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

MxD-22-10:
Operational Technology Test Methods

Revision 1.0 Release Date: April 14, 2022

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I.   RECORD OF CHANGE

Revision	Date	Sections	Description
1.0	14 April, 2022	N/A	Original

II.   PROJECT OVERVIEW

RFP Released	14 April, 2022
Team Formation List	Updated on Rolling Basis
Team Formation Opportunity (Optional)	05 May, 2022
Technical and Cost Proposal Due	16 June, 2022
Anticipated MxD Funding	$750,000
Period of Performance	12 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.

We are 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.

TECHNICAL SUMMARY

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IV. TECHNICAL SUMMARY

PROBLEM STATEMENT

Over the last decade, the scope and variety of cyberattacks against ICS (Industrial Control Systems) has expanded rapidly. The acceleration and convergence of connecting the factory floor to the web such as sensors streaming data to the cloud, increases the risk of a cyberattack on OT (Operational Technology) due to vulnerabilities within a manufacturer's OT system. OT *(Table 1)* is a combination of software and hardware for direct monitoring and control of a variety of devices, physical structures, and infrastructure. Industrial engineering is used to monitor a variety of processes within an enterprise, from critical infrastructure to robot management. OT is widely used in industrial control systems such as supervisory control and data acquisition (SCADA) systems and in manufacturing facilities, oil and gas industries, aviation, rail transport and more. In a recent survey conducted in 2022 by OTORIO on Cybersecurity for OT, *98% of respondents reported noticing an increase in cyber risks since 2019 while only 2% of respondents haven't noticed a difference in the level of cyber risks over the past three years*. They will continue to rise if industry does not secure and target weaknesses within their OT environment.

Unlike IT (Information Technology), which has an abundance of security tests such as vulnerability scanning or penetration testing currently in the market, OT security strategies, tactics, and test methods are either not well defined or inconsistent which can be overwhelming to industry due to the anarchic information on cybersecurity for ICS. Solutions currently serving OT are often modified IT solutions with mitigation methods unsuitable for OT. IT *(Table 1)* is a system, primarily computing system hardware, for performing various tasks such as receiving, storing, retrieving, transmitting, modifying, and protecting input so that data or information can be used between different organizations. IT also handles the use of telecommunications. Rather than performing a fixed set of functions, IT can be updated and reprogrammed in a variety of ways to meet evolving and changing applications, business needs, and user needs. IT networks are used in all industries to manage computer systems and corporate data more securely. Operational Technology (OT) consists of many different hardware and software system components whose primary function may be quite different than IT. Examples of unique function OT includes but is not limited to sensors, motors and motorcontrollers, and other physical equipment. Operational technology, monitors and manages industrial process assets and manufacturing/industrial equipment.

Industry requires a detailed understanding of the application of existing test methods on OT networks to mitigate the various attack profiles. This knowledge can allow industry to use existing solutions to enhance and manage cybersecurity postures and to identify gaps in attack profiles that are not sufficiently addressed by current tools. To address this industry need, MxD is funding the development of a simplified application guide that will identify and label reliable and safe OT test to model various cybersecurity attacks and validate security controls. The guideline will provide a clear and unbiased reference for security tactics and techniques from the MITRE ATT&CK® MATRIX and other defense frameworks such as the RAMI 4.0 Model and the D3FEND Matrix. Through this investment, MxD seeks to deliver and expand on education and awareness for securing OT by demonstrating the test methods from the application guide to

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a test bed at MxD's factory floor. This effort will work toward cutting through the "noise" around OT and cybersecurity as well as providing the public a guideline they can trust.

Table 1   **KEY DIFFERENCES BETWEEN OT & IT (DESCRIPTIONS)**

OT Network	IT Network
It is a combination of both hardware and software	Networking, information processing, enterprise data centers, and cloud systems are all part of IT
OT is the livelihood of all institutions	IT is extremely important at the corporate (or "Enterprise") level
OT is focused on their back-end production activities	IT-focused on front-end informational activities
OT is industrial-oriented	IT network is business-oriented
Mainly interacts with machines	Mainly interacts with information
Works on real-time data processing	Works on transactional data processing
Any disruption in the OT network will have a direct impact on the overall business	IT network failure can have a negative influence on a company's bottom line, depending on the industry
It controls physical access to any device	IT networks to ensure security by authenticating devices and users on the network
Safety and availability are a priority for OT	Confidentiality is a priority for IT
Need special precaution for updating OT networks. Sometimes, need to shut down or redundancy method has to use the plant for updating	IT security updates are so frequent and no need to shut down for updates
The typical lifetime of OT equipment is about 10+ years	The typical lifetime of IT equipment is about 12-18 months

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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 change to the requirements as they see fit. These changes should be justified in their proposal. MxD encourages both waterfall and agile methodologies for the 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 highly encouraged to propose evergreen artifacts for the project deliverables or the team's added requirements such as modernizing the guideline and/or test bed as needed over time. Teams are expected to focus their proposals to a scope that is realistic, achievable, and aligned with their unique subject matter expertise. A wider range of expertise is preferable to MxD, but teams will be evaluated based on their proposed approach and its potential impact in the development of the application guide and test bed that will have the potential to make a broad impact on industry, specifically small and medium manufacturers (SMMs).

