The Digital Manufacturing Institute

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

MxD-22-07:
Track and Trace Technology and Solutions

Revision 1.0 Release Date: November 15, 2022

Contact: Patrick Barrett
Project Engineer
MxD
projects@mxdusa.org

MxD
1415 North Cherry Ave
Chicago, IL 60642

TABLE OF CONTENTS

I. RECORD OF CHANGE

Revision	Date	Sections	Description
1.0	15 November 2022	N/A	Original

II. PROJECT OVERVIEW

Project Type	TIA Enterprise Project
RFP Released	15 November 2022
Team Formation List	Updated on Rolling Basis
Team Formation Opportunity (Optional)	14 December, 2022
Technical and Cost Proposal Due	09 February, 2023
Anticipated MxD Funding	$350,000
Minimum Cost Share Amount	$350,000 or requested funding amount, whichever is lower
Period of Performance	9 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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@mxdinnovates
info@mxdusa.org

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Chicago, IL 60642
(312) 281-6900

TECHNICAL SUMMARY

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(312) 281-6900

IV.   TECHNICAL SUMMARY

PROBLEM STATEMENT

There are many factors affecting how efficiently manufacturers are operating. From supply chain issues to labor shortages to natural disasters – anything can disrupt daily operations. With the proliferation of industry 4.0 and the rapidly advancing state of technologies, manufacturers can be further equipped to make production decisions faster and more informed than ever before. Overall Equipment Efficiency (OEE) is a common measurement of how well an organization is operating. It is a valuable way to identify problems and find ways to continuously improve operations.

$$\textbf{OEE} = \textbf{Availability} \times \textbf{Performance} \times \textbf{Quality}$$

Track and trace capabilities can have a direct effect on both **Availability** and **Quality**. Tools and fixtures required to run certain parts or production lines can get lost or misplaced, causing delays for production and affecting other manufacturing processes. If components aren't located in a timely manner, production may be forced to alter their schedule or can waste time if forced to be idle. When organizations have higher visibility to components that are critical to their success, they become more informed and more efficient.

Tracking and tracing assets throughout a supply chain or within a facility is a practice that has become common throughout industry. Whether companies want to know when to expect components or simply want the location of tools or fixtures in their facility, tracking and tracing provides value for various groups and job functions. Although tracking and tracing solutions have been available for some time now, there is no tool that allows manufacturers to review all options in one place. Different industries have different needs when it comes to tracking and tracing – investing in technologies or methods that don't provide maximum value wastes time and money for organizations that don't have an excess of either. With so many tools and methods available to manufacturers, it becomes difficult to identify which technology is needed for a given use case.

Decision makers need to be informed and empowered to make educated decisions on behalf of their organizations and applications. The current state does not ensure manufacturers are able to locate and implement tools and resources that will allow them to increase adoption of Industry 4.0 practices. This project seeks to develop a tool that will allow manufacturers to explore Track and Trace solutions to identify those best suited for their unique situation.

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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.

Additionally, teams are not expected to provide all-encompassing solutions that cover all possible track and trace possibilities but should consider the basic, commercially available solutions that are readily available to U.S. manufacturers of all sizes for both asset location and inventory monitoring applications. 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 track and trace 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 track and trace technology.

The key objectives are defined below:

1. **Understand Track and Trace Options:** Summarize the current and evolving commercialized track and trace products and many service provider options with a clear summary of each for comparison and decision making. Address the high costs of getting started with track and trace.

   The requirements for this objective are as follows:

   - Analysis and research into identifying and listing the factors that may impact the design, implementation, and maintenance of a track and trace system in a manufacturing environment.
   - Track and trace systems must include both asset location and inventory monitoring applications.
   - Track and trace technologies must include RFID, barcoding, UWB, Bluetooth, geo-tracing/geo-fencing, vision recognition, serialization methods, and other relevant technology.
   - Selection factors must include cost, performance metrics, capabilities, requirements of each technology, range available for tracking, interference throughout the factory floor, implementation considerations, maintenance, training, and other key factors.
   - "Best practices" for successful design, implementation and maintenance needs to be included in the assessment.
   - Include input and feedback from appropriate users in the development of this effort including personnel at different roles in a factory as well as various manufacturing applications.
   - Identify which areas in production are best suited for technology implementation.
   - Provide a table, matrix, or similar type of method representing the different track and trace options currently available and those that are still evolving.

