOR	\$1,429,567	53,769	100,293	514,799
TRAVEL	\$146,880			
SUBCONTRACT	\$5,798,703	135,139	142,556	1,318,076
MATERIALS	\$240,850	0	0	104,850
EQUIPMENT	\$100,000	0	0	100,000
CONSULTANT	\$200,000	0	0	90,000
ODC's	\$84,000	0	0	0
TOTAL REQUESTED AMERICA MAKES FEDERAL FUNDING	\$8,000,000	\$188,908	\$242,849	\$2,127,725
COST SHARE				
LABOR	\$101,100	0	0	35,065
TRAVEL	\$0			
SUBCONTRACT	\$2,609,412	218,900	6,141	726,903
MATERIALS	\$50,000	0	0	20,000
EQUIPMENT	\$0	0	0	0
CONSULTANT	\$0	0	0	0
ODC's	\$110,000	0	0	40,000
TOTAL PROPOSED COST SHARE	\$2,870,512	\$218,900	\$6,141	\$821,968
TOTAL PROJECT EFFORT	\$10,870,512	\$407,808	\$248,990	\$2,949,693

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6 Exhibit VII. America Makes Sub-Recipient Agreement

SUB-RECIPIENT AGREEMENT

This SUB-RECIPIENT AGREEMENT (this “Agreement”) is made as of XXXXXXXX by and between National Center for Defense Manufacturing and Machining having offices at 486 Cornell Road, Suite 2, Blairsville, Pennsylvania 15717 (“NCDMM”) and XXXXXXXX, having offices at ADDRESS, CITY, STATE ZIP (“Sub-Recipient”) with a DUNS number of XXXXXXXXXXXX and a Cage Code of XXXXX.

WITNESSETH:

WHEREAS, NCDMM is a manufacturing technology center that has entered an agreement with the United States Department of the Air Force, dated as of November 25, 2019 under cooperative agreement number FA8650-20-2-5700 with CFDA number 12.800, to act as an administrator and technical performer in the fulfilment of the “America Makes Partnership (AMP) The National Additive Manufacturing Innovation Institute” (the “Prime Agreement”);

WHEREAS, NCDMM desires to engage Sub-Recipient and America Makes (NAMII) member to assist NCDMM in satisfying certain NCDMM obligations under the Prime Agreement; and

WHEREAS, the activities contemplated by this Agreement are of mutual interest and benefit to NCDMM and Sub-Recipient, and will further the fulfilment of America Makes (NAMII);

NOW, THEREFORE, in consideration of the mutual covenants and agreements contained herein, NCDMM and Sub-Recipient hereby agree as follows:

1 ARTICLE 1. DEFINITIONS AND SCHEDULES

1.1 1.1 Definitions. In addition to the terms defined elsewhere in this Agreement, the following terms shall have the meanings set forth below:

1.1.1 1.1.1 “**Affiliate**” means, with respect to any person or entity, any other person or entity directly or indirectly controlling, controlled by, or under common control with, such first person or entity. For purposes of this definition, the term “control” (including the correlative meanings of the terms “controlled by” and “under common control with”), as used with respect to any person or entity, shall mean the possession, directly or indirectly, of the power to direct or cause the direction of the management or policies of such person or entity, whether through the ownership of voting securities or by agreement or otherwise.

1.1.2 1.1.2 “**Applicable Law**” means all applicable federal, state and local laws, rules, regulations and guidelines relating to the conduct of the Parties’ businesses and the performance by the Parties of their respective obligations under this Agreement.

1.1.3 1.1.3 “**Exploit**” means to make, have made, import, use, sell, offer for sale or otherwise dispose of, including any research, development, registration, modification, enhancement, improvement,

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manufacture, storage, formulation, optimization, export, transport, distribution, promotion or marketing related thereto.

- 1.1.4** 1.1.5 “**Facility**” means the facility of Sub-Recipient, or any other facility used for the conduct of the activities that has been approved by NCDMM and complies with Applicable Law
- 1.1.5** 1.1.6 “**Invention**” means any discovery, improvement, process, formula, invention, know-how, trade secret, procedure, device, or other intellectual property, whether or not patentable.
- 1.1.6** 1.1.7 “**Materials**” means the equipment and materials supplied to Sub-Recipient by or on behalf of, or purchased at the expense of, NCDMM, reasonably necessary for Sub-Recipient to perform activities, solely as set forth in the SOW.
- 1.1.7** 1.1.8 “**Party**” means either NCDMM or Sub-Recipient; “**Parties**” means both NCDMM and Sub-Recipient.
- 1.1.8** 1.1.9 “**Statement of Work**” means the plan set out in Schedule A hereto.
- 1.1.9** 1.1.10 “**Consortium Research**” means research supported by membership dues and / or Incorporates funds provided by the FA8650-20-2-5700 cooperative agreement. Consortium Research does not include:
- 1.1.10.1 Research carried out under separate contract unless specified therein, or
- 1.1.10.2 Research fully funded by a Member and/or without using any of the funds specified in 1.1.10 above, or
- 1.1.10.3 Research carried out independently by a Member using America Makes (NAMII) facilities
- 1.1.10** 1.1.11 “**Consortium Developed Intellectual Property**” means individually and collectively all Intellectual Property which are conceived or made solely or jointly by Member(s) during the performance of this sub award project under Consortium Research.
- 1.1.11** 1.1.12 “**Background Intellectual Property**” means technical know-how, inventions, technical data, discoveries, materials, samples, software, software programs, whether patentable or not, copyrightable programs, documentation and reports whether in existence at the time of this agreement or coming into existence subsequent to this agreement, which were not developed in the course of performance of any sub award under the America Makes (NAMII) consortium.
- 1.1.12** 1.1.13 “**Intellectual Property**” means technical know-how, inventions, technical data, discoveries, materials samples, software, software programs, documentation, reports, any and all other copyrightable materials, and/or invention or discovery that is or may be patentable or otherwise protectable under title 35 of the U.S. Code.
- 1.2** 1.2 Schedules. The Schedules attached hereto are incorporated in and are deemed to be an integral part of this Agreement.

2 ARTICLE 2. ACTIVITIES

- 2.1** 2.1 . Sub-Recipient shall undertake and perform work in accordance with the Statement of Work (SOW) attached hereto as Schedule A, as the same may be amended from time to time in accordance with the terms hereof (Sub-Recipient’s responsibilities as set out in the SOW being hereinafter referred to as the “Activities”). The specific objectives, scope, deliverables and estimated schedule for the Activities are set forth in the SOW. Sub-Recipient agrees that it shall implement changes to the SOW that are reasonably requested in writing by

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NCDMM, subject, if applicable, to NCDMM's payment of any reasonable additional fees and/or expenses incurred by Sub-Recipient as determined in accordance with Section 4.4 that arise solely from such changes to the SOW. Any material change in the SOW shall be evidenced in a written amendment of Schedule A.

