



The Digital Manufacturing Institute

MxD REQUEST FOR PROPOSAL

TECHNICAL SUMMARY, PROGRAM OVERVIEW and PROPOSAL PREPARATION INFORMATION

MxD-22-23:

Classification & Remediation of Defects using AI

Revision 1.0 Release Date: March 9, 2023

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I. RECORD OF CHANGE

Revision	Date	Sections	Description
1.0	09 March, 2023	N/A	Original

II. PROJECT OVERVIEW

Project Type	TIA Enterprise Project
RFP Released	09 March, 2023
Team Formation List	Updated on Rolling Basis
Team Formation Opportunity (Optional)	30 March, 2023
Technical and Cost Proposal Due	19 May, 2023
Anticipated MxD Funding	\$500,000
Minimum Cost Share Amount	\$500,000 or requested funding amount, whichever is lower
Period of Performance	18 Months

III. 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 through the world.

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 is also the DoD's National Center for Cybersecurity in Manufacturing. 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 Request for Proposal (RFP) 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 RFP topic is developed and approved, the MxD RFP will be posted to the MxD website

and represents the official notification to Proposal Teams of a request to submit the required documents.

This RFP contains the following elements:

1. Technical Summary: 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 needed to submit a proposal to MxD

The RFP is available on the MxD website at <https://mxdusa.org/projects/>. Amendments to a MxD RFP may be used to extend due dates, clarify procedural requirements, or modify technical requirements. If an updated RFP is issued, the previous RFP will be rescinded. Proposal Teams should carefully monitor the MxD website after an original posting of an RFP, up to the time of the Technical Proposal and Cost Proposal submission date. Any revisions, amendments or updates will appear in the same section of the website as the original solicitation. It is the responsibility of the Proposal Team to monitor the MxD RFP updates and ensure their proposal 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 proposal in response to a Request for Proposals. 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.

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 appropriate. Questions submitted within one week prior to a deadline may not be answered.



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TECHNICAL SUMMARY



IV. TECHNICAL SUMMARY

PROBLEM STATEMENT

Many enterprises operate quality control programs based on digital inspection methods such as cameras and other sensing technology, which produce digital data but utilize manual evaluations to classify the defects and to determine remediation steps to restore the product to an acceptable condition. Overall, while manual inspections can be useful in catching defects and errors in manufacturing processes, they have limitations that can negatively impact the quality, efficiency, and cost-effectiveness of production:

- Manual inspections can be subjective, as different inspectors may interpret the same defects differently. This can lead to inconsistencies in quality control and variation in product quality.
- Manual inspections in many cases are very taxing on the eyes and requires high level of concentration of the inspectors who can become fatigued or distracted, leading to errors in their assessments.
- Onboarding new inspectors can be difficult as new inspector training is subject to the experience of trainer.

When setup properly automated inspection techniques, such as machine vision or artificial intelligence, can empower the inspector by providing more consistent, efficient, and objective quality control. Overall, automated inspection techniques can help to improve product quality, increase productivity of inspectors, and reduce costs, making AI based inspection techniques a valuable tool for many industries.

Additionally, automating this type manufacturing application using AI technology addresses a wide range of use cases across the automotive, electronics, semiconductor, and industrial sectors and the purpose is to go beyond the typical, binary, go-no-go inspection systems in use today, for example:

- An AI driven disposition process decision tree to determine if a defective component must be scrapped, repaired, or can be conditionally accepted based on defect threshold parameter limits such as, too big, or too many.

However, explaining how to integrate or apply AI/ML to as many use cases as possible and serving multiple spaces with many devices such cameras, Xray, Cat Scan, is novel in many applications, especially outside of objective metrics such as dimensional checks.