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- A summary of advantages and disadvantages for each option to be compared against the contributing factors must be included.
- A summary of leading options for specific applications must be included. These applications should represent typical use cases in a manufacturing environment.
- The summary must also include a risk assessment, and if possible, methods to reduce those risks.
- Documented feedback from appropriate users on the results of the analysis and summary.
- List information resources for additional investigation, knowledge, and opportunities.

2. **Development of Track and Trace Selection Tool:** Leveraging the results of the track and trace options summary in Objective 1, convert the summary and analysis into a tool that can be used for an efficient understanding of the track and trace choices. This objective is to convert the static summary in Objective 1 into an interactive tool that is easy to access and use for 'What if" analysis and comparisons.

The requirements for this objective are as follows:

- Provide a tool that does not require any special equipment or software for support. It would preferable that the tool is off the shelf.
- The tool needs to be easy to be configurable for future updates, edits, and possible additions without requiring unique or advanced programming expertise.
- The tool must include key factors and other features that are listed in Objective 1.
- The tool must have the capability for comparing different track and trace technologies across the key factors, including asset location and inventory monitoring applications.
- The tool must be able to support basic 'What if" options and comparisons.
- The design and development of the tool should include use and review by appropriate people outside of the team prior to completion to verify its value and usability.

3. **Derive a Track and Trace Best Practices Playbook(s):** Leveraging the results of the track and trace selection tool in Objective 2, develop guidebooks that walk manufacturers through the specific solutions available from the selection tool. These documents should allow an organization to visualize ideal applications for available solutions and understand the pros and cons associated with implementing them.

The requirements for this objective are as follows:

- Document the commonalities across the requirements of existing systems.
- Define the industry specific practices that certain manufacturing sectors or verticals should consider apart from the broadly applicable practices.
- Consideration the categories of scanning technologies that can be utilized to support the best practices.

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- Consider the feasibility of deploying each of the best practices when faced with the real-world hurdles of the manufacturing sector and specifically the challenges of SMMs.
- Address the infrastructure requirements to handle large volumes of traceability reports.
- Address software applications to interface between the track and trace scanning equipment and MES system/Inventory tracking system.
- Address wireless interference considerations with regards to existing systems and frequencies already in use or planned to be used
- Playbook should cater to an SMM audience and provide practical guidance details regarding hardware and software necessary to use the identified technologies.

4. **Development and Installation of Track and Trace Demonstration at MxD:** Purchase a representative sample of commercially available equipment and install / configure on the MxD Factory Floor to create a demonstration of track and trace technology and solutions.

The fundamental objective of the demonstration is to present technology as an enabler and help manufacturers to see the value of track and trace solutions with respect to both direct and indirect benefits. Direct benefits include, data-based decision making, process improvements, transferring data between MES/Inventory tracking systems, impact to OEE, and delivery of trustworthy equipment. Indirect benefits include, cost avoidance, damage control, brand protection, protection against counterfeit products and contract requirements.

The solution team has the freedom on what setups or use cases to utilize when demonstrating the various track and trace choices.

Ideally, the team should follow the 'Playbook' developed in Object 3 which will not only be a verification check of the Playbook, but also demonstrate the usefulness and credibility of the Playbook

The requirements for this objective are as follows:

- **Demonstration Architecture:**
    - Create an architecture that provides a both asset location and inventory monitoring applications.
    - Create at least one standard use cases for each application that are typical in a manufacturing environment that can be used to demonstrate track and trace implementations.
    - At a minimum the use case(s) must demonstrate the following operations and features to illustrate the effectiveness of track and trace solutions:
        - Movement of assets (asset location application).
        - Changing levels of inventory (inventory monitoring application).
        - Track moving items and densely located items.
        - Account for human reaction or adverse effect to scanning methods.