- 2.2** 2.2 Cooperation. The Parties shall cooperate with each other in the performance of this Agreement and shall deal honestly and in good faith with each other.
- 2.3** 2.3 Reporting/Transfer of Results. Sub-Recipient shall comply with the monthly written progress report requirements set forth in Section 4.5.1 and, if requested by NCDMM, on an ongoing basis, Sub-Recipient shall keep NCDMM informed of progress and interim results on an informal basis, including if requested, periodic meetings to discuss Activities progress and interim results. Further specific guidance regarding programmatic requirements are found in Schedule D. Upon completion of the Activities, termination of this Agreement pursuant to Section 10.2, or expiration of this Agreement (without a further agreement related to the substance hereof entered into as contemplated in Section 10.1), Sub-Recipient will provide NCDMM with a comprehensive written report of the results that have been developed, compiled or learned during the course of the Activities, and will comply with NCDMM's reasonable requests for follow-up information

3 ARTICLE 3. SUPPLY OF MATERIALS AND INFORMATION

- 3.1** 3.1 Supply or Purchase of Materials. If applicable, subject to the final sentence of this Section 3.1, within a commercially practicable time after written request from Sub-Recipient, NCDMM shall supply Sub-Recipient, if previously negotiated, Materials as set forth in the SOW. Sub-Recipient shall own all right, title and interest in and to any Materials, unless specifically identified to the contrary in writing. If NCDMM supplies Materials to Sub-Recipient, NCDMM shall provide Sub-Recipient with written documentation evidencing the value of such Materials (the "Valuation Price"). If the Parties disagree over the Valuation Price provided by NCDMM, after thirty (30) days of good faith discussions, either Party may request that the matter be submitted to arbitration for a binding decision in accordance with Section 4.7.
- 3.2** 3.2 Information. If requested by Sub-Recipient to provide information in NCDMM's possession that is not otherwise accessible to Sub-Recipient and that is reasonable and necessary for Sub-Recipient's performance under this Agreement ("Information"), subject to the following sentence, NCDMM shall provide such Information (or an explanation of the legitimate reason for any refusal or delay, and if delay, a projected date by which such Information will be provided) within a commercially practicable period of time after receipt of Sub-Recipient's written request. Notwithstanding the foregoing, NCDMM may, in its sole discretion, refuse to provide any Information to Sub-Recipient, including Confidential Information, Inventions or any other Information NCDMM deems, in its sole discretion, to be proprietary or unnecessary for use in the Activities, provided that Sub-Recipient shall not be deemed in breach of this Agreement if the sole reason it cannot perform any Research or Development Activities is NCDMM's refusal to provide Information reasonable and

necessary for the conduct of the Activities. NCDMM shall own all right, title and interest in and to any Information, unless specified to the contrary in writing.

- 3.3** 3.3 Use of Materials and Information. Sub-Recipient shall (i) use the Materials and Information only for the purposes described in the SOW or such other purposes as NCDMM may approve in writing, (ii) restrict access to and use of the Materials and Information to the Principal Investigator and other researchers employed by, or who are agents of, Sub-Recipient or any permitted Sub-Recipients for whom such access and use is required to conduct the Activities and who are bound by obligations of confidentiality at least as strict as those set forth in Section 6.
- 3.4** 3.4 Supply of Other Materials by Sub-Recipient. All equipment and materials other than the Materials set forth in the SOW, required for the Activities shall be purchased and paid for by Sub-Recipient, unless otherwise agreed to in writing by NCDMM. Sub-Recipient shall own all right, title and interest in and to such equipment and materials purchased under this Section 3.4, unless specifically identified to the contrary in writing.
- 3.5** 3.5 Non-Exclusive License. If, in its sole discretion, NCDMM determines that it is necessary for Sub-Recipient's conduct of the Activities, NCDMM may, by separate written agreement with Sub-Recipient, grant Sub-Recipient a non-exclusive, non-transferable and non-assignable right and license to use an Invention owned by, or licensed (with the right to sublicense) to, NCDMM, which license shall be limited in duration to the Term or such shorter period of time designated by NCDMM, limited in territory to use in a Facility, and limited in scope to use solely as needed to perform the Activities (or a part thereof as designated by NCDMM). For the avoidance of doubt, this Agreement does not grant any such license.

4 **ARTICLE 4. BUDGET AND PAYMENT**

- 4.1** 4.1 Compensation and Payment Terms. In consideration for the satisfactory performance of the Activities by Sub-Recipient in accordance with this Agreement, subject to the provisions of this Section 4, NCDMM shall, within thirty (30) days of receipt of an invoice and any supporting documentation in accordance with Section 4.5, pay to Sub-Recipient the amounts for the invoiced incurred expenses. All payments hereunder shall be made in U.S. dollars, by check.
- 4.2** 4.2 Reimbursement of Expenses. NCDMM shall reimburse Sub-Recipient for actual expenses incurred by Sub-Recipient for reasonable, necessary and verifiable:
- 4.2.1** 4.2.1 Materials that are set forth in the SOW that NCDMM does not provide to Sub-Recipient;
- 4.2.2** 4.2.2 Travel expenses incurred while performing the Activities in accordance with the Joint Travel Regulations as published by the Federal Government("Travel Expenses");
- 4.2.3** 4.2.3 Other expenses expressly set forth in Schedule B (Budget) ("Other Approved Expenses");
- 4.2.4** 4.2.4 Any other expenses specifically approved in advance in writing by NCDMM.

Collectively, the expenses referred to in Sections 4.2.1 through 4.2.4, are referred to herein as the "Expenses." Notwithstanding the foregoing, Sub-Recipient shall only be reimbursed for Expenses that are allowable costs under 2 Code of Federal Regulations 200, Subpart E. Sub-Recipient acknowledges

and agrees that NCDMM shall not pay or reimburse Sub-Recipient for any Expenses incurred by, or purchases made by or on behalf of, Sub-Recipient other than those set forth in this Section 4.2.

4.3 4.3 Total Obligation. Unless otherwise agreed in writing by the Parties, the foregoing amounts represent NCDMM's total obligation for any and all Activities and any and all expenses incurred by or on behalf of Sub-Recipient. The total funds authorized by this agreement shall not exceed \$XXXXXXXX.

4.4 4.4 Expense Changes. The Expenses are based on the scope of work and assumptions stated in the SOW. If NCDMM requests a change in the SOW which the Parties agree, in good faith, would result in an increase to Sub-Recipient of its cost of conducting the Activities, the Parties shall, in good faith, evaluate and discuss revised Expenses. Based on this evaluation and discussion, the Parties shall amend the SOW and Budget by written agreement. In the event the Parties cannot agree on a price change after thirty (30) days of good faith discussions, either Party may request that the matter be submitted to arbitration for a binding decision in accordance with Section 4.7.

4.5 4.5 Invoicing and Progress Reports.

4.5.1 4.5.1 Sub-Recipient shall invoice NCDMM once each month during the Term. Each invoice shall be accompanied by a written progress report, which shall describe the Activities Sub-Recipient has performed since the date of the last invoice and provide such other information as may be required by this Agreement or reasonably requested by NCDMM. Each monthly invoice shall include expenses and cost share for expenses incurred to NCDMM's reasonable satisfaction due Sub-Recipient since the date of the last invoice. For Expenses to be reimbursed pursuant to Section 4.2, Sub-Recipient shall include in the monthly invoice a summary report of the Expenses incurred since the date of the last invoice.

4.5.2 4.5.2 If NCDMM disputes any portion of an invoice, it shall pay the undisputed portion and shall provide Sub-Recipient with written notice of the disputed portion and its reasons therefor, and NCDMM shall not be obligated to pay interest on such disputed portion. In the event the Parties cannot agree on an invoice after thirty (30) days of good faith discussions, either Party may request that the matter be submitted to arbitration for a binding decision in accordance with Section 4.7.

4.5.3 4.5.3 **Closeout, Adjustment, Continuing Responsibilities and Reimbursement** – Final payment will not be made nor can this agreement be closed out until the sub-recipient delivers to NCDMM all the final closeout paperwork, disclosure of subject inventions, and the final project report. NCDMM may adjust downward the total obligation for the effort if this information is not provided.

4.6 4.6 Records Retention and Audit.

4.6.1 4.6.1 Records Retention. Sub-Recipient shall keep or cause to be kept accurate records or books of account in accordance with applicable generally accepted accounting principles that, in reasonable detail, fairly reflect the invoiced Fees and Expenses. Such books and records shall be maintained by Sub-Recipient for at least three (3) years following the end of the calendar year to which they pertain.

4.6.2 4.6.2 Audit. Upon the written request of the United States Government or NCDMM, Sub-Recipient shall permit a Government auditor, or a certified public accountant or a person possessing similar professional status and associated with an independent accounting firm reasonably acceptable to the Parties, to inspect during regular business hours all or any part of

Sub-Recipient's records and books necessary to verify invoices related to Expenses and Cost Share.