This project seeks to classify various defects across multiple industry sectors, catalog available AI based digital inspection systems, and implement an intuitive automated AI driven digital inspection system in a live production environment. Additionally, the project seeks to evaluate the demonstration system to determine the effectiveness of AI driven inspection techniques in a production environment, evaluate Return on Investment from a business perspective, and report on system performance and methodologies, to enable manufacturers to make educated and informed decisions about the classification and remediation of defects using AI and increase the adoption of Industry 4.0 practices.



OBJECTIVES

The following objectives outline the key activities that MxD considers applicable for a successful project. MxD's recommended set of requirements are included under each objective, but the team is encouraged to make value-added changes to the requirements as they see fit. These changes should be justified in their proposal. The objectives below are listed in a rough chronological order based on a general concept of project execution but accomplishing tasks in this specific order is not a requirement. MxD encourages agile development on its projects to ensure that the deliverables are shaped and validated by customers and key stakeholders throughout the period of performance.

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 automated AI inspection 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 AI inspection 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.

Finally, teams are not expected to provide all-encompassing solutions to cover use cases across all industrial sectors but should consider common challenges and provide methods to understand what issues we need to think about such as a matrix of options to determine the most important factors to enable AI to ingest information accurately and make decisions. This will ensure the solution is scalable and enable transition to industry when it is iterated, refined, and adapted to address similar applications across additional industrial sectors.

The key objectives to improve the classification and remediation of defects using AI and digital inspection techniques in manufacturing processes are defined below:

- 1. Review commercial AI based inspection options:** Catalog the current and evolving commercial AI based inspection product and service options with a clear summary of each for comparison and decision making. This will help get a sense of what work has already been established and what functional gaps exist within common manufacturing process applications.

The requirements for this objective are as follows:

- Evaluate feasibility for manufacturing process such as technical requirements, the cost and time required for implementation, and the impact on the existing workforce.
- Identify categories of defects across multiple industry sectors and specify the key technical requirements of AI based defect detection systems associated with each category, such as:
 - Electronics assembly industry and missing component defects.
 - Aircraft industry and fasteners installation defects.
 - Ship building industry and welding operation defects.
 - Automotive industry and wire harness assembly defects.



- Identify existing industrial capability in the realm of AI based digital inspection systems.
- Ensure that the commercial products and service offerings are delivering the expected benefits.
- Identify any further opportunities for improvement.
- Document the commercial AI based inspection options, review results, and the listings of defect categories, to enable manufacturers to understand AI based inspection product and service options for comparison and decision making, including:
 - Recommendations about technical requirements for distinct types of defect categories.
 - List of information resources for additional investigation, knowledge, and opportunities.

2. Demonstrate how to integrate AI technology and digital inspection methods: Use the results of objective one, to identify and develop a pilot solution to provide an intuitive demonstration of how-to integrate AI technology and digital inspection methods. Ideally the demonstration will enable manufacturers to adapt AI based technology to address similar applications across additional industrial sectors.

The pilot solution should implement an AI integration with existing digital inspection methods used in manufacturing process in a live production environment. Identify any limitations of the existing methods, clearly define a problem the solution will solve, and measure the improvements the pilot solution is intended to achieve. For example, are there specific products or components that require more accurate inspection?

The requirements for this objective are as follows:

- Evaluate feasibility for manufacturing process such as technical requirements, the cost and time required for implementation, and the impact on the existing workforce.
- Leverage readily available equipment.
- Design the solution in a manner that enables and augments the value of human inspector's actions and skills within the overall quality control process.
- Consider how to exchange data between inspection systems and enterprise systems.
- Monitor and evaluate performance over time.
- Ensure that the pilot AI implementation is delivering the expected benefits.
- Pilot solution maintenance:
 - Awareness of system and equipment updates; where to locate and access.
 - Identify and install advised updates.
 - Expertise and skill set required for the maintenance of an AI based digital inspection quality control system. This should include training and education for personnel who will be assigned maintenance.
- Pilot solution documentation:
 - Troubleshooting guides as required.