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The key objectives are defined below:

1. **Survey existing state of the art test methods:**
    o   Review, compare, and assess cutting edge test methods in each of the major tactics and techniques of the MITRE ATT&CK ® MATRIX, other frameworks to reference are the D3FEND Matrix, NIST Controls and Open Systems Interconnection (OSI) for OT networks
    o   Develop in-depth remediation levels depending upon the tactic (i.e., detect or protect)
    o   Review what is being done at the enterprise environment in terms of cybersecurity, current techniques may be helpful to the team
2. **Map test methods against MITRE ATT&CK ICS or D3FEND Framework**
    o   Reference the following AAA rule for this objective; Arrange, Act, Assert
    o   Summarize test methods and results (i.e., applying x method results in a, b, c)
        ▪   Consider the techniques, software programs, and target networks the frameworks describe
3. **Define ICS profile(s)**
    o   Outline industry control system profiles representative of industry
    o   Interview manufacturers of all sizes, specifically SMMs, to gather current model trends of an OT environment as well as personnel and other important key factors to label ICS profiles appropriately
4. **Develop a test bed at MxD to apply the surveyed and mapped test methods**
    o   Consider leveraging the MxD Cyber Wall to compliment the test bed
        ▪   Reference the [MxD Virtual Tour](#) for a visual of the Cyber Wall
    o   Test bed is required to implement test methods in a wired system only
    o   Secure the proper engineering talent to develop and test a realistic environment
    o   Design, network, and connectivity requirements of the test bed will need to be approved by MxD before build and installation:
        ▪   The team will rely on MxD for support, planning, and logistical efforts regarding the test bed's setup at MxD

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- ▪ Properly plan, collaborate with team(s), and other personnel such as IT/OT and other project partners where involvement is applicable in order to reduce amount of work and overcome struggles
  - o Develop a sustainable, robust, and flexible test bed where MxD can make adaptations and demonstrate new technologies
    - ▪ Leverage the current MxD Cyber wall if applicable for this project
  - o Provide all documentation such as training manuals, educational reporting, and other related design/operable documentation

5. **Demo test methods against the major tactics and techniques of MITRE ATT&CK and D3FEND frameworks**
   - o Reference the following AAA rule for this objective, Arrange, Act, Assert
   - o Showcase identified and pertinent test methods onto the test bed
     - ▪ Consider the use cases listed below
     - ▪ Visitors will need to have a hands-on experience to the test bed

6. **Develop public application guide of the test methods**
   - o Provider an introduction to the application guide to contain information on how/where IT and OT meet by providing examples such as the various ways ICS can connect to the internet (i.e., sensors, controllers, NC code passing through CAT5 cables)
   - o Include (while not marketing) whitelisted products in the guideline
   - o Provide examples of the top 10-15 strategies to secure a manufacturing environment
     - ▪ Include actual manufacturing environments such as showcasing old routers, WIFI set up, laptop/workstation, etc.
     - ▪ Include resource development to support these strategies
   - o Apply the identified and surveyed OT test methods from the first and second objectives
   - o ***Note:*** This guide is intended to be used by industry (public) as a technical application guide to identify and deploy test methods to mitigate various attacks. Industry will also use the solution to identify tool development needs
   - o ***Note:*** MxD is aware of the supply chain issues occurring at this time, MxD will support the project team with scheduling and any extensions if required regarding the ordering and delivery of equipment. The team should highlight any risks to the timeline.

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

As a manufacturer, I need to understand how to secure my OT environment and access reliable resources (products) to kick off my cybersecurity journey.

As an SMM, researching and applying cybersecurity for my OT environment is over-whelming, I need a reliable and structured approach in order to educate and prepare my team/organization.

As a manufacturer who does business with the DoD, I need to follow security regulations and compliance requirements set by the Government, however, current guidelines are too complex and not easy to digest. A translated version to be understood by SMMs would be valuable.

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As an SMM, having an interactive and visual representation of reliable OT test methods will provide my organization to act on implementing respond/recover capabilities.

