



The Digital Manufacturing Institute

MxD REQUEST FOR PROPOSAL TECHNICAL SUMMARY, PROGRAM OVERVIEW and WHITE PAPER PREPARATION INFORMATION

MxD-23-12: Scaling Content Development for AR in Manufacturing

Revision 1.0 Release Date: October 17, 2023

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I. RECORD OF CHANGE

Revision	Date	Sections	Description
1.0	17 October 2023	N/A	Original

II. PROJECT OVERVIEW

Project Type	TIA Enterprise Project
Agreement Type	Enterprise Award Agreement
Contract Type	Cost Reimbursable preferable; Firm Fixed Price if necessary
Fee or Profit Allowed	No
Anticipated MxD Funding	\$1,000,000
Minimum Cost Share Amount	\$1,000,000 or the requested funding amount, whichever is lower
Period of Performance	15 Months

III. KEY DATES

Project Call Released	17 October 2023
White Paper Due	27 November 2023 5pm Central Time
Invitation to Submit Technical and Cost Proposal	07 December 2023
Team Formation List	Updated on Rolling Basis
Team Formation Opportunity (Optional)	12 December 2023
Technical and Cost Proposal Due	06 February 2023 5pm Central Time

IV. INTRODUCTION

MxD: The Digital Manufacturing Institute is where innovative manufacturers go to forge their futures. In partnership with the Department of Defense, MxD (also referred to as the Institute) equips U.S. factories with the digital tools and expertise they need to begin building every part better than the last. MxD's core mission is to transform American manufacturing, by fully integrating the digital thread across the manufacturing enterprise to reduce overall manufacturing costs, stabilize and grow the manufacturing industrial base and improve US competitiveness throughout the world. MxD is also the DoD's National Center for Cybersecurity in Manufacturing.

MxD has invested over \$120 million in more than 85 applied research and development projects in areas including design, product development, systems engineering, future factories, agile and resilient supply chains, and cybersecurity.

MxD operates from a nearly 75,000-square-foot innovation center near downtown Chicago. Its future factory floor features some of the most advanced manufacturing equipment in the world, which partners can use for experimentation and training on everything from augmented reality to advanced simulation techniques.

MxD uses a broad and collaborative process to develop the Strategic Investment Plan (SIP) and Technology Roadmap to ensure its technology, outreach, and education investments provide U.S. manufacturing with the right skills, solutions, and tools to compete globally. A Project Call is initiated when MxD desires new and creative solutions to problems and/or advances in knowledge, understanding and technology for digital manufacturing and design. Once the Project Call topic is developed and approved, the Project Call will be posted to the MxD website and represents the official notification of a request to submit the required documents.

This Project Call contains the following elements:

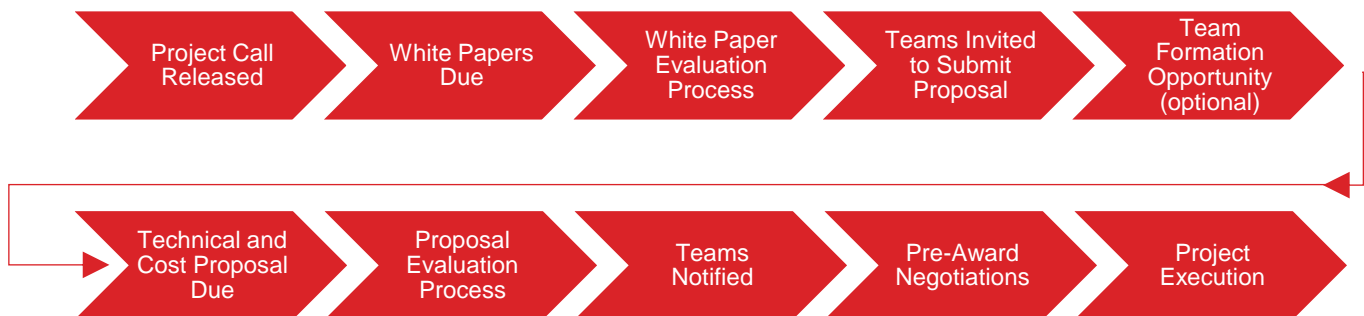
1. Technical: description of a specific technology objective
2. Program Overview: description of technical and program requirements
3. Proposal Preparation Information: background and guidance for the preparation of required forms and instructions for the White Paper Proposal