- List software licenses required and how they will be managed (one time purchase or subscription).
 - Document the pilot solution system architecture and integrations, to enable manufacturers to understand the steps needed to get started with AI based inspection technologies in their facilities, including:
 - The methodology for identifying and designing the system.
 - Explain why and how specific options were chosen.
 - Address implementation issues and misconceptions.
 - Describe applications and integrations.
 - Explain how the systems work, including any additional technology required to support the implementation.
 - Lessons learned from implementing the pilot solution in a live production environment.
 - Identify any further opportunities for improvement.
- 3. Determine effectiveness in a production environment:** Use the pilot solution and the production environment from objective two, to determine the effectiveness of AI inspection in a production environment. Use the state and performance of the original inspection process as a benchmark to compare the specific goals that the AI inspection system is intended to achieve and report on the results.

The requirements for this objective are as follows:

- Clearly define the scope of the benchmark, including the system, process, or technology being evaluated, as well as the specific objectives of the benchmark.
 - Identify the specific goals that the AI inspection system is intended to achieve, such as reducing defects, increasing production efficiency, or improving product quality.
 - Identify key metrics that will be used to measure performance. These metrics should be relevant to the system, process, or technology being evaluated, and should be measurable and objective.
 - Collect data that represents the current state of the inspection process before implementing AI inspection systems.
 - Clean and process the data to ensure that it is accurate and consistent and analyze the data to identify patterns, trends, and outliers.
 - Document the data and results of the baseline benchmark, including the metrics used, the data collected, the cleaning and processing steps taken, and the analysis performed.
 - Document the data and results of the AI inspection system effectiveness comparison to enable manufacturers to understand and make informed decisions about how to optimize the AI inspection process for maximum efficiency and effectiveness.
- 4. Estimate ROI (Return on Investment) from a business perspective:** Use the supporting documentation from the results of objective one, the implementation of the pilot solution from objective two, and the performance analysis from objective three, to determine the ROI of AI inspection systems from a business perspective and report on the results.



The requirements for this objective are as follows:

- Identify KPIs most relevant to business, such as reduced waste, increased productivity, and improved work force retention rates.
- Establish a baseline of the operations before implementing AI inspection systems.
- Estimate costs such as, initial investment cost, ongoing maintenance costs, and any training costs associated with implementing the system.
- Estimate potential savings such as, reduced inspection costs, scrap, and product recalls.
- Consider intangible benefits such as, improved quality control, enhanced customer satisfaction, and verified compliance with regulatory requirements.
- Consider expansion opportunities such as, adapting this type of technology and solutions to additional business operations.
- Document the data and results of the AI inspection system ROI estimate to enable business owners to understand and make informed decisions about the comparison of costs and savings for AI based inspection systems.

- 5. Report on system performance post project:** Establish communication channels between MxD and the necessary team partners to enable on-going communications about the long-term impact of the project. The purpose of follow-on communications about project implementation after the project period of performance is to understand the continuing performance status and to explore the potential of further project development or development of complimentary projects.

The requirements for this objective are as follows:

- Identify key performance metrics to measure and track the long- term impact of the AI based digital inspection system.
- Collect data on the performance of the system at the end of the project period of performance to establish a baseline for long-term comparisons.
- Consider the mutual benefits to team members and MxD such as collaborating on projects or referring contacts.
- Secure commitment from necessary team partners to participate in on-going communication including, contact information, area of expertise, etc.
- Establish frequency of communications, minimum partner commitments, and an end date.
- Document how the post project follow-on communication agreements will monitor system performance and report results to MxD.