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- Trigger an action based on a scanning event.
- Consider how to scan devices and when, may need special process designs to enable appropriate proximity such as gating areas (loading docks, doorways, etc.).
- Provide data recall (the ability to locate historical records and have context about the data).
- Maintain Parent-Child relationships (the ability to distinguish a batch of products from a truck load of cargo).
- Digital/RF Ecosystem impacts (increasing RF density in the environment, interference with other machines, other interactions and conflicts).
- The Architecture must be readily available commercial equipment that does not necessarily lock down a manufacturer into a specific solution or vendor.
- Include in the Architecture the methodology for identifying and designing the system so manufacturers can understand the steps needed to get started with track and trace technologies in their facility.
- The Architecture must be designed so additional equipment, use cases, etc. can be added in the future that does not require significant changes to the system; goal is for easy plug-in & play.
- The Architecture wireless technology cannot interfere with existing or planned wireless systems.

- **Design, procure, install, and test the MxD Track and Trace Demonstration:**
  - The team is to design, procure, install, and test the system(s)
  - Define a method for selecting equipment that can be shared with MxD members. This includes a list of distributors and sources from which equipment can be purchased.
  - Installation considerations:
    - Facility requirements.
    - Equipment physical requirements.
    - Cost considerations for a typical installation for the different track and trace choices.
    - Wireless antenna placement.
  - Testing of a system:
    - Special equipment that may be required.
    - Contractors who may do this work; what to look for and how to select.
    - Interference testing should be considered.
  - Staffing skill sets / expertise:
    - What unique skills or expertise is needed to design, procure, install, and test a basic track and trace system.
    - What additional skills are needed for more advanced systems or technology.
    - When to do the work in-house and when to contract out.

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- What training resources are available for understanding, designing, implementing, operating, and maintaining track and trace technologies in a factory environment.

- **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 a track and trace system. This should include training and education for personnel who will be assigned maintenance.

- **Documentation**
  - Troubleshooting guides as required.
  - List software licenses required and how they will be managed (one time purchase or subscription).
  - Lessons learned from deployment on the MxD factory floor.

- **Proof of Concept**
  - Build out of the Demonstration system should ideally be done at a convenient location before transfer and implementation at MxD. The project team must determine if this is the most efficient manner to identify, root cause, and resolve design and implementation issues.

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

- *As a manufacturing manager or engineer, I need to determine what are my options and best choices for asset location and inventory monitoring applications using track and trace systems.*
- *As a manufacturing manager or engineer, need to understand the effort and resources needed to implement a track and trace system which includes the initial design to maintaining the system once installed.*
- *As an Operational Technology (OT), Information Technology (IT) or Business Technology (BT) professional, I need to know what considerations to understand to successfully implement a track and trace system.*
- *As a facility engineer or manager, I need to understand the physical requirements for a track and trace system and ensure the implementation aligns to those requirements.*
- *As a person interested or having a need to better understand track and trace solutions in a manufacturing environment, I need a tool that will provide a summary of choice with trade-offs, risk, advantages and disadvantages for the choices available for a specific situation or use case.*
- *As a person interested or having a need to better understand track and trace solutions in a manufacturing environment, I need a tool that will provide the factors required in understanding what considerations for a track and trace system are needed before an analysis can be made.*

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- *As a member of MxD, I need to know how I can de-risk my use case by utilizing the MxD Track and Trace Technology Demonstration for Proof of Concept.*
- *As a member of MxD, I need to understand how to utilize the Lessons Learned from the 22-07 project work.*

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RFP SCOPE OF WORK

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

Period of Performance: 9 months
Anticipated MxD Funding: $350,000
Minimum Cost Share Contribution: $350,000

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 #)
Documentation of Track and Trace Technology and Selection Criteria	Develop requirements and criteria needed to assess track and trace technologies including asset location and inventory monitoring; document current and future wireless technologies	Month 3
Track and Trace Technology Assessment Report	Provide a report of the track and trace technologies with a comparison including strengths, weaknesses, and Best Practices	Month 5
Track and Trace Technology Assessment Summary	Provide a summary of the detailed report (key findings and information from the Assessment Report)	Month 5
Selection Tool Design	Provide architecture for the Selection Tool that includes user input and feedback on the tool development	Month 5
Selection Tool Demonstration	Demonstration of Selection Tool	Month 6
Validation of the Selection Tool	Validation of the Selection Tool with appropriate users outside of the Project Team	Month 7
Playbook	Training material describing how to implement selected track and trace solutions based on best practices catering to the SMM community.	Month 7
Developer Documentation	Includes documentation for troubleshooting, modifications, and future expansion	Month 8
User Guide	Includes requirements, how to setup, how to use, troubleshooting, and how to make changes	Month 8
Transition Plan	Documentation of how this project outcome will be transitioned to the broader manufacturing	Month 8