The Project Call is available on the MxD website at <https://mxdusa.org/projects/>. Amendments to a MxD Project Call may be used to extend due dates, clarify procedural requirements, or modify technical requirements. The previous document will be rescinded if an updated Project Call is issued. Proposal Teams should carefully monitor the MxD website after an original posting of a Project Call, up to the time of the submission date. Any revisions, amendments or updates will appear in the same section of the website as the original solicitation. The Proposal Team is responsible for monitoring the MxD website for updates and ensuring their submission meets the solicitation requirements. MxD welcomes any comments or suggestions for improving the contents of this guide. Please address them to projects@mxdusa.org.

MxD refers to the Proposal Team Lead as the non-Federal organization that submits a response to a Project Call. Proposal Team members are other participants on the proposal and are further broken down into Recipient/Subrecipient relationships similar to a prime/subcontractor relationship in traditional contracting.

This Project Call follows the process outlined below with a White Paper Phase, followed by a Technical and Cost Proposal submission by invitation only. **MxD is piloting this process with this Project Call and will assess this modification to the process for future Project Calls.**

The Proposal Team Lead shall submit a White Paper according to the instructions in the White Paper Submission Instructions section. The White Papers will be reviewed and evaluated as described in the White Paper Evaluation section. MxD will inform the Proposal Team Leads of the White Paper evaluation process outcome and invite those whose White Papers have been selected to advance to the Proposal Phase to develop a Technical and Cost Proposal. The proposals will be reviewed and evaluated as described in the Technical and Cost Proposal Evaluation section. MxD will inform the Proposal Team Leads of the evaluation process outcome and begin pre-award negotiations with those Proposal Teams who have been downselected.



Any questions regarding this solicitation must be provided to projects@mxdusa.org. The questions will be sent to the appropriate MxD and/or Government POC, and answers will be published on the MxD website, if applicable. Questions submitted within one week before the deadline may not be answered.



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TECHNICAL SUMMARY



V. TECHNICAL SUMMARY

PROBLEM STATEMENT

Augmented Reality (AR) technology has the potential to revolutionize manufacturing processes by providing visual guidance and information overlaid directly onto the physical environment to enhance worker productivity, improve overall efficiency, increase training efficacy, and provide real-time information.

AR technology offers an immersive learning experience for worker training and cross-training. It provides visual guidance that simplifies complex assembly or maintenance tasks. Additionally, AR can assist workers in locating and identifying materials or components by overlaying information onto physical objects. It can also display real-time data, such as production metrics or machine status, to help workers make informed decisions that support various aspects of the manufacturing process. However, there are several challenges associated with implementing AR in manufacturing:

- Ensuring that AR software is compatible with existing software systems (e.g., ERP, MES, CAD) can be challenging and lead to software integration issues.
- Developing and updating content for AR applications can be time-consuming and the content needs to be continually updated to keep the information and instructions relevant.
- Implementing a sample AR experience may be relatively straightforward but scaling it across an entire organization can be a significantly more complex problem.

For example, the workflow concept shown below in Figure 1 to input data for content generation and output AR content to various AR platforms involves connecting work instructions (SOP, maintenance, etc.) and linking enterprise software (MES/PLM/QMS/etc.)