The project team may provide their own specific use case, but the project is aligned with the following more general use cases:

- *As a quality control manager, I want to understand how AI based digital inspection quality control systems can be used to inspect product quality on the production line, by analyzing images or sensor data, to detect defects and deviations from standards, such as scratches, dents, or missing parts and recommend remediation actions.*



- *As a compliance manager, I want to understand how AI based digital inspection quality control systems can monitor compliance with regulatory requirements, by analyzing inspections data to detect potential violations and recommend corrective actions.*
- *As a manufacturing manager or engineer, I need to understand the effort and resources needed to implement an AI based digital inspection quality control system from the initial design phase through to maintaining the system after it has been installed.*
- *As a manufacturing manager or engineer, I need to determine what are my options and best practices for implementing an AI based digital inspection quality control system.*
- *As an Operational Technology (OT), Information Technology (IT) or Business Technology (BT) professional, I need to know what considerations to understand to successfully implement an AI based digital inspection quality control system.*
- *As a facility engineer or manager, I need to understand the physical requirements for an AI based digital inspection quality control system and ensure the implementation aligns to those requirements.*
- *As a member of MxD, I need to know how I can de-risk my use case by utilizing the pilot solution implementation and the evaluation results of the MxD 22-23 Classification & Remediation of Defects project work as a Proof of Concept.*
- *As a member of MxD, I need to understand how to utilize the Lessons Learned from the MxD 22-23 Classification & Remediation of Defects using AI project work.*

RFP SCOPE OF WORK

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

Period of Performance: 18 months

Anticipated MxD Funding: \$500,000

Minimum Cost Share Contribution: \$500,000

During the period of performance, the Proposal Team will produce deployable deliverables that will be shared with the MxD membership in accordance with the Membership Agreement. The recommended deliverables are listed below in Table 1, but **the Proposal Team is encouraged to include additional deliverables or provide value-added changes to the recommended set of deliverables.**

IMPORTANT: If changes are made to the deliverables, the Proposal Team must provide the reasoning and detail any assumptions to provide context for the changes. Their proposed set of deliverables must align with MxD's focus on achieving deployable outcomes and enabling the transition of the research.



Table 1. Technical Deliverables

Deliverable	Description	Deliverable Due Date (Month #)
Background Technology Evaluation		
Documentation of Defect Categories and Associate Detection Methods	Develop list of defect categories across multiple industry sectors with recommendations about the methodology to develop requirements and criteria needed to assess AI based inspection systems.	Month 3
Documentation of Available AI Inspection Systems Assessment Review	Provide a report of available commercial AI based inspection solutions with a comparison including strengths, weaknesses, and sample defect detection use case.	Month 3
Demonstration System Implementation		
System Architecture and Integration Framework	Documentation of the system architecture and framework including approach, diagrams, requirements, and expansion capability.	Month 4
Equipment Identification and Procurement	Detailed BOM (Bill of Material) that includes hardware and software specifics.	Month 6
System Test and Validation Report	Validate Proof of Concept of system design and BOM by building and validating the system.	Month 6
Live Production Environment Install	Install and begin final prep at live production environment.	Month 6~12
Lessons Learned in Deployment on Factory Floor	Report on implementation challenges and lessons learned.	Month 9~12
Demonstration System Acceptance	Demonstration system working per project objectives and deliverables.	Month 9~12
Demonstration System Evaluation		
Baseline Benchmark	Documentation of the state and performance of the original inspection process as a benchmark to compare the specific goals that the AI inspection system is intended to achieve.	Month 5~11
Report Intermediate System effectiveness	Documentation on the data and results of the AI inspection system effectiveness comparison part way through evaluation period.	Month 6~15
Report Final System effectiveness	Documentation on the data and results of the AI inspection system effectiveness comparison by end of evaluation period.	Month 17
Report ROI (Return on Investment)	Documentation on the data and results of the AI inspection system ROI estimate.	Month 17



Software	If applicable to implementation, all software completed and transferred to MxD.	Month 18
Documentation	All documentation completed and transferred to MxD.	Month 18
Transition Plan	Documentation of how this project outcome will be transitioned to the broader manufacturing community.	Month 18
Post Project Status Agreement	Documentation on how the post project follow-on communication agreements will monitor system performance and report results to MxD.	Month 18