- 4.7** 4.7 Arbitration. In the event that a Party requests a Valuation Price determination in accordance with Section 3.1, a price change determination in accordance with Section 4.4, or an invoice determination in accordance with Section 4.5.2 to be submitted to an arbitrator, such determination shall be determined by a single arbitrator in accordance with the Commercial Arbitration Rules of the American Arbitration Association. The decision of the arbitrator shall be final and conclusive, absent manifest error. The Parties shall amend this Agreement if and as appropriate to implement the decision of the arbitrator.

5 **ARTICLE 5. REPRESENTATIONS, WARRANTIES AND COVENANTS**

- 5.1** 5.1 Sub-Recipient represents and warrants to, and covenants with, NCDMM that:

- 5.1.1** 5.1.1 Sub-Recipient shall perform the Activities in good scientific manner and in compliance with Applicable Law and shall use reasonable efforts to perform the Activities in accordance with the SOW.
- 5.1.2** 5.1.2 Neither Sub-Recipient nor any of its principal officers or employees has been debarred or suspended by any governmental entity from conducting any Activities or is subject to any such debarment and Sub-Recipient will not use in any capacity, in connection with its obligations under this Agreement, including via any permitted Sub-Recipient, any person who has been so debarred.
- 5.1.3** 5.1.3 Each Facility is and shall be during the Term in material compliance with all requirements of Applicable Law. There are, and during the Term shall be, no pending or uncorrected citations or adverse conditions noted in any governmental inspection of any Facility with respect to any Activities.
- 5.1.4** 5.1.4 Sub-Recipient owns or has the legal right to use all patents, know-how and other intellectual property rights required for use in its conduct of the Activities, excluding those rights obtained from NCDMM under separate written agreement of the Parties or owned by or licensed to NCDMM pursuant to this Agreement or otherwise.
- 5.1.5** 5.1.5 The Principal Investigator is, and at all times during the conduct of the Activities shall be, qualified by training and experience with appropriate expertise to conduct and supervise the Activities.
- 5.1.6** 5.1.6 Sub-Recipient (for itself and each Facility) and the Principal Investigator have, and at all times during the conduct of the Activities shall have, all appropriate licenses, approvals, authorizations, registrations, permits, and certifications necessary to safely, adequately and lawfully perform the Activities. Sub-Recipient shall provide copies of all such licenses, approvals, authorizations, registrations, permits or certifications upon NCDMM's request.

Sub-Recipient shall advise NCDMM immediately if any of the foregoing in this Section 5.1 ceases to be true and correct.

- 5.2** 5.2 Each Party represents and warrants to, and covenants with, the other Party that:

- 5.2.1** 5.2.1 It has the requisite power and authority to execute, deliver and perform its obligations under this Agreement and all governmental and third-party approvals necessary for it to enter into

and perform its obligations under this Agreement have been obtained, are in full force and effect and are final and non-appealable.

5.2.2 5.2.2 This Agreement is its legal, valid, and binding obligation, enforceable in accordance with its terms and conditions.

5.2.3 5.2.3 The execution and delivery of this Agreement and the transactions contemplated in it do not violate, conflict with, or constitute a default under the terms or provisions of any agreement or other instrument to which it is a party or by which it is bound, or any order, award, judgment, or decree to which it is a party or by which it is bound.

5.2.4 5.2.4 It is in compliance with all Applicable Law and it will comply with all Applicable Law during the Term.

A Party shall immediately notify the other Party if any of the foregoing in this Section 5.2 with respect to such first Party ceases to be true or correct.

5.3 5.3 Disclaimer. EXCEPT AS EXPRESSLY SET FORTH IN THIS SECTION 5, NCDMM MAKES NO REPRESENTATIONS AND GRANTS NO WARRANTIES, EXPRESS OR IMPLIED, EITHER IN FACT OR BY OPERATION OF LAW, BY STATUTE OR OTHERWISE, UNDER THIS AGREEMENT, AND NCDMM SPECIFICALLY DISCLAIMS ANY OTHER WARRANTIES, WHETHER WRITTEN OR ORAL, OR EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF QUALITY, MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE WITH RESPECT TO ANY MATERIALS (AS DEFINED IN SECTION 1.1.7) OR ANY WARRANTY AS TO THE NON-INFRINGEMENT OF ANY INTELLECTUAL PROPERTY RIGHTS OF THIRD PARTIES UNDER THIS AGREEMENT.

6 ARTICLE 6. CONFIDENTIALITY

6.1 6.1 In the normal and routine completion of this project, there may be some occasions where one Party discloses information that is proprietary and confidential to the disclosing Party. All such information which a disclosing Party believes to be proprietary, confidential, trade secret or the like undisclosed information shall be provided in writing or other permanent visual form (such as, for example, a physical prototype, physical sample, photograph, video or sound recording on any type of recording media) and designated as proprietary with an appropriate restrictive legend stamped or marked thereon at the time disclosure. Proprietary Information disclosed orally, must be identified as proprietary at the time of disclosure and summarized in writing as being proprietary within thirty (30) days of such disclosure.

6.2 6.2 The receiving Party agrees to exercise the same care and safeguards with respect to Proprietary Information disclosed by the disclosing Party as used to maintain the confidentiality of its own information of like character, but in no event less than a reasonable degree of care.

6.3 6.3 The obligations of confidentiality and non-disclosure set forth in this Section 6 shall continue for a period of five (5) years from the termination or expiration of this Agreement or until the information ceases to fall under the definition of Proprietary Information.

7 ARTICLE 7. INTELLECTUAL PROPERTY

7.1 7.1 Background Intellectual Property. Each Sub-Recipient/Sub-Recipient/Member shall retain all rights to its Background Intellectual Property; and the decision to make available any such Background Intellectual Property for use in a Sub-Recipient/Member's sub award project shall be at the sole discretion of each Sub-Recipient/Member and in accordance with DOD regulations with respect to identification of all such Background Intellectual Property. No license or rights are granted to a Sub-Recipient/Member's Background Intellectual Property under this Agreement.

7.1.1 7.1.1 In the event that one Sub-Recipient/Member may require use of another Sub-Recipient/Member's Background Intellectual Property that has been disclosed by a Sub-Recipient/Member as part of the Consortium Research in order to successfully commercialize any CDIP then the Sub-Recipient/Members agree to discuss potential licensing terms and conditions in a separate legally binding agreement between the Sub-Recipient/Members, separate from this Agreement. Sub-Recipient/Member(s) are not required to license any such originating Sub-Recipient/Member(s) Background Intellectual Property.

7.2 7.2 Consortium Developed IP shall be owned by the respective inventing or creating organizations, subject to any government rights and/or any pre-existing rights of any third party and subject to the following conditions:

7.2.1 7.2.1 If a Party solely or jointly creates CDIP, the Party must disclose the creation of such CDIP to its technology transfer office, licensing office or other similar department ("Party's TechTransfer Office"). A non-confidential summary of the CDIP disclosed to the Party's TechTransfer Office shall be sent to NCDMM as soon as practicable so that NCDMM can maintain a list of CDIP. Sub-Recipient/Members owning CDIP shall grant upon request to NCDMM and Sub-Recipient/Members-In-Good-Standing at the time of creation a limited, non-exclusive, royalty-free license to use the CDIP for the Sub-Recipient/Member's internal procedures, research or development purposes (but not to make, use, or sell products or external processes for commercial purposes, with the exception of licenses granted pursuant to Section 7.2.3). Such licenses shall be granted to interested Sub-Recipient/Members upon request in a separate legally binding mutually agreeable license agreement between the Sub-Recipient/Members. Payment of patent expenses may be required of Parties granted non-exclusive, royalty-free commercial licenses by universities and other non-profit institutions. Such licenses for Sub-Recipient/Members shall be without the right to grant sublicenses to third parties, except for any Sub-Recipient/Member-designated agents, contractors and non-employee students ("Permitted Third Parties") performing work for the benefit of such Sub-Recipient/Member. Under these circumstances the Sub-Recipient/Member is responsible for having any and all appropriate written agreements with such Permitted Third Parties to enable Sub-Recipient/Member's compliance with this Agreement and is responsible for such parties' use of the CDIP in the same manner Sub-Recipient/Member is responsible for its own use of such CDIP (e.g., violation of the license parameters set

forth in this section by a Sub-Recipient/Member's Permitted Third Parties shall be considered a breach of this Agreement by Sub-Recipient/Member).