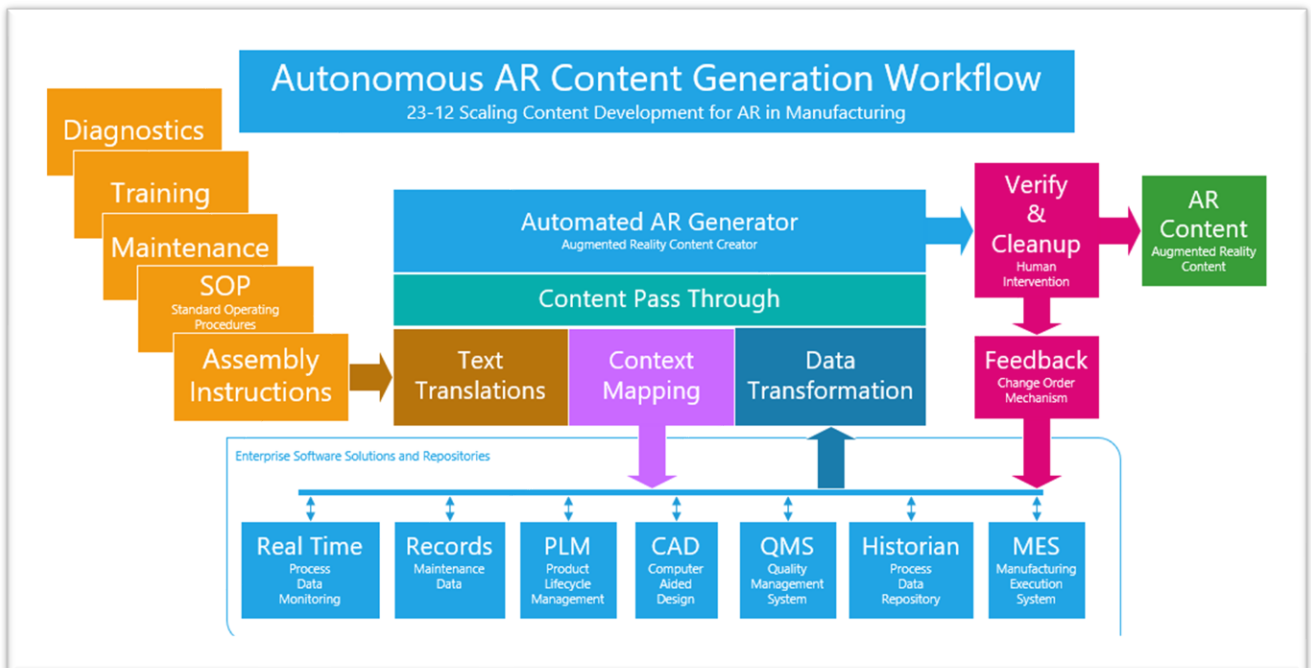


Figure 1 Workflow concept for autonomous AR content generation



The workflow relies on the integration of core components to collect relevant work instructions and auxiliary data for conversion into AR content, potential actions and tasks include:

- Text Translations: Methods to input work instructions and apply techniques like text summarization, named entity recognition, and sentiment analysis to extract key information from work instructions.
- Context Mapping: Methods to facilitate content acquisition and apply techniques like mapping PLM data fields to corresponding fields in the AR content generation system to ensure data is synchronized accurately.
- Data Transformation: Data preprocessing and optimization to bridge the gap between enterprise systems data and the AR platforms.
- Additionally, the workflow includes quality control and feedback components to validate the autonomous AR content generation and make necessary adjustments to ensure that it generates AR content correctly and functions as intended.

Creating a comprehensive AR content generation solution that connects to enterprise software system (MES/PLM/QMS/etc.) for gathering content sources and integrates data processing to input real world work instructions, is a significant undertaking and it requires collaboration with experts in various fields and domains such as, IT and data architectures and CAD/PLM conversions.

Despite these challenges, manufacturers are actively exploring AR technology because of the benefits of producing work instructions that focus on the worker's information needs, application flexibility, and support for a wide variety of devices.

Paving the way for scaling content development for AR in manufacturing is undoubtedly a role for MxD because progress in AI and machine learning, particularly in the areas of natural language processing (NLP) will play a crucial role and collaborating with these stakeholders will be essential to drive progress in autonomous AR content generation.

This project call seeks to create and demonstrate the capability (framework/methodology) to guide and support manufacturers with a model of how to automate AR content generation process by connecting working procedures and linking references to external databases to input data for content generation and output AR content to various AR platforms with minimum human intervention.



OBJECTIVES

Teams are expected to focus their solutions on a scope that is realistic, achievable, and aligned to what a typical manufacturer would consider when understanding, developing, designing, and implementing Augmented Reality (AR) content capability into their production environment. The solutions may also include future looking roadmaps that manufacturers can rely on for planning purposes and roadmaps of when commercial equipment will be available for future AR technology.

Additionally, teams are expected to collaborate with industry partners and stakeholders to understand their needs, constraints, and goals, and work together to develop solutions that address these challenges to demonstrate the feasibility and potential of the technology.

It's important to note that the development of autonomous content generation for AR is an ongoing process and requires continuous advancements in multiple fields to reach a state where deployment-ready AR content can be generated autonomously and seamlessly at scale. This development effort aims to provide a reusable structure or set of components that can be utilized across different projects or applications to reduce redundancy, save development time, and enforce consistency in design, coding standards, and processes by following a common set of rules and guidelines.