The Proposal Team is expected to develop a transition plan, which is detailed in Table 2 in Section V. MxD is focused on supporting the transition of project outcomes to its membership in the form of pilot integrations on their factory floors, follow-on research projects or commercialized products available for use. Proposal Teams are expected to tailor their deliverables to their transition goals in order to provide outcomes that have continuing impact after the period of performance is complete. **Pilot deployments and actionable transition plans are a priority for MxD to help maximize the benefits of funded research to the membership and ultimately, help increase the competitiveness of the US manufacturing base through new technological advancements. Thus, it is important that proposals emphasize not just technical merit but transition and deployment.**



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PROGRAM OVERVIEW



V. PROGRAM REQUIREMENTS

COLLABORATION

Participation in this program 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 for test and validation of the solution.

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 during the first month of the proposal period and will then disseminate the compiled list of contacts to the responders via email.
- Team Formation Opportunity: MxD will host a Team Formation Opportunity to provide organizations and/or teams 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 in order to submit a proposal.

PROGRAM MANAGEMENT

MxD will be responsible for managing 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/or stop orders, and project costs of the associated Enterprise Award Agreement (EAA), the agreement that governs a project awarded by MxD to the Proposal Team Lead. Proposal Teams will submit the reports listed below in Table 2 to their identified Project Manager to fulfill their reporting requirements. These reports will be internally accessed by the MxD Senior Director of MxD's PMO, the Government, the Project Manager and other authorized MxD staff members in the course of their official duties. Technology advancements will be summarized at least annually in order to support reporting to the Executive Committee, Technical Advisory Committee, MxD Members, and the Government, when applicable.



Table 2. Program Deliverables

Deliverable	Description
Project Immersion Workshop	Face to face meeting with manufacturer(s) including stakeholders from key business units to review project transition plan and define pilot requirements.
Transition Plan	Written plan for successful transition of project outcomes after period of performance including technology integration, educational distribution, and potential commercialization.
Monthly Technical and Financial Reports	Monthly report from the Project Team Lead including the financial and technical status of the project.
Member Technical Reviews	Presentation encompassing all technical advancements made prior to key milestone and presented to the MxD Project Manager, members of the Technical Advisory Committee, and other interested MxD members.
Presentations at MxD	Presentation and demonstration of developed technology presented in person at MxD.
Annual Patent Reports	Report of inventions and subcontracts.
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.
Safety Accident/Incident Report	Participants must report any major 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.
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.
Final Technical Report	See above.
Project Team Lead Release	Release by Project Team Lead confirming scope of work to be complete.
Property Report	List of all MxD funded equipment and planned disposition.
Final Patent Report	Report of inventions and subcontracts.

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 to 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 pilot site for implementation and testing with proper justification.

PERIOD OF PERFORMANCE REQUIREMENTS

Proposed projects should be no more than eighteen months in duration. Please note that projects are initiated once an EAA 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. For any change requests, project teams will need to follow MxD's Change Management process which will be included in the EAA (Enterprise Award Agreement).



AND INTELLECTUAL PROPERTY AND 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 the expectation that a member of the Proposal Team will co-own or will 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 expects that the IP Management Plan (Attachment 1b) submitted with this proposal will reflect this position. 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. It is important to note that MxD will consider proposals that do not meet this request; proposals with IP Management Plans that reflect this will be favorably reviewed.

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 \$500,000 of Federal Funding, not inclusive of required cost share, under the MxD-22-23 RFP. MxD reserves the right to fund all, some or none of the Technical Proposals received under issued RFPs. Final award amounts will be adjusted accordingly 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** and teams must include the signed certification acknowledging the costs proposed 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 has any responsibility for costs associated with Technical Proposal or Cost Proposal development, submissions, or pre-award negotiations.

If down selected, the Proposal Team must submit substantiating documentation for all Proposal Team Member costs (including cost share) and MxD will complete a comprehensive cost analysis (including cost reasonableness and cost realism) prior to award. In addition, the Government Agreements office may conduct a cost analysis of all submitted cost proposals to approve the project. Approval of the Cost Proposal and Technical Proposal by the Government Agreements office and the DoD Program Manager is required for all MxD projects.