7.2.2 7.2.2 Sub-Recipient/Members are strongly encouraged to seek legal protection in the form of patents as soon as is reasonably possible following disclosure of all CDIP to NCDMM. Protection of a Sub-Recipient/Member's solely developed CDIP shall be done at Sub-Recipient/Member's own expense and through use of their respective Party's TechTransfer Office. Each Sub-Recipient/Member agrees to notify in writing NCDMM in a timely manner of all such actions in which legal protection is or has been sought so that NCDMM can enter such information in its invention disclosure database. With respect to jointly developed CDIP the relevant Sub-Recipient/Members agree to negotiate a separate legally binding agreement encompassing those terms and conditions to be used to govern the manner in which jointly developed CDIP will be owned, administered, protected, and licensed. NCDMM will be notified in writing in a timely manner of the existence of these agreements between Sub-Recipient/Members and NCDMM shall maintain pertinent information in its invention disclosure database. In the event that a single Sub-Recipient/Member for solely developed CDIP, or all Sub-Recipient/Members with an ownership right for jointly developed CDIP choose not to seek legal protection and thereby elect not to file a patent application on any CDIP, then Sub-Recipient/Member(s) agree to notify NCDMM in writing of its intent and must report any pending publication or presentation to NCDMM at the time of this notification. NCDMM may negotiate to obtain such protection at its own expense where Sub-Recipient/Member(s) choose not to seek legal protection. Ownership of CDIP shall remain with the originating Sub-Recipient/Member(s).

7.2.3 7.2.3 It is anticipated that one of the outcomes of an active IP licensing and commercialization plan is the generation of royalty income by a respective Sub-Recipient/Member. It is acknowledged that Sub-Recipient/Members of academic, government, and industry sectors will manage the disposition and reporting requirements of all royalties received in accordance with their institution's existing policies, through their Party's TechTransfer Office. To the extent it may legally do so, Sub-Recipient/Members owning CDIP shall grant NCDMM and Lead Sub-Recipient/Members-In-Good-Standing a limited, non-exclusive, royalty-free license to use the CDIP for commercial purposes and Full Sub-Recipient/Members-In-Good-Standing shall be granted such licenses at a fair market value royalty rate. Such licenses shall be granted to interested Sub-Recipient/Members upon request in a separate legally binding mutually agreeable agreement between the Sub-Recipient/Members. Such licenses for Sub-Recipient/Members shall be without the right to grant sublicenses to third parties, except for any Sub-Recipient/Member-designated agents, contractors and non-employee students performing work for the benefit of such Sub-Recipient/Member, provided, however, the Sub-Recipient/Member is responsible for having any and all appropriate written agreements with such parties to enable Sub-Recipient/Member's compliance with this Agreement and is responsible for such parties' use of the CDIP in the same manner Sub-Recipient/Member is responsible for its own use of such CDIP (e.g., violation of the license parameters set forth in this section by a Sub-Recipient/Member's contractor shall be considered a breach of this Agreement by Sub-

Recipient/Member). In addition, sublicensing shall be permitted to the licensee's direct customers.

- 7.3** 7.3 Licenses granted under this Section 7 shall be subject to these additional terms:
- 7.4** Any licenses granted to a Sub-Recipient/Member through a separate document as specified in this Section 7 shall become a royalty bearing license at fair market value for such a Sub-Recipient/Member who is designated a Withdrawn Sub-Recipient/Member.
- 7.5** It is understood that the United States Government (through any of its agencies or otherwise) may provide use of its facilities or equipment and / or may provide funds for Consortium Research. As a result this Agreement, any and all rights and obligations of the Sub-Recipient/Member to any CDIP resulting from use of any United States Government's facilities, equipment or funds are subject to any and all applicable rights of the United States Government.
- 7.6** Notwithstanding anything to the contrary in this Agreement, certain laws, regulations and/or policies may prevent and/or limit certain Sub-Recipient/Member's ability to offer royalty-bearing licenses to CDIP that has previously been licensed by such Sub-Recipient/Member on a royalty-free basis. Therefore, the ability to charge royalties to Full Sub-Recipient/Member, Supporting Sub-Recipient/Member, and/or third parties is subject to the granting Sub-Recipient/Member's ability to do so in light of then-existing contractual obligations, legal and regulatory requirements, and policies of the granting Sub-Recipient/Member.

8 **ARTICLE 8. INDEMNIFICATION AND INSURANCE**

- 8.1** 8.1 Indemnification by Sub-Recipient. Sub-Recipient agrees to defend, indemnify and hold harmless NCDMM and its Affiliates and their respective directors, officers, employees and agents from and against any and all costs (including reasonable legal fees), damages, expenses and losses (collectively, "Losses") arising from any third party suit, claim, demand, assessment, action or proceeding (collectively, "Claims"), in any manner caused by, resulting from or arising out of any misrepresentation, negligence or breach of this Agreement on the part of Sub-Recipient, any of Sub-Recipient's Affiliates or any permitted Sub-Recipients, or any of Sub-Recipient's or its Affiliates' or permitted Sub-Recipients' directors, officers, employees or agents, including Losses arising out of the breach or inaccuracy of any of Sub-Recipient's representations, warranties, or covenants under Section 5 of this Agreement, except to the extent any such Loss is attributable to any breach by NCDMM of this Agreement, or any negligence, wilful misconduct or unreasonable inaction by NCDMM, any of NCDMM's Affiliates, or any or NCDMM's or its Affiliates' directors, officers, employees or agents.
- 8.2** 8.2 Indemnification by NCDMM. NCDMM agrees to defend, indemnify and hold harmless Sub-Recipient and its Affiliates and their respective directors, officers, employees and agents from and against any and all Losses arising from any third party Claims, in any manner caused by, resulting from or arising out of any misrepresentation, negligence or breach of this Agreement on the part of NCDMM, or any of NCDMM's directors, officers, employees or agents, including any Losses arising out of any breach or misrepresentation

made by NCDMM under Section 6, except to the extent any such Loss is attributable to any breach by Sub-Recipient of this Agreement, or any negligence, wilful misconduct or inaction by Sub-Recipient, any of Sub-Recipient's Affiliates or any permitted Sub-Recipients, or any of Sub-Recipient's or its Affiliates' or any permitted Sub-Recipients' directors, officers, employees or agents.

- 8.3** 8.3 Indemnification Procedures. In the event that either Party (an "Indemnified Party") seeks indemnification from the other Party (the "Indemnifying Party") under the terms of this Article 8 with respect to any claim made by a third party, it shall inform the Indemnifying Party of the claim as soon as reasonably practicable after it receives notice thereof, shall permit the Indemnifying Party, at the Indemnifying Party's cost, to assume direction and control of the defense of the claim, and shall co-operate as requested (at the expense of the Indemnifying Party), in the defense of the claim. After notice to the Indemnified Party of the Indemnifying Party's election to assume the defense of such claim, the Indemnifying Party shall be liable to the Indemnified Party only for such legal or other expenses subsequently incurred by the Indemnified Party in connection with the defense thereof at the request of the Indemnifying Party. The Indemnifying Party shall not settle or otherwise compromise any claim or suit without the prior written consent of the Indemnified Party, which shall not be unreasonably withheld. As to those third party claims with respect to which the Indemnifying Party does not elect to assume control of the defense, the Indemnified Party will afford the Indemnifying Party an opportunity to participate in such defense, at the Indemnifying Party's own cost and expense, and will not consent to the entry of any judgment, settle or otherwise dispose of any of the same without the consent of the Indemnifying Party, which shall not be unreasonably withheld.
- 8.4** 8.4 Limitation of Liability and Claims. NCDMM shall not be liable to Sub-Recipient hereunder for any indirect, incidental, special, punitive or consequential damages of any kind, including lost profits or loss of goodwill or otherwise; and in no event shall the collective, aggregate liability of NCDMM and its Affiliates and its and their respective directors, officers, employees and agents under this Agreement exceed the amount of compensation actually received by Sub-Recipient from NCDMM pursuant to this Agreement. No action, regardless of form, arising out of or in any way connected with this Agreement or the Activities, may be brought by Sub-Recipient more than one (1) year after the cause of action accrued.