The key objectives to make AR content development more efficient, reliable, and cost-effective while ensuring a level of consistency and quality are defined below:

1. Develop a framework/methodology to automate AR content creation from standard work instructions:

The purpose of the development work is to automate authoring content from work instructions, allow human intervention when automation cannot complete 100% of the content, accommodate sharing data across multiple sources by integrating enterprise systems, and apply technology agnostic techniques to scale across multiple software or hardware systems and platforms.

- This capability will enable input of data for content generation and output of AR content to various AR platforms.

2. Demonstrate how AR content creation can be adopted by multiple manufacturers:

The purpose of the demonstration is to help MxD's ecosystem address the challenges associated with implementing AR in manufacturing and to consider scalability and performance optimizations as applications are expanded across multiple industries. Use the AR content creation demonstration to build a work instruction example that illustrates how to use the core tools, libraries, and resources from this project call to create AR content and experiences.

- The demonstration should highlight a specific use-case in manufacturing (SOP, Maintenance procedure, training, etc.) with consideration of how the content will be accessed (iPad vs headset, etc.). For instance, in specific job roles, it can prioritize and display instructions that are most relevant to a specific user's tasks.

3. Document how to use framework/methodology and describe core components:

The purpose of documentation and training materials is to define the specific objectives of the AR content generation and to help developers understand how to use it effectively and get up to speed quickly by providing setup instructions, usage guidelines, troubleshooting



information. Additionally, comprehensive documentation that outlines the data preparation process, including data sources, formats, conversions, and any custom scripts or tools, is also required to help developers extend and adapt the development work to meet specific project requirements and evolving technology.

- This is necessary because development of autonomous content generation for AR is an ongoing process that requires continuous advancements in multiple fields.

Through these objectives, the project principally seeks to address the following use cases:

- *As a training manager, I need to provide an immersive learning experience for training or cross-training workers by providing visual guidance to make complex assembly or maintenance tasks more straightforward to understand and execute in order to enable new employees to learn processes more intuitively, become productive more quickly, and retain knowledge more easily.*
- *As a maintenance manager, I need to provide detailed, step-by-step instructions for complex tasks and reduce time spent referring to paper-based manuals or searching for digital documents in order to reduce downtime and minimize the risk of errors.*
- *As an operator of manufacturing equipment, I need real-time guidance and support to monitor critical parameters and understand data from the machine's sensors in order to configure the machine optimally and reduce the risk of errors and accidents.*
- *As an operations manager, I need to efficiently and continuously update and maintain AR content as work instructions change or new information becomes available in order to empower teams to work with the most up-to-date information in an immersive and interactive environment.*
- *As a manufacturer of industrial machines, I need to make it easier for customers to follow equipment setup and configuration procedures by seeing step-by-step instructions, diagrams, and videos in order to ensure the machine is set up correctly and remains in optimal condition.*



PROJECT CALL SCOPE OF WORK

The above objectives must be completed within the following project constraints:

Period of Performance: 15 months

Anticipated MxD Funding: \$1,000,000

Minimum Cost Share Contribution: \$1,000,000

The overall intended scope of work for this augmented reality project is around developing the capability (framework/methodology) to connect enterprise software (MES/PLM/QMS/etc.) to natural language processing for work instructions, (SOP, maintenance, etc.) and integrating that information with AR generation in an automated or near-automated fashion to output deployment ready AR-based work instructions.

This work will generate AR based work instructions with better accuracy and efficiency and empower teams to work with the most up-to-date information in an immersive and interactive environment.

It will also streamline the AR content development process and make it more efficient to continuously update and maintain AR content as work instructions change or new information becomes available.



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PROGRAM OVERVIEW



VI. PROGRAM REQUIREMENTS

COLLABORATION

Participation in this project call requires collaboration with a team of organizations with diverse capabilities. Competitive teams should include representation from the manufacturing base, academia, solution/service providers and standards bodies.