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



VI. ELIGIBILITY

MxD MEMBERSHIP

This RFP is open to the public; any organizations regardless of membership status may submit a Technical Proposal and Cost Proposal in response to this RFP. However, the MxD Membership Agreement must be fully executed with every Proposal Team member within 30 days of notification of project down select; acknowledgement of this is required in the Technical Proposal submission. Additionally, any organizations which are already members of MxD must ensure they are a member in good standing within 30 days of notification of project down select.

Any non-MxD members are strongly encouraged to conduct a legal pre-review of the Membership Agreement prior to submission as this is a common source of delay during negotiations with proposal teams that have been chosen during down selection. Please direct questions to MxD's Director of Business Development, Tony Papke (tony.papke@mxdusa.org). For more information on how to become 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 and cannot propose to RFPs in any capacity unless they address the following conditions:

- FFRDCs or Government entities may not exclusively team on any specific proposal team.
- FFRDCs must clearly 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, as well as, where relevant, contractual authority, establishing their ability to propose to solicitations utilizing government funding.

Government agencies interested in participating in MxD RFPs as part of Proposal Team should notify MxD in advance of Proposal submission. For RFPs utilizing Federal funding, special agreements and considerations may need to be implemented 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. If any member of the proposal team is not either a U.S. citizen or a lawful permanent U.S. resident (green card holder), please reach out to MxD at projects@mxdusa.org before submitting a proposal. In providing justification for foreign participation there should be an explanation of why the proposed foreign participant is the only person available that can do the work and why you are unable to find a US citizen to do the work. Foreign participation should be unusual and limited to experts that 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. The foreign participation requests need to state why a particular person or student is the only person that can do the work and why there is not a US citizen available.

All proposed project participation by non-U.S. Citizens must be disclosed to MxD on Attachment 2c MxD Foreign Firms, Travel, & Non-U.S. Citizens at least 60 days prior to proposed participation. Written approval of foreign firms and/or non-U.S. Citizens must be received by the member of the Proposal Team from MxD prior to commencing work.

VII. TECHNICAL & COST PROPOSAL EVALUATION

EVALUATION PROCESS

An MxD Evaluation Board (EB) will review and evaluate each submitted Technical Proposal utilizing the evaluation criteria specified in the following section.

The EB may consist of recognized experts from industry and academia and key government stakeholder representatives (when appropriate). MxD representatives, such as the Senior Director PMO, and respective Project Managers, may participate in and lead EB meetings. All members of the EB will need to meet strict standards of personal and organizational conflict of interest. The evaluators may be supported by subject matter experts to review and comment upon the proposed work.

Through its deliberations, the EB will determine "selectability" of each submission. Selectability determination incorporates average EB score, judgement of market impact, and budget availability. The EB will identify a list of all proposed Technical Proposals that are "selectable for negotiation" leading to a subagreement award, along with their associated evaluation scores, to the Project Manager. The Senior Director, PMO, with the consultation of other MxD representatives, will determine which subset of the proposed Technical Proposals deemed "selectable for negotiation" will be down selected for negotiations. This determination will take into account the EB's recommendation, funding availability, alignment with MxD's SIP as well as external stakeholder requirements (when applicable).

EVALUATION CRITERIA

MxD's primary goal is to apply digital manufacturing technologies to solve business problems. To this end, successful proposers must demonstrate an understanding of both the business needs



as well as the technology solutions. Proposals should provide a clear explanation of how the solutions address business problems and technical requirements outlined in the RFP, any assumptions, and considerations for deployment of developed solution through a pilot.