9 ARTICLE 9. PUBLICATIONS

9.1 The Parties agree and expect that results of Consortium Research associated with this agreement shall be published or otherwise made publicly available and that Parties engaged in Consortium Research shall be permitted to present at symposia, national or regional professional meetings and to publish in journals, theses or dissertations, or by other means of their own choosing, the results of their research, provided that nothing will be done which could bar the availability of patent protection with respect to CDIP of a Sub-Recipient/Member or America Makes (NAMII) invention or which would disclose Proprietary Information of any Sub-Recipient/Member or of America Makes (NAMII) or disclose information in violation of the applicable U.S. laws and regulations (e.g., the International Traffic in Arms Regulations ("ITAR") and the Export Administration Regulations ("EAR")) that govern the export

of specific technical data and technologies, including software, prototypes and other intellectual property, to foreign countries and foreign nationals (“Export Control Laws”).

9.1.1 A Party will not make a public disclosure without a review of the full text of the proposed publication, presentation or other form of public disclosure by the Sub-Recipient/Member(s) involved, the America Makes (NAMII) Director and Government PM as described below. The Sub-Recipient/Member(s) involved, the America Makes (NAMII) Director and Government PM shall be provided a copy of the proposed public disclosure at least sixty-five (65) days in advance of the submission of such proposed public disclosure and shall have two (2) weeks after receipt of said proposed disclosure to respond in writing to the submitting Party to identify Proprietary Information and/or to identify any potentially patentable CDIP and/or to identify any CDIP in which the submitting Party does not have an ownership interest. A submitting Party agrees to remove any identified Proprietary Information, potentially patentable CDIP and/or CDIP in which the submitting Party does not have an ownership prior to public disclosure (or, for potentially patentable CDIP in which the submitting Party does have an ownership interest, delay public disclosure for a period of sixty (60) days from the date of the response).

9.1.2 Notwithstanding anything to the contrary above, student theses and dissertations shall be subject to a separate review and comment process wherein the student shall submit such student thesis or dissertation in draft form at least sixty (60) days in advance of the date of their final defense in order to afford an opportunity to identify Proprietary Information and/or identify any potentially patentable CDIP and/or any CDIP in which the Party’s student does not have an ownership interest.

9.1.3 America Makes (NAMII) and/or America Makes (NAMII) Sub-Recipient/Members may negotiate and implement a more restrictive public disclosure agreement than defined in paragraphs 9.1.1 and 9.1.2 for a specific America Makes (NAMII) project based on the need for extended non-disclosure of CDIP by the project participants.

9.1.4 An acknowledgment of funding and a disclaimer shall appear in the publication of any material, whether copyrighted or not, resulting from an America Makes (NAMII) project incorporating U.S. Government funds granted in support of the America Makes (NAMII) Consortium. The acknowledgement shall read:

“This material is based on research sponsored by Air Force Research Laboratory under agreement number FA8650-20-2-5700. The U.S. Government is authorized to reproduce and distribute reprints for Governmental purposes notwithstanding any copyright notation thereon.”

The disclaimer shall read:

“The views and conclusions contained herein are those of the authors and should not be interpreted as necessarily representing the official policies or endorsements, either expressed or implied, of Air Force Research Laboratory or the U.S. Government.”

10 ARTICLE 10. TERM AND TERMINATION

10.1 10.1 Term. The term of this Agreement shall begin on the date hereof and shall continue until **XXXXXXXXXX** (the “Term”). Subject to termination in accordance with Section 10.2, the Parties agree to discuss in good faith prior to the end of the Term amending this Agreement (including this Section 10.1 and Schedules A, B, C, and D (if applicable)) or entering into a separate agreement governing the Parties’ relationship with respect to the general substance of this Agreement, subject to mutual agreement, for one or more years following the end of the Term. All projects must be complete and all deliverables and reporting submitted on or before June 3, 2024. There will be no extensions permitted under this effort.

10.2 10.2 Termination.

10.2.1 10.2.1 Either Party shall have the right to terminate this Agreement, by giving written notice to the other Party, upon material breach by the other Party of any material provision of this Agreement, including any covenant, representation or warranty contained in this Agreement or failure to perform any material portion of the Activities in accordance with the SOW, provided that such breach shall have continued for a period of thirty (30) days after the non-breaching Party has delivered written notice of said breach to the breaching Party.

10.2.2 10.2.2 This Agreement may be terminated at any time by written agreement of the Parties.

10.2.3 10.2.3 NCDMM shall have the right to terminate this Agreement for any or no reason upon thirty (30) days prior written notice to Sub-Recipient.

10.2.4 10.2.4 NCDMM shall have the right to terminate this Agreement immediately upon termination of the Prime Agreement (in whole or part) or upon any amendment or other change to the Prime Agreement that materially affects the need for or value of (each in NCDMM’s reasonable sole discretion) all or a portion of the Activities hereunder.

10.2.5 10.2.5 Sub-Recipient shall have the right to terminate this Agreement upon thirty (30) days written notice if circumstances beyond its reasonable control preclude continuation of the Activities as described in the SOW.

10.3 10.3 Rights and Duties Upon Termination or Expiration. Upon termination or expiration (without a further agreement related to the substance hereof entered into as contemplated in Section 10.1) of this Agreement, (i) Sub-Recipient shall cease all work on the Activities and turn over to NCDMM all documentation prepared by (or on behalf of, as the case may be) Sub-Recipient for NCDMM during the Activities (whether in written or electronic form) and (ii) NCDMM shall, in accordance with Article 4 pay Sub-Recipient. Termination or expiration of this Agreement shall be without prejudice to any rights that shall have accrued to the benefit of a Party prior to such termination or expiration.

10.4 10.4 Survival. The respective rights and obligations set forth in the previous Articles and any other provisions required to interpret and enforce the Parties’ rights and obligations under this Agreement shall indefinitely survive the expiration or termination of this

Agreement to the extent expressly set forth therein or if no survival term is expressly set forth therein to the extent necessary to preserve these rights and obligations.