Each Proposal Team must include participation by a manufacturer to drive use case and operational requirements. The manufacturer(s) are expected to define technical requirements, drive the business case for project outcomes and serve as a pilot manufacturer to test and validate the solution. The Tier 1 or Tier 2 Manufacturing Member is encouraged to provide the research testbed site, but this is not required if an alternative location aligns better with the team's transition plan. Identification of the entire team is not required as part of the White Paper submission but is required upon submission of the Technical and Cost Proposal.

There is no requirement for a standards organization to be included on the Proposal Team but the Proposal Team is required to collaborate with industrial standards bodies to better inform their draft standards and help popularize their work to increase the potential for endorsement in the future.

The Proposal Preparation Information section outlines the opportunities that MxD provides to facilitate proposal team development:

- Team Formation List: MxD will collect contact information from parties interested in forming a team and then email the compiled list of contacts to the responders.
- Team Formation Opportunity: MxD will host a Team Formation Opportunity to provide those organizations invited to submit a Technical and Cost Proposal the opportunity to share a snapshot of their solution approach and allow them to identify synergies with other interested parties.
- Participation in the Team Formation List and Team Formation Opportunity is optional and NOT required to submit a White Paper.

PROGRAM MANAGEMENT

MxD will manage the project to ensure the team meets all the technical objectives and requirements proposed within the project's period of performance and budget. The MxD Project Manager will coordinate with Principal Investigators (PIs) of the Proposal Team to manage the program following MxD's project processes. The Senior Director of MxD's Project Management Office (PMO), in coordination with the assigned MxD Project Manager, will monitor technical performance, change requests and stop orders, and project costs of the associated Enterprise Award Agreement (EAA). The EAA governs a project awarded by MxD to the Proposal Team Lead. Proposal Teams will submit the reports in Table 2 to their identified Project Manager to fulfill their reporting requirements. The MxD Senior Director of MxD's PMO, the Government, the Project Manager and other authorized MxD staff members will access these reports internally during their official duties. Technology advancements will be summarized at least annually to support reporting to the Executive Committee, Technical Advisory Committee, MxD Members, and the Government, when applicable.



Table 2. Program Deliverables

Deliverable	Description	Due Date
Project Immersion Workshop	Face-to-face meeting with manufacturer(s) including stakeholders from critical business units to review project transition plan and define pilot requirements.	Month 1
Transition Plan	Written plan for successful transition of project outcomes after period of performance including technology integration, educational distribution, and potential commercialization.	Month 2
Monthly Technical and Financial Reports	Monthly report from the Project Team Lead including the financial and technical status of the project	Monthly
Member Technical Reviews	Presentation encompassing all technical advancements made prior to key milestones and presented to the MxD Project Manager, members of the Technical Advisory Committee, and other interested MxD members.	As requested
Presentations at MxD	Presentation and demonstration of developed technology presented in person at MxD	As requested
Annual Patent Reports	Report of inventions and subcontracts	Annually
Intellectual Property Reports	Participants must promptly notify the MxD Project Manager apprised of Project IP created, filing status, claims against the Project IP, and BIP licensed to other Members.	Upon occurrence
Safety Accident/Incident Report	Participants must report any significant accident/incident (including fire) resulting in any one or more of the following situations: one or more fatalities or one or more disabling injuries; damage of Government property exceeding \$10,000; impact to Project planning or production schedules or degradation of the safety of equipment under contract. Such report will also identify potential hazards requiring corrective action.	Upon occurrence
Draft Final Technical Report	Draft report must include a comprehensive, cumulative, and substantive summary of all technical advancements and significant accomplishments achieved during the project.	Month 13
Final Technical Report	Final report must include a comprehensive, cumulative, and substantive summary of all technical advancements and significant accomplishments achieved during the project.	Month 15
Project Team Lead Release	Release by Project Team Lead confirming scope of work to be complete	End of project
Property Report	List of all MxD-funded equipment and planned disposition	End of project
Final Patent Report	Report of inventions and subcontracts	End of project

TRAVEL REQUIREMENTS

Proposals should include funding for four (4) trips per year for two (2) people for each member of the Proposal Team. These trips will be used for face-to-face meetings and presenting to the MxD membership. These trips may be for travel to MxD or another location at the request of MxD (e.g., a conference, workshop, showcase, etc.). For estimation purposes, use Chicago, IL as the destination. Proposals may include additional funding for travel to the pilot site for implementation and testing with proper justification.