Each proposal is evaluated by a specific set of criteria. Below are the Proposal Evaluation criteria for this RFP:

Proposal Evaluation Criteria	Order of Importance
Requirements Compliance <ul style="list-style-type: none">Clearly articulates how the team will meet all the capabilities required by the RFPProposed solution clearly addresses problem statement and use cases identified in RFPClear identification of assumptions, risks, and mitigations; proposed deliverables align with requirementsProgram management plan meets requirements in the RFP and is reasonable for the scope of work described in the technical proposal	1
Methodology <ul style="list-style-type: none">Clear and concise work effort scope targeted at problem statementProposed effort of direct relevance to RFPClear identification of barriers to implementation and explanation of how they will be overcomeInnovative methodology with high-potential for market impactSignificant and impactful use of external resourcesMethodology demonstrates scientific and technical meritSMART metrics and KPIs identified and described and demonstrate clear understanding of proposed workProvides a maturity level assessment of both current and future state of technology with substantiation of assessed levelsDeliverables are fully described and identified	2



Transition Plan <ul style="list-style-type: none">• <i>Transition plan clearly articulates all project results and application into commercial and/or government products, systems and applications</i>• <i>Plan includes detailed descriptions of project results, risks/assumptions/mitigations, all required actions and timing, detailed funding and ROI strategy, key milestones, schedule and go/no-go decision points</i>• <i>Proposed team includes appropriate representation from supply chain, researchers and industrial partners</i>• <i>Transition tasks and partners identified and thoroughly defined, both to MxD members and the broader industry</i>• <i>Solution and strategy to rapidly enable the adoption of the new technologies across the US manufacturing base is presented</i>• <i>Clearly defined IP ownership and innovative licensing strategies designed for rapid adoption of the new technologies</i>• <i>Discussion of future transition and/or commercialization demonstrates a clear understanding of the industry and possible markets for the technology</i>• <i>Benefits of technology are clearly defined and substantiated.</i>	3
Team Qualifications <ul style="list-style-type: none">• <i>Members of proposed team are highly qualified to accomplish project tasks with clear delineation of roles and responsibilities</i>• <i>Solid evidence of commitment by team members, such as letters of commitment from their companies</i>• <i>Team members have unique capabilities that are directly associated with the target technology</i>• <i>Team includes a broad mix of capabilities and experiences to ensure success along with the commitment of top-tier facilities to accomplish all project tasks.</i>	4
Cost Factors <ul style="list-style-type: none">• <i>Proposed cost estimates are reasonable and realistic for the proposed work effort</i>• <i>The minimum cost share proscribed in the RFP has been met or exceeded</i>• <i>Cost share is clearly defined and directly applicable to the performance and success of the project</i>• <i>Cost share value is readily discernable</i>• <i>Cost share from partners is documented with letters of commitment.</i>	5



VIII. 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. All contractual negotiations related to RFPs will be executed by MxD. 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; Milestone Payment/Cost Share based EAAs will be considered upon request.

MxD has provided an EAA template within the PPK for Proposal Teams to review prior to proposal submission. **The EAA should not be submitted with the proposal.** After receiving a notification of down selection, MxD will request the down selected Proposal Team to officially begin contract review and negotiations. **The EAA must be fully agreed with the proposal team lead within 60 days of down selection notification;** acknowledgment of this is required in the Technical Proposal submission. MxD would prefer to execute an EAA only with the Proposal Team Lead. Once the EAA is executed, the Proposal Team can begin working on the project. When applicable, it is the sole responsibility of the Proposal Team Lead to issue contracts with applicable flow down clauses outlined in the EAA to any subcontractors, consultants, and any suppliers.

FINAL TECHNICAL PROPOSAL & COST PROPOSAL REVISIONS

MxD reserves the right to negotiate the cost and scope of the proposed work with the Proposal Team that has been down selected prior to award. MxD will facilitate the creation of a Statement of Work with the Proposal Team including technical scope modifications and program management aspects. All members of the down selected Proposal Team who intend to pursue selection are required to participate in the proposal revision process prior to award. For example, MxD may request that the organizations revise the technical scope to better align to RFP requirements.