RFP SCOPE OF WORK

The above objectives must be completed within the following project constraints:
Period of Performance: 12 months
Anticipated MxD Funding: $750,000
Minimum Cost Share Contribution: $750,000

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 and for public consumption such as the manufacturing and cybersecurity community. The recommended deliverables are listed below in Table 2, but **the Proposal Team is encouraged to include additional deliverables or provide value-added changes to the recommended set of deliverables**.

The proposal team should perform an initial market research and survey existing state of the art test methods for OT networks. This preliminary process will aid the team to discover, compare and orient themselves with the major tactics and techniques from the MITRE ATT&CK ICS MATRIX and the D3FEND MATRIX.

Once the evaluation on the state-of-the-art test methods for OT has been completed, the team will then move on to map the recommended and applicable test methods against the MITRE ATTA&CK ICS and D3FEND frameworks. Supporting documentation, results, and diagrams should be provided as part of the second objective listed in the previous section. During the period of performance, the proposal team will define and outline ICS profiles representative of industry. It is highly recommended for the team to interview manufacturers of all sizes, specifically SMMs, to gather facts and figures of an OT environment.

The project should employ waterfall and/or agile methodology. The team should have active engagement from all partners throughout the period of performance. Through this planning and development process, the team must develop a test bed at MxD to apply the surveyed and applicable mapped test methods. The team will aim to meet the requirements of the test bed listed in the fourth objective as well as incorporating MxD's objective of showcasing the test bed to the public for an educational and interactive experience. The following are typical challenges shared by many testbeds, this is a guide to assist the team as they plan and architect the project test bed:

• How to initiate an industrial IoT project and get partner/customer support?
• What is the best process for deploying a testbed?
• How to deal with human factors?
• What are the typical roadblocks and how to deal with them?
• How to handle the mismatch between IT and OT?
• What is the best way to deploy specific technologies for human learning?

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

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deliverables must align with MxD's focus on achieving deployable outcomes and enabling the transition of the research.

Table 2. Technical Deliverables

Deliverable	Description	Deliverable Due Date (Month #)
Survey & Mapped Test Methods Documentation	Documentation and other supporting citations of the approach, diagrams of the mapped test methods, and findings of the surveyed test methods for OT – reference the MITRE ATT&CK ICS MATRIX and the D3FEND MATRIX	Month 5
Detailed ICS Profile Report	Reporting and properly diagramed ICS profiles representing industry such as network (SCADA) layout, size of personnel and organization, production network, internet arrangement, etc.	Month 6
Test & Validation Report	Technical report on the testing results for the test methods being applied to the test bed	Month 6 - 7
Test Bed at MxD	Develop and implement a test bed at MxD meeting the test bed requirements – meet with stakeholders to plan and organize requirements and personnel **Note:** Prior to build, MxD will need to review and approve the design and requirements of the design/functionality of the test bed	Month 11
Test Bed Training Manual	Provide documentation for user operation and maintenance	Month 12
Technical Demonstrations at MxD	Demonstration of technical research and development outcomes in MxD's factory floor	Month 12
Public Application Guide	A straightforward application guidebook detailing best practices for cybersecurity in OT, summarizing the test methods and results, and other useful information for industry	Month 12

The Proposal Team is expected to develop a transition plan, which is detailed in Table 3 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

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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 at least one participation by a manufacturer to drive use case and OT/operational input. The manufacturer(s) are expected to provide feedback on technical requirements, drive the business case for project outcomes and serve as a reference point for test and validation of the test methods and application guide.

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 Director of Cybersecurity, 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 Director of Cybersecurity, 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.

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Table 3. 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 three (3) 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 MxD for implementation and testing with proper justification.

PERIOD OF PERFORMANCE REQUIREMENTS

Proposed projects should be no more than twelve months in duration. Please note that projects are initiated once an EAA is signed, therefore, the project duration must include the

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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 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 $750,000 of Federal Funding, not inclusive of required cost share, under the MxD-22-10 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. 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.

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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. <u>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.</u> 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 Director of Cybersecurity, 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 Director of Cybersecurity, 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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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 second 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 22-10."*

TEAM FORMATION OPPORTUNITY

Additionally, MxD will host a **Team Formation Opportunity** on May 05, 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, June 16, 2022. All submissions must be made electronically to projects@mxdusa.org. Please include the RFP designation (e.g., "MxD-<XX>-<XX> – <RFP Title> - <Proposal Team> - <Proposal Title>") in the subject line of the email.

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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.xlsx	XLS
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 template. The IPMP must contain 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**

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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.