PERIOD OF PERFORMANCE REQUIREMENTS

Proposed projects should be no more than fifteen months in duration. Please note that projects are initiated once a subaward agreement is signed; therefore, the project duration must include the subcontracting of all project participants between the Proposal Team Lead and each member of the Proposal Team. Project teams must follow MxD's Change Management process for any change requests.

INTELLECTUAL PROPERTY

To accelerate digital adoption, cybersecurity, and workforce development across the U.S. manufacturing sector and to support the increased priority from our funding partners to transition project technology, MxD desires to own or co-own all the rights to intellectual property (IP) created during the project (Foreground IP or Project IP). It is expected that a Proposal Team member will co-own or have a non-exclusive, non-transferable license to use the Foreground IP it creates. MxD will negotiate in good faith to achieve this result. MxD will have no rights to pre-existing intellectual property (Background IP) belonging to any member of the Proposal Team except as may be expressly agreed to in the Project documents.

FUNDING REQUIREMENTS

This MxD project will be funded under the MxD Technology Investment Agreement (TIA), Contract Number W15QKN-19-3-0003 between MxD and the Government. MxD anticipates awarding one project for no more than \$1,000,000 of Federal Funding, not including required cost share, under the MxD-23-12 Project Call. MxD reserves the right to fund all, some or none of the Technical Proposals received under issued Project Calls. Final award amounts will be adjusted based on proposals received and subsequent evaluations.

The Technology Investment Agreement between MxD and the Government **does NOT allow for any profit, fee, or proceeds**. Teams invited to submit a Technical and Cost Proposal must include the signed certification acknowledging that the proposed costs do not include profit, fee or proceeds.

This project requires a **minimum** 1-to-1 Cost Share in aggregate by the Proposal Team. For every dollar of Federal funding awarded, the Proposal Team must contribute at least a dollar of in-kind effort or cash. Thus, the Proposal Team in aggregate will need to provide at **minimum** 50% of the total project cost (inclusive of labor, equipment, materials, indirect, etc.) in cost share. This cost share can be in-kind or cash and can be distributed among the members of the Proposal Team however the team decides. Cost share must be accounted for in the cost proposal, as described in the Cost Development Guide found in the Proposal Preparation Kit.

Neither MxD nor the U.S. Government is responsible for costs associated with White Paper, Technical Proposal, or Cost Proposal development, submissions, or pre-award negotiations.

NOTE: Project award timelines are subject to the government's approval of the project plan and the allotment of funds from the government.



VII. ELIGIBILITY

MxD MEMBERSHIP

This Project Call is open to the public; any organization, regardless of membership status, may submit a White Paper in response to this Project Call. However, the MxD Membership Agreement must be fully executed with every Proposal Team member within 30 days of notification of project downselect; acknowledgment of this is required in the Technical Proposal submission. Additionally, any organizations that are already members of MxD must ensure they are a member in good standing within 30 days of notification of project downselection.

Any non-MxD members are strongly encouraged to conduct a legal pre-review of the Membership Agreement before submission, as this is a common source of delay during negotiations with proposal teams chosen during downselection. Please direct questions to MxD's Director of Business Development, Tony Papke (tony.papke@mxdusa.org). For more information on becoming a MxD Member, please visit the MxD Membership page on our website.

Federally Funded Research and Development Centers (FFRDCs) and Government entities (Government/National laboratories, military educational institutions, etc.) are subject to applicable direct competition limitations. They cannot propose to Project Calls in any capacity unless they address the following conditions:

- FFRDCs or Government entities may not exclusively team on any specific proposal team.
- FFRDCs must demonstrate that the proposed work is not otherwise available from the private sector and must also provide a letter on letterhead from their sponsoring organization citing the specific authority establishing their eligibility to compete with industry and propose to solicitations utilizing Government funding.
- Government entities must clearly demonstrate that the work is not otherwise available from the private sector and provide written documentation citing the specific statutory authority and, where relevant, contractual authority, establishing their ability to propose to solicitations utilizing government funding.

Government agencies interested in participating in MxD Project Calls as part of a Proposal Team should notify MxD in advance of Proposal submission. Special agreements and considerations may need to be implemented for projects utilizing Federal funding to enable participation.