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	community. Can include training videos, education materials, webinars, etc.	
Demonstration System		
System Architecture and Integration Framework	Documentation of the system architecture and framework including approach, diagrams, requirements, and expansion capability	Month 2
Equipment Identification and Procurement	Detailed BOM (Bill of Material) that includes hardware and software specifics	Month 3
System Test and Validation Report	Validate Proof of Concept of system design and BOM by building and validating the system	Month 4
Use Cases Identified	Create two use cases	Month 5
Proof of Concept	Includes track and trace system and a use case at a minimum	Month 7
MxD Install	Install and begin final prep at MxD	Month 8
Lessons learned in deployment on factory floor	Report on implementation challenges and lessons learned.	Month 9
Demonstration System Acceptance	Demonstration system working per project objectives and deliverables	Month 9
Documentation	All documentation completed and transferred to MxD	Month 9

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.**

PROGRAM OVERVIEW

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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 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

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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 nine 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.

Ownership of Deliverables 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

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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

MxD anticipates awarding one project for no more than $350,000 of Federal Funding, not inclusive of required cost share, under the MxD-22-07 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.

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.

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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.

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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. 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:

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Proposal Evaluation Criteria	Order of Importance
Requirements Compliance • *Clearly articulates how the team will meet all the capabilities required by the RFP* • *Proposed solution clearly addresses problem statement and use cases identified in RFP* • *Clear identification of assumptions, risks, and mitigations; proposed deliverables align with requirements* • *Program management plan meets requirements in the RFP and is reasonable for the scope of work described in the technical proposal*	1
Methodology • *Clear and concise work effort scope targeted at problem statement* • *Proposed effort of direct relevance to RFP* • *Clear identification of barriers to implementation and explanation of how they will be overcome* • *Innovative methodology with high-potential for market impact* • *Significant and impactful use of external resources* • *Methodology demonstrates scientific and technical merit* • *SMART metrics and KPIs identified and described and demonstrate clear understanding of proposed work* • *Provides a maturity level assessment of both current and future state of technology with substantiation of assessed levels* • *Deliverables are fully described and identified*	2
Transition Plan • *Transition plan clearly articulates all project results and application into commercial and/or government products, systems and applications* • *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* • *Proposed team includes appropriate representation from supply chain, researchers and industrial partners* • *Transition tasks and partners identified and thoroughly defined, both to MxD members and the broader industry* • *Solution and strategy to rapidly enable the adoption of the new technologies across the US manufacturing base is presented* • *Clearly defined IP ownership and innovative licensing strategies designed for rapid adoption of the new technologies* • *Discussion of future transition and/or commercialization demonstrates a clear understanding of the industry and possible markets for the technology* • *Benefits of technology are clearly defined and substantiated.*	3

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Team Qualifications • *Members of proposed team are highly qualified to accomplish project tasks with clear delineation of roles and responsibilities* • *Solid evidence of commitment by team members, such as letters of commitment from their companies* • *Team members have unique capabilities that are directly associated with the target technology* • *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.*	4
Cost Factors • *Proposed cost estimates are reasonable and realistic for the proposed work effort* • *The minimum cost share proscribed in the RFP has been met or exceeded* • *Cost share is clearly defined and directly applicable to the performance and success of the project* • *Cost share value is readily discernable* • *Cost share from partners is documented with letters of commitment.*	5

VIII.   PROJECT AWARDS

CONTRACT

MxD projects 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,

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MxD may request that the organizations revise the technical scope to better align to RFP requirements.

PROPOSAL PREPARATION INFORMATION

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info@mxdusa.org

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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-22-07 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 22-07."*

TEAM FORMATION OPPORTUNITY
Additionally, MxD will host a **Team Formation Opportunity** on December 14, 2022 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, February 9th, 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.

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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. 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

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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 <u>not</u> 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.