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PROPOSAL PREPARATION INFORMATION



IX. PROPOSAL PREPARATION INFORMATION

This Proposal Preparation Information section offers detailed instructions on how to respond to this RFP; the Proposal Preparation Kit (PPK) includes the required proposal templates and reference documents on how to complete the templates. Together, 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 Request for Proposal Technical Summary & Program Overview prior to the PPK.

X. TEAM FORMATION OPPORTUNITIES

TEAM FORMATION LIST

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

“Subject: MxD-XX-XX RFP 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 RFP 22-23.”

TEAM FORMATION OPPORTUNITY

Additionally, MxD will host a **Team Formation Opportunity** on March, 30, 2023 to provide organizations and/or teams the opportunity to share a snapshot of their solution and receive preliminary feedback from the MxD community. It will also serve as an excellent opportunity for individuals and groups to identify synergies between their pitches. 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 Proposal and Cost Proposal.

XI. SUBMISSION INSTRUCTIONS

SUBMISSION DETAILS

Each Proposal Team must submit their Technical Proposal and Cost Proposal no later than 5:00PM Central Time, May, 19, 2023. All proposals must be submitted via the MxD website. The SUBMIT button can be found on each RFP 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 necessary documentation, templates and submission formats required to submit a Technical Proposal and Cost Proposal in response to this RFP. Below are the documents (organized by PPK folder) that must be completed and submitted by the due date:

Required Proposal Documentation			
Title	Document	Template	Submission Format
Technical Proposal ONE PER PROPOSAL TEAM	Technical Proposal	Attachment 1a MxD Technical Proposal Template.docx	PDF
	Resume(s) of the Principal Investigator and Key Technical Personnel	N/A	PDF
	Letter(s) of Commitment	N/A	PDF
	Intellectual Property Management Plan (IPMP)	Attachment 1b MxD IP Management Plan.pdf	PDF
Cost Proposal and Participant Certification ONE PER PROPOSAL TEAM	Cost Proposal	Attachment 2a Project Cost Proposal Template.xlsm	XLS
	Cost Narrative	Attachment 2b Cost Narrative Template.docx	PDF
	Certification of Foreign Firms, Travel and Non-U.S. Citizens	Attachment 2c Foreign Firms, Travel, & Non-U.S. Citizens.docx	PDF

- Each Proposal Team must submit **one Technical Proposal** (Attachment 1a). The instructions for completing the Technical Proposal are in the Technical Proposal template provided in the PPK folder. All questions are required, and attachments should be included.
- Each Proposal Team must submit **one completed IP Management Plan** (Attachment 1b) for the entire team with the Proposal. Instructions for completing the IPMP are provided in the pdf. An additional IP Management Plan will be requested if the proposal team is awarded, an excel version of the IPMP will require the team to document Background Intellectual Property (BIP), Project (Foreground) IP, and assertions of limited rights to the Government.
- Each Proposal Team must submit **one Cost Proposal** (Attachment 2a) **including the Cost Narrative** (Attachment 2b) that is a summary or “roll-up” of all Proposal costs including cost share. Please reference the MxD Cost Proposal Development Guide



for instructions on how to develop the Cost Proposal. An example Cost Proposal Excel Sheet and Cost Narrative are provided for reference. **Proposal Teams should be prepared to provide substantiating documentation for all Proposal Team Member costs within two weeks of down selection if the proposal is down selected. Additionally, if the proposal is down selected, the Proposal Team Lead must provide single audit results or other audited financials if Proposal Team Lead is not subject to single audit requirements.**

- Each Proposal Team must submit **one Certification of Foreign Firms, Travel and Non-U.S. Citizens** (Attachment 2c) with information from every Proposal Team member. If there is personally identifiable information, separate certifications may be submitted
- The EAA is provided for review prior to submission. **The EAA should not be submitted with the proposal.**

Proposals that do not include the minimum requirements identified in the RFP will be deemed non-responsive and will not be evaluated.