NOTIFICATION OF PARTICIPATION BY FOREIGN FIRMS & NON-U.S. CITIZENS

Membership in MxD shall be granted only to U.S. companies, firms, organizations, institutions, or other entities organized or existing under the laws of the United States, its territories, or possessions (as defined in Section 120.15 of International Traffic in Arms Regulations, 22 CFR § 120 et. seq. ("ITAR")).

Membership and project participation (or participation in projects without membership status) will be granted on a case-by-case basis at the sole discretion of the MxD Senior Leadership Team upon approval of the U.S. Government for any of the following:

- Any agency or instrumentality of a foreign government;
- Companies, firms, organizations, institutions, or other entities not organized or existing under the laws of the United States (as defined in Section 120.16 of the ITAR); and
- Non-U.S. Citizens.



In such event, all Members will be notified immediately of the foreign entity's role.

If a Member is a Corporation with subsidiaries or affiliates, its membership will include its wholly-owned and controlled and majority-owned and controlled U.S. subsidiaries and affiliates who qualify as a U.S. person under Section 120.15 of the ITAR.

It is a requirement that work related to the project must be completed in the U.S. by people legally authorized to work in the U.S. Foreign participation should be unusual and limited to experts who are uniquely qualified to do the work. Requests that include work that any student or any student with a similar background could do will probably not be granted.

VIII. WHITE PAPER EVALUATION

EVALUATION PROCESS

An MxD Evaluation Board (EB) will review and evaluate each White Paper using the criteria specified in the following section.

The EB will recommend which White Papers should move forward to the Proposal phase; the Senior Director, PMO, in consultation with other MxD representatives, will finalize which White Papers will be invited to move forward to the Proposal Phase.

EVALUATION CRITERIA

MxD primarily aims to apply digital manufacturing technologies to solve business problems. To this end, successful White Papers should demonstrate an understanding of both the business needs and the technology solutions. White Papers should clearly explain how the solutions address business problems and technical requirements outlined in the Project Call, any assumptions, and considerations for deployment of the developed solution through a pilot.



Below are the White Paper Evaluation criteria for this Project Call:

White Paper Evaluation Criteria	Order of Importance
Requirements Compliance <ul style="list-style-type: none">Clearly articulates how the capabilities required by the Project Call will be metProposed solution addresses problem statement and use cases identified in the Project CallDeliverables are fully described and identified, and align with the requirements outlined in the Project CallAll sections of the White Paper template have been completed and adequately address the requirements of the Project CallProvides a maturity level assessment (TRL) of both current and future state of technology	1
Methodology and Program Plan <ul style="list-style-type: none">Clear and concise work effort scope targeted at the problem statementInnovative methodology with high potential for industry impactMethodology demonstrates scientific and technical meritSMART metrics and KPIs identified and described and demonstrate clear understanding of proposed work	2
Transition Strategy <ul style="list-style-type: none">Solution and strategy to rapidly enable the adoption of the new technologies across the US manufacturing base is presentedDiscussion of future transition and/or commercialization demonstrates a clear understanding of the industry and possible markets for the technologyBenefits of technology are clearly defined and substantiated.Clear identification of barriers to implementation and explanation of how they will be overcome	3
Cost Factors <ul style="list-style-type: none">Proposed cost estimates are reasonable and realistic for the proposed work effortCost share is clearly defined and directly applicable to the performance and success of the projectMinimum cost share proscribed in the Project Call has been met or exceeded	4



IX. PROJECT AWARDS

CONTRACT

This MxD project will be funded under the MxD Technology Investment Agreement (TIA), Contract Number W15QKN-19-3-0003 between MxD and the Government. MxD will execute all contractual negotiations related to Project Calls. Funds will be distributed to the Proposal Team Lead selected through the evaluation/selection process utilizing an Enterprise Award Agreement (EAA). EAAs are usually Cost Reimbursement/Cost Share agreements; Firm Fixed Price/Cost Share based EAAs will be considered upon request.



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PROPOSAL PREPARATION INFORMATION



X. PROPOSAL PREPARATION INFORMATION

This Proposal Preparation Information section offers detailed instructions on responding to this Project Call; the Proposal Preparation Kit (PPK) includes the required templates and reference documents on how to complete the templates. The Proposal Preparation Information and PPK are intended to provide the basic information necessary for assembling complete proposals.

NOTE: MxD recommends Proposal Teams review the Technical Summary and Program Overview before the PPK.