11 ARTICLE 11. MISCELLANEOUS

- 11.1** 11.1 No Commercialization. Sub-Recipient agrees that it shall not commercialize or, except as expressly permitted under the terms of this Agreement, otherwise Exploit any Materials, Information or Inventions owned by or licensed to NCDMM.
- 11.2** 11.2 Equitable Relief. Sub-Recipient acknowledges and agrees that the restrictions set forth in Articles 6 and 7 and Sections 8.1 and 8.2 of this Agreement are reasonable and necessary to protect the legitimate interests of NCDMM and that NCDMM would not have entered into this Agreement in the absence of such restrictions, and that any violation or threatened violation of any provision of Article 6 or 7 or Section 8.1 or 8.2 will result in irreparable injury to NCDMM. Sub-Recipient also acknowledges and agrees that in the event of a violation or threatened violation of any provision of Article 6 and 7 or Section 8.1 or 8.2, NCDMM shall be entitled to preliminary and permanent injunctive relief, without the necessity of proving irreparable injury or actual damages and without the necessity of having to post a bond. The rights provided in the immediately preceding sentence shall be cumulative and in addition to any other rights or remedies that may be available to NCDMM. Nothing in this Section 11.2 is intended, or should be construed, to limit NCDMM's right to preliminary and permanent injunctive relief or any other remedy for a breach of any other provision of this Agreement.
- 11.3** 11.3 Publication. Sub-Recipient, including its Affiliates and any permitted Sub-Recipients and its or their respective employees or agents, has no right to publish the NCDMM name or logo, except as expressly consented to in writing by NCDMM.
- 11.4** 11.4 Waiver. The failure of a Party to enforce any breach or provision of this Agreement shall not constitute a continuing waiver of such breach or provision and, subject to Section 8.4, such Party may at any time thereafter act upon or enforce such breach or provision of this Agreement. Any waiver of breach executed by either Party shall affect only the specific breach and shall not operate as a waiver of any subsequent or preceding breach. To be effective any waiver must be in writing.
- 11.5** 11.5 Assignment. Sub-Recipient shall not sell, transfer, assign, pledge or otherwise dispose of, whether voluntarily, involuntarily, by operation of law or otherwise, this Agreement or any of its rights or obligations hereunder without the prior written consent of NCDMM, provided that in the event such consent and approvals, if applicable, are granted, the proposed assignee shall agree in writing, in a form reasonably satisfactory to NCDMM, to perform all of Sub-Recipient's obligations hereunder. Any attempt to assign, transfer, subcontract or delegate any portion of this Agreement or Sub-Recipient's rights or obligations hereunder in violation of this Section 11.5 shall be null and void. Subject to the terms hereof, this Agreement shall be binding upon and inure to the benefit of the successors and permitted assigns of the respective Parties hereto.
- 11.6** 11.6 Severability. If any provision of this Agreement is held to be illegal, invalid or unenforceable under any present or future law, and if the rights or obligations of any Party under this Agreement will not be materially and adversely affected thereby, (a) such provision shall be fully severable, (b) this Agreement shall be construed and enforced as if

NCDMM/America Makes reserves all rights in connection with this document and in the subject matter represented therein. The recipient hereby acknowledges these rights and shall not, without permission in writing, disclose or divulge this document in whole or in part to third parties or use it for any purpose other than that for which it was delivered to recipient.

such illegal, invalid or unenforceable provision had never comprised a part hereof, (c) the remaining provisions of this Agreement shall remain in full force and effect and shall not be affected by the illegal, invalid or unenforceable provision or by its severance herefrom and (d) in lieu of such illegal, invalid or unenforceable provision, there shall be added automatically as a part of this Agreement, a legal, valid and enforceable provision as similar in terms to such illegal, invalid or unenforceable provision as may be possible and reasonably acceptable to the Parties.

11.7 11.7 Notices. Any notice, request or other communication required to be given pursuant to the provisions of this Agreement shall be in writing and shall be deemed to be given when delivered in person, by facsimile or by courier (return receipt requested) or five (5) days after being deposited in the United States mail, postage prepaid, certified, return receipt requested to the Parties addressed as follows:

If to NCDMM, to:	If to Sub-Recipient, to:
Gary R. Fleegle, Sr., Vice President & COO	NAME
486 Cornell Road, Suite 2	ADDRESS
Blairsville, PA 15717	CITY, STATE ZIP
Tel: (724) 539-1361	Tel: XXX-XXX-XXXX
Fax: (724) 459-8500	Fax: XXX-XXX-XXXX

Either Party may change its contact person, address or telephone or facsimile number by giving the other Party written notice, delivered in accordance with this Section 10.7.

11.8 11.8 Construction. Except where the context otherwise requires, wherever used, the singular shall include the plural, the plural the singular, the use of any gender shall be applicable to all genders and the word “or” is used in the inclusive sense (“and/or”). When this Agreement refers to a number of days, unless otherwise specified as business days, that reference is to calendar days. The captions of this Agreement are for convenience of reference only and in no way define, describe, extend or limit the scope or intent of this Agreement or the intent of any provision contained in this Agreement. The term “including” as used herein shall mean including, without limiting the generality of any description preceding such term. A reference to a Schedule, Article, Section or clause is a reference to a Schedule, Article, Section or clause of this Agreement, and the terms “hereof,” “herein,” and other like terms refer to this Agreement as a whole, including any attachments hereto. The language of this Agreement shall be deemed to be the language mutually chosen by the Parties and no rule of strict construction shall be applied in favor of or against either Party hereto.

11.9 11.9 Governing Law. This Agreement and the rights and obligations of the Parties shall be governed by and construed under the laws of the Commonwealth of Pennsylvania, excluding

any conflicts or choice of law rule or principle that might otherwise refer construction or interpretation of this Agreement to the substantive law of another jurisdiction. Code of Federal Regulation parts and clauses shall be governed by Federal law, including the Federal common law of agreements.

- 11.10** 11.10 Parties Independent. In making and performing this Agreement, the Parties act and shall act at all times as independent entities and nothing contained in this Agreement shall be construed or implied to create an agency, partnership or employer and employee relationship between NCDMM and Sub-Recipient. Except as expressly provided herein, at no time shall either Party make commitments or incur any charges or expenses for or in the name of the other Party.
- 11.11** 11.11 Conflicts. Except as otherwise required by Applicable Law, to the extent that any provision of this Agreement conflicts with a provision of a Schedule, the provision of this Agreement shall govern.
- 11.12** 11.12 Cumulative Remedies. Unless expressly set forth herein to the contrary, all remedies set forth herein are cumulative and are in addition to any and all remedies provided either Party at law or in equity.
- 11.13** 11.13 Entire Agreement; Amendment. This Agreement and the previously signed America Makes (NAMII) Sub-Recipient/Membership agreement contain the entire understanding of the Parties with respect to the subject matter hereof. Any amendment or supplement to this Agreement shall be effective only if in writing signed by each Party.
- 11.14** 11.14 Counterparts. This Agreement may be executed in any number of counterparts, each of which shall be an original as against the Party whose signature appears thereon, but all of which taken together shall constitute but one and the same instrument.

IN WITNESS WHEREOF, each Party has caused this Sub-Recipient Agreement to be signed by its duly authorized officer as of the date first above written.

NCDMM	[Sub-Recipient]
By: _____ (Signature)	By: _____ (Signature)
Name: _____ (Printed Name)	Name: _____ (Printed Name)

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Title: _____ Date: _____	Title: _____ Date: _____
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SCHEDULE A

INSERT SOW AS NEGOTIATED

SCHEDULE B

BUDGET

INSERT BUDGET AS NEGOTIATED

SCHEDULE C

APPLICABLE FEDERAL REGULATION AND PRIME AGREEMENT FLOW-DOWN

1.01 Trafficking in Persons (March 2015)

This award is subject to the requirements of Section 106 (g) of the Trafficking Victims Protection Act of 2000 (22 U.S.C. 7104, as implemented by 2 CFR 175)

You as the sub-recipient and your employees may not—

1. Engage in severe forms of trafficking in persons during the period of time that the award is in effect; or
 - (ii) Procure a commercial sex act during the period of time that the award is in effect; or
 - (iii) Use forced labor in the performance of the award or subawards under the award.

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1.02 Title to Property – Identified in Budget (March 2015)

Title to personal property acquired with agreement funds shall vest in the sub-recipient upon acquisition, except that supplies shall be managed in accordance with 2 CFR 200 Section 314. Title to real property shall vest in the sub-recipient subject to conditions contained in 2 CFR 200 Section 311. The sub-recipient shall dispose of real property in accordance with 2 CFR 200 Section 311.

1.03 Property System (March 2015)

Sub-recipient's property system shall meet the standards as set forth in 2 CFR 200 Section 310-316.

1.04 Cost Principles (March 2015)

Sub-recipient(s) shall comply with the cost principles as contained in 2 CFR 200, Subpart E, Cost Principles. Cost principles for determining allowability of costs applicable to lower tier, cost type contracts or awards under this agreement shall be determined by type of entity receiving the award.

1.05 Standards for Financial Management (March 2015)

Sub-recipient(s) financial management system shall comply with the standards identified in 2 CFR 200 Section 302.

1.06 Audit Requirements/Retention and Access to Records (March 2015)

Sub-recipient shall comply with the audit requirements of 2 CFR 200, Subpart F Audit Requirements and shall comply with the requirements appropriate for the type of entity receiving the award. Sub-recipient's financial records, supporting documents, statistical records, and all other records pertinent to an award shall be retained and access to them permitted in accordance with 2 CFR 200 Section 336.