XI. WHITE PAPER SUBMISSION INSTRUCTIONS

SUBMISSION DETAILS

Each Proposal Team Lead must submit their White Paper no later than 5:00PM Central Time, 27 November 2023. **All proposals must be submitted via the official MxD Submission Form.** The SUBMIT button can be found on each Project Call webpage at www.mxdusa.org/projects. By clicking the SUBMIT button, applicants will be directed to the official Submission Form.

REQUIRED PROPOSAL DOCUMENTATION

The following section provides guidance on the White Paper content in response to this Project Call.

Each Proposal Team Lead must submit a **White Paper** using the template provided. Please reference the information below while completing the White Paper. The White Paper should not exceed 5 pages (not including the cover page and table of contents).

Title: Provide a descriptive title for the project

Project Summary: Complete the tables in the template with the appropriate information as described below:

Project Participants: List the Team members who will be participating on this project. If team members are not yet determined, indicate the type of organization expected to carry out the proposed work (e.g., small/medium manufacturer, solution provider, etc.).

Period of Performance: Indicate the period of performance required to complete the proposed work (e.g., 9 months, 12 months, etc.).

Proposed MxD Funding: Provide a reasonable estimate of the funding required to complete the proposed work. Sufficient cost information to substantiate the proposed cost (and cost share contributions) as realistic and reasonable for the proposed effort must be provided if the white paper is selected to move forward to the proposal stage.

Cost Share: Indicate the proposed cost share amount. This project requires a minimum 1-to-1 Cost Share in aggregate by the Proposal Team. For every dollar of Federal funding awarded, the Proposal Team must contribute at least a dollar of in-kind effort or cash. Thus, the Proposal Team in aggregate will need to



provide at minimum 50% of the total project cost (inclusive of labor, equipment, materials, indirect, etc.) in cost share. This cost share can be in-kind or cash and can be distributed among the members of the Proposal Team however the team decides.

Initial and Target TRL: Indicate the starting TRL (Technology Readiness Level) of the proposed solution, and the expected TRL after all proposed work has been completed.

Executive Summary: Provide a brief (~100 words) summary of the proposed project.

Problem Statement and MxD Relevance: Provide a clear description of why and how the proposed project addressed the requirements of the Project Call.

Methodology: Briefly describe your approach to solving the problem. Include relevant background data about your approach. Include the current status of your approach.

Program Plan:

- a. **Schedule:** Include description and milestones for major activities and efforts.
- b. **Deliverables:** Describe deliverables anticipated for the entire effort, including hardware and software prototypes if proposed. Include any technical data or computer software. Deliverables should include monthly status reports and a final report.
- c. **Metrics/Measures of Success:** Describe criteria to measure progress vs. stated goals.
- d. **Facilities/Equipment:** Describe facilities and/or equipment necessary to accomplish the proposed effort.
- e. **Risk:** Briefly describe anticipated risks and mitigation plan.

Transition Strategy: Provide a brief description and justification of the maturity of the proposed technology, benefits of the technology to industry, possible transition or commercialization plans, and any barriers to adoption of the proposed technology. Include information about Intellectual Property/Data Rights Assertions.

White papers not including the minimum requirements identified in the Project Call will be deemed non-responsive and will not be evaluated.

If a White Paper proposer is invited to submit a Technical and Cost Proposal, additional instructions will be provided with the invitation.



XII. TEAM FORMATION OPPORTUNITIES

TEAM FORMATION LIST

MxD will collect contact information from parties interested in forming teams during the proposal period to facilitate proposal team formation. MxD will then email the compiled list of contacts to the responders. If you are interested in submitting your contact info to this distributed list, please email projects@mxdusa.org with the following information:

“Subject: MxD-23-12 Team Formation

[Organization Name]

[Name of Contact]

[Email address of contact]

[1 sentence description of expected contributions to Proposal]

I agree to have the information herein disseminated to other organizations that have indicated interest in forming a team for MxD’s Project Call 23-12.”

TEAM FORMATION OPPORTUNITY

MxD will host a **Team Formation Opportunity** on 12 December 2023 to provide those organizations invited to submit a Technical and Cost Proposal an opportunity to explore synergies with other organizations interested in joining a team. Team Formation Opportunity registration information will be posted at www.mxdusa.org/projects. Participation in the Team Formation Opportunity is not required to submit a Technical and Cost Proposal.