1.07 Cost Sharing (August 2001)

Sub-recipient's contributions may count as cost sharing only to the extent that they comply with 2 CFR 200(200.306)

1.08 Export Control (March 2015) (TAILORED)

(a) Access to the technology developed under this agreement by foreign firms, institutions or individuals shall be controlled by the Sub-recipient under applicable U.S. export control laws.

(b) The sub-recipient shall receive NCDMM and grants officer approval before assigning or granting access to any work, equipment, or technical data generated or delivered under this agreement to foreign persons or their representatives. The notification shall include the name and country of origin of the foreign person or representative, the specific work, equipment, or data to which the person will have access.

1.09 Inventions (March 2015)

(a) The clause entitled Patent Rights (Small Business Firms and Nonprofit Organizations, (37

CFR 401.14(a)) is hereby incorporated by reference and is modified as follows: replace the word "recipient" with "Sub-recipient"; replace the words "agency," "Federal Agency" and "funding Federal Agency" with "NCDMM"; replace the word "contract" with "agreement"; delete paragraphs (g)(2), (g)(3) and the words "to be performed by a small business firm or domestic nonprofit organization" from paragraph (g)(1). Paragraph (1), Communications, point of contact on matters relating to this clause will be the servicing Staff Judge Advocate's office

(b) Interim or final Invention Reports 1) listing subject invention(s) and stating that all subject inventions have been disclosed, or 2) stating that there are no such inventions, shall be sent to the NCDMM. Please include in the subject line of the e-mail the contract number followed by the words "Invention Reporting." The Sub-recipient shall file Invention (Patent) Reports on the DO Form 882, Report of Inventions and Subcontracts, as of the close of each performance year and at the end of the term for this agreement. Annual reports are due 60 days after the end of each year of performance and final reports are due 60 days after the expiration of the final performance period. Negative reports are also required annually.

(c) The DD Form 882 may also be used for the notification any lower tier award for experimental, developmental or research work which contain a "Patent Rights" clause

(d) This provision also constitutes the request for the following information for any subject invention for which the recipient has retained ownership: 1) the filing date, 2) serial number and title, 3) a copy of the patent application and 4) patent number and issue date. Submittal shall be to the NCDMM.

1.10 Data Rights (March 2015)

(a) All rights and title to data, as defined in 48 CFR 27.401, generated under this agreement shall vest in the sub-recipient.

(b) The sub-recipient hereby grants to the U.S. Government a royalty free, world-wide, nonexclusive, irrevocable license to use, modify, reproduce, release, perform, display or disclose any data for Government purposes.

- “Government purpose includes competitive procurement, but not the rights to use, modify, reproduce, release, perform, display, or disclose technical data for commercial purposes or authorize others to do so”

(c) The sub-recipient is responsible for affixing appropriate markings indicating rights on all data delivered under the agreement. The Government will have unlimited rights in all data delivered without markings.

(d) The sub-recipient shall include this article, suitably modified to identify the parties, in all lower tier contracts and awards, regardless of tier, for experimental, developmental, or research work.

1.11 Publishing Project Results (March 2015)

(a) Publications. The Sub-recipient(s) is expected to publish or otherwise make publicly available the results of the work conducted under this subaward. One copy of all publications resulting from the project shall be forwarded to the NCDMM as it becomes available.

(b) An acknowledgment of awarding agency's support shall appear in the publication of any material, whether copyrighted or not. The acknowledgement shall read:

"This material is based on research sponsored by Air Force Research Laboratory under agreement number FA8650-20-2-5700. The U.S. Government is authorized to reproduce and distribute reprints for Governmental purposes notwithstanding any copyright notation thereon."

(c) The Sub-recipient is responsible for assuring that every publication of material based on or developed under this project contains the following disclaimer:

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"The views and conclusions contained herein are those of the authors and should not be interpreted as necessarily representing the official policies or endorsements, either expressed or implied, of Air Force Research Laboratory or the U.S. Government."

1.12 Reporting Subawards and Executive Compensation (March 2015)

(a) Reporting of first-tier subawards.

(1) Applicability. Unless you are exempt as provided in paragraph d. of this award term, you must report each action that obligates \$25,000 or more in Federal funds that does not include Recovery funds (as defined in Section 1512(a)(2) of the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5) for a subaward to an entity (see definitions in paragraph e. of this award term).

(2) Where and when to report.

(i) You must report each obligating action described in paragraph a.1. of this award term to <http://www.fsr.gov>.

(ii) For subaward information, report no later than the end of the month following the month in which the obligation was made. (For example, if the obligation was made on November 7, 2010, the obligation must be reported by no later than December 31, 2010.)

(3) What to report. You must report the information about each obligating action that the submission instructions posted at <http://www.fsr.gov> specify.

(b) Reporting Total Compensation of Recipient Executives.

(1) Applicability and what to report. You must report total compensation for each of your five most highly compensated executives for the preceding completed fiscal year, if-

(i) the total Federal funding authorized to date under this award is \$25,000 or more; (ii) in the preceding fiscal year, you received-

(A) 80 percent or more of your annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR 170.320 (and subawards); and

(B) \$25,000,000 or more in annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR

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170.320 (and subawards); and

(iii) The public does not have access to information about the compensation of the executives through periodic reports filed under Section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m(a), 78o(d)) or Section 6104 of the Internal Revenue Code of 1986. (To determine if the public has access to the compensation information, see the U.S. Security and Exchange Commission total compensation filings at <http://www.sec.gov/answers/execomp.htm>.)

(2) Where and when to report. You must report executive total compensation described in paragraph b.1. of this award term:

(i) As part of your registration profile at <http://www.ccr.gov>.

(ii) By the end of the month following the month in which this award is made, and annually thereafter. (c)

Reporting of Total Compensation of Subrecipient Executives.

(1) Applicability and what to report. Unless you are exempt as provided in paragraph d. of this award term, for each first-tier subrecipient under this award, you shall report the names and total compensation of each of the subrecipient's five most highly compensated executives for the subrecipient's preceding completed fiscal year, if-

(i) in the subrecipient's preceding fiscal year, the subrecipient received

(A) 80 percent or more of its annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR

170.320 (and subawards); and

(B) \$25,000,000 or more in annual gross revenues from Federal procurement contracts (and subcontracts), and Federal financial assistance subject to the Transparency Act (and subawards); and

(ii) The public does not have access to information about the compensation of the executives through periodic reports filed under Section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m(a), 78o(d)) or Section 6104 of the Internal Revenue Code of 1986. (To determine if the public has access to the compensation information, see the U.S. Security and Exchange Commission total compensation filings at <http://www.sec.gov/answers/execomp.htm>.)

(2) Where and when to report. You must report subrecipient executive total compensation described in paragraph c.1. of this award term:

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(i) To the recipient.

(ii) By the end of the month following the month during which you make the subaward. For example, if a subaward is obligated on any date during the month of October of a given year (i.e., between October 1 and 31), you must report any required compensation information of the subrecipient by November 30 of that year.

(d) Exemptions: If, in the previous tax year, you had gross income, from all sources, under \$300,000, you are exempt from the requirements to report:

(1) Subawards, and

(2) The total compensation of the five most highly compensated executives of any subrecipient. (e)

Definitions. For purposes of this award term:

(1) Entity means all of the following, as defined in 2 CFR part 25:

(i) A Governmental organization, which is a State, local government, or Indian tribe;

(ii) A foreign public entity;

(iii) A domestic or foreign nonprofit organization; (iv) A domestic or foreign for-profit organization;

(v) A Federal agency, but only as a subrecipient under an award or subaward to a non-Federal entity. (2)

Executive means officers, managing partners, or any other employees in management positions. (3)

Subaward:

(i) This term means a legal instrument to provide support for the performance of any portion of the substantive project or program for which you received this award and that you as the recipient award to an eligible subrecipient.

(ii) A subaward may be provided through any legal agreement, including an agreement that you or a subrecipient considers a contract.

(4) Subrecipient means an entity that:

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(i) Receives a subaward from you (the recipient) under this award; and

(ii) Is accountable to you for the use of the Federal funds provided by the subaward.

(5) Total compensation means the cash and noncash dollar value earned by the executive during the recipient's or subrecipient's preceding fiscal year and includes the following (for more information see 17 CFR 229.402(c)(2)):

(i) Salary and bonus.

(ii) Awards of stock, stock options, and stock appreciation rights. Use the dollar amount recognized for financial statement reporting purposes with respect to the fiscal year in accordance with the Statement of Financial Accounting Standards No. 123 (Revised 2004) (FAS 123R), Shared Based Payments.

(iii) Earnings for services under non-equity incentive plans. This does not include group life, health, hospitalization or medical reimbursement plans that do not discriminate in favor of executives, and are available generally to all salaried employees.

(iv) Change in pension value. This is the change in present value of defined benefit and actuarial pension plans.

(v) Above-market earnings on deferred compensation which is not tax-qualified.

(vi) Other compensation, if the aggregate value of all such other compensation (e.g. severance, termination payments, value of life insurance paid on behalf of the employee, perquisites or property) for the executive exceeds \$10,000.

1.13 Disclosure or Information (March 2015) (Tailored)

(a) The Sub-recipient shall not release to anyone outside the Sub-recipient's organization any unclassified information, regardless of medium (e.g., film, tape, document, media announcements, etc.), pertaining to U.S. Government Agency-Driven Projects unless-

(1) The NCDMM Agreements Officer has given prior written approval; or

(2) The information is otherwise in the public domain before the date of release.

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(b) Requests for approval shall identify the specific information to be released, the medium to be used, and the purpose for the release. The Sub-recipient shall submit its request to the NCDMM Agreements Officer at least 65 days before the proposed date for release through NCDMM.

(c) The Sub-recipient agrees to include a similar requirement in each sub-agreement under this agreement. Sub-recipients shall submit requests for authorization to release through the NCDMM to the Agreements Officer.

1.14 Procurement System (March 2015)

The sub-recipient's procurement system shall comply with the standards contained in 2 CFR 200 Section 317-326.

1.15 Military Recruiting on Campus (March 2015)

As a condition for receipt of funds available to the Department of Defense (DoD) under this award, the Sub-recipient agrees that it is not an institution of higher education (as defined in 32 CFR 216) that has a policy or practice that prohibits or, in effect, prevents ROTC or military recruiting on campus, as described in DFARS 252.209-7005(b). If the Sub-recipient is determined, using the procedures in 32 CFR part 216, to be such an institution of higher education during the period of performance of this agreement, and therefore to be in breach of this clause, the NCDMM will cease all payments of DoD funds under this agreement and all other DoD grants and cooperative agreements to the sub-recipient, and it may suspend or terminate such grants and agreements unilaterally for material failure to comply with the terms and conditions of award.

1.16 Assurances (March 2015)

(a) By signing or accepting funds under the agreement, the Sub-recipient assures that it will comply with applicable provisions of the following National policies on: (1) Prohibiting discrimination:

(i) On the basis of race, color, or national origin, in Title VI of the Civil Rights Act of 1964 (42 U.S.C. 2000d, et seq.), as implemented by DoD regulations at 32 CFR part 195;

(ii) On the basis of age, in the Age Discrimination Act of 1975 (42 U.S.C. 6101, et seq.) as implemented by Department of Health and Human Services regulations at 45 CFR part 90;

(iii) On the basis of handicap, in Section 504 of the Rehabilitation Act of 1973 (29 U.S.C. 794), as implemented by Department of Justice regulations at 28 CFR part 41 and DoD regulations at 32 CFR part 56;

(iv) On the basis of sex or blindness, in Title IX of the Educational Amendments of 1972 (20 U.S.C. 1681, et. seq.).

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(2) The Clean Air Act (42 U.S.C. 7401, et seq.) and Clean Water Act (33 U.S.C. 1251, et seq.), as implemented by Executive Order 11738 (3 CFR, 1971-1975 Comp., p. 799).

The Sub-recipient shall obtain assurances of compliance for all subawards under this effort

1.17 Prohibition on Using Funds under Grants and Cooperative Agreement with Entities that Require Certain Internal Confidentiality Agreements (June 2015)

(a) The sub-recipient may not require its employees, contractors, or subawardees seeking to report fraud, waste, or abuse to sign or comply with internal confidentiality agreements or statements prohibiting or otherwise restricting them from lawfully reporting that waste, fraud, or abuse to a designated investigative or law enforcement representative of a Federal department or agency authorized to receive such information.

(b) The sub-recipient must notify its employees, contractors, or subawardees that the prohibitions and restrictions of any internal confidentiality agreements inconsistent with paragraph (a) of this award provision are no longer in effect.

(c) The prohibition in paragraph (a) of this award provision does not Contravene requirements applicable to Standard Form 312, Form 4414, or any other form issued by a Federal department or agency governing the nondisclosure of classified information.

(d) If the NCDMM determines that the sub-recipient is not in compliance with this award provision, it:

(1) Will prohibit the sub-recipient's use of funds under this award, in accordance with Section 743 of Division E of the Consolidated and Further Continuing Resolution Appropriations Act, 2015, (Pub. L. 113-235) or any successor provision of law; and

(2) May pursue other remedies available for the sub-recipient's material failure to comply with prime award terms and conditions.

Schedule D

Additional Requirements

Kickoff Meeting

The sub-recipient will schedule a kickoff meeting with the NCDMM Project Manager to be held within 30 days of contract award. At the kickoff meeting the sub-recipient will provide the following:

- A detailed Gantt chart for the entire project that includes clearly identified milestones. The milestones must include identification of the key elements of Technology Development, Education and Workforce, Technology Transition, Sustainability, and MRL/TRL status.
- A listing of project deliverables with associated delivery dates

- A Spend Plan by month for the entire project. The attached template is provided as assistance. The Spend Plan must incorporate both America Makes funding and cost share.
- Identification of team Sub-Recipient/Members and their roles and responsibilities

Project Reporting

For the duration of the project, monthly reports, invoices and cost share reports will be due by the 10th of the month for activities of the preceding month. The sub-recipient is responsible for assembling information from subcontractors to support reporting requirements. Both technical and financial reports will be required.

- Technical reports will highlight the reporting period's technical achievements, identify any unexpected technical issues that have been encountered and action plans to resolve such issues, state the current MRL/TRL level and justification for advancing in MRL/TRL, updated Gantt charts, progress on metrics and future planned activities. All technical reports must provide a brief publicly-releasable section and a section for release to America Makes Sub-Recipient/Members. Proprietary information available only to project team Sub-Recipient/Members and appropriate America Makes staff/Government representatives can also be contained in the report and marked accordingly. A template for the reporting format will be provided by NCDMM/America Makes.
- Financial reports and invoices will document expenditures of both America Makes funds and cost share. Pertinent backup documentation, such as cost share reports, will be required to support financial reports. Backup documentation to be supplied by the sub-recipient will include, but not be limited to, individual cost share reports for team Sub-Recipient/Members. Tracking of actual expenditures vs. those provided in the Spend Plan will be required. The ratio of America Makes funding vs. cost share funding is expected to be roughly 1:1 at all times throughout the project. Both the ratio of America Makes funding to cost share funding and actual expenditures to expenditures stated in the Spend Plan will be monitored by the NCDMM Project Manager. If either or both of these financial goals are not met, the sub-recipient will be required to submit a corrective action plan. Failure to correct financial shortcomings may be grounds for contract cancellation.
- America Makes will provide an online portal for reporting. All reports will be uploaded to the America Makes online portal site by the sub-recipient. Note: Microsoft SharePoint will be used initially and log-on credentials will be provided by the America Makes team.

Meeting Participation

- Sub-recipient participation in regularly scheduled conference calls, quarterly review meetings and Project Management Review (PMR) meetings will be required.