The Digital Manufacturing Institute

MxD REQUEST FOR PROPOSAL

TECHNICAL SUMMARY, PROGRAM OVERVIEW and PROPOSAL PREPARATION INFORMATION

MxD-22-03:

Digital Manufacturing Playbook

Revision 1.0 Release Date: June 9th, 2022

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I. RECORD OF CHANGE

Revision	Date	Sections	Description
1.0	9 June, 2022	N/A	Original

II. PROJECT OVERVIEW

RFP Released	9 June, 2022
Team Formation List	Updated on Rolling Basis
Team Formation Opportunity (Optional)	30 June, 2022
Technical and Cost Proposal Due	18 August, 2022
Anticipated MxD Funding	$250,000
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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TECHNICAL SUMMARY

IV. TECHNICAL SUMMARY

PROBLEM STATEMENT

The manufacturing industry is in the process of a years-long transition towards Industry 4.0 and is harnessing the benefits of increasingly connected production equipment, business systems, and data. This transition is uneven and varies across industry, region, and company size but generally those within high-tech regulated industries (such as aviation) or large automated production (such as automotive) have been the first implementers of digital manufacturing technologies. However, these firms represent the exception and not the rule and the vast majority of US manufacturers are small companies. In fact, 98% of manufacturers have fewer than 500 employees and 73% have fewer than 20[1]; these are collectively considered small and mid-sized manufacturers (SMMs).

All manufacturers experience challenges in their digital transformation—some are especially pronounced at SMMs but apply similarly at brownfield facilities regardless of ownership size. There are many reasons why SMMs have been slower to adopt advanced manufacturing technologies, but chief among them is the lack of time/personnel resources/expertise to pursue transformation implementations that may have uncertain or unclear return on investment (ROI). This is complicated by infrastructural obstacles such as an increased proportion/age of legacy equipment, immaturity, or absence of supporting systems like ERP/MES, and a reliance on outsourced IT (Information Technology) services.

Beyond these material challenges, there is often reticence within organizations towards change and SMMs are no exception. Because digital transformation is a continuous process that touches all parts of the business, it is necessary to develop buy-in from both the shop floor and front office personnel. Some workers have an understandable mistrust of automation due to concerns that it may replace their labor and render them redundant. MxD espouses a more inclusive vision of a digitally mature enterprise which empowers employees with the information they need to do their job better. Organizations thrive when they continuously improve operations by democratizing access to data and iterating on its value at all levels of work.

There is tremendous latent value in the digitization of the US manufacturing industry, despite these barriers. Digitization of factories is estimated to have increased factory output by 10% and labor productivity by 12% over 3 years between 2016 and 2019[2]; these trends are expected to accelerate over the next decade. The first movers in this area who are trailblazing towards a complete digital transformation of one or more of their factories see more than double the level of efficiency gains as manufacturers who are earlier in their transformation journey. The adoption of Industry 4.0 technology also provides timely benefits in a post-pandemic economy facing headwinds such as labor shortages, supply chain disruption, and the need to work remotely.

Beyond the benefits to the specific organization, adoption of digital manufacturing technologies will have transformational impact on the manufacturing industry. A networked supply chain where manufacturing data travels seamlessly along a digital thread connecting suppliers, manufacturers, and end-users enables key industry priorities such as tracking/tracing to source, real-time supply

[1] https://www.nam.org/facts-about-manufacturing/
[2] https://www2.deloitte.com/global/en/insights/industry/manufacturing/driving-value-smart-factory-technologies.html

chain planning, and virtual commissioning. Governmental and defense procurement groups are keenly interested in the volume of newly available data that will come with this digitization, exposing a rich new field to analytics that could improve operations, efficiency, and security. Large OEMs (Original Equipment Manufacturer) have already begun to request or require that their tiered suppliers integrate with their own smart industry technology. This could include mandating that components/assemblies be provided with model-based definition (MBD) native designs or managing supplier parts within a subset of their product lifecycle management (PLM) system.

There is significant opportunity for SMMs who quickly adapt to the new landscape to obtain new business or retain current customers. For those who do not digitally transform there is growing risk in no longer being able to serve market needs. MxD's mission is to accelerate the rate of adoption of Industry 4.0 technology among US manufacturers—this project call seeks to develop a broadly-applicable, SMM-focused, incremental playbook that will guide organizations in identifying, comparing, scoping, executing, and evaluating outcomes of their digital manufacturing implementation.

OBJECTIVES

This project's key objectives are separated into two categories which subdivide the overall intended scope of the project.

- **Part A: Digital Manufacturing SMM Implementations** is intended to support two to four digital manufacturing technology implementations at two to four SMMs (one each). In addition to the execution of a transformation project, Part A team(s) will be expected to contribute business outcomes, KPI achievement, firsthand experience, and lessons learned to the Part B team.
- **Part B: Digital Manufacturing Playbook** will incorporate case studies from Part A into a larger playbook that gives similar SMM/brownfield organizations step-by-step guidance to initiate and complete a digital manufacturing technology implementation. It is expected that the Part B team will have a team member embedded in each of the two to four Part A implementation teams in order to capture learnings and develop rapport with the SMMs themselves.

The graphic below represents one potential programmatic organization which follows MxD's preferred approach of having one proposal which covers the entire scope of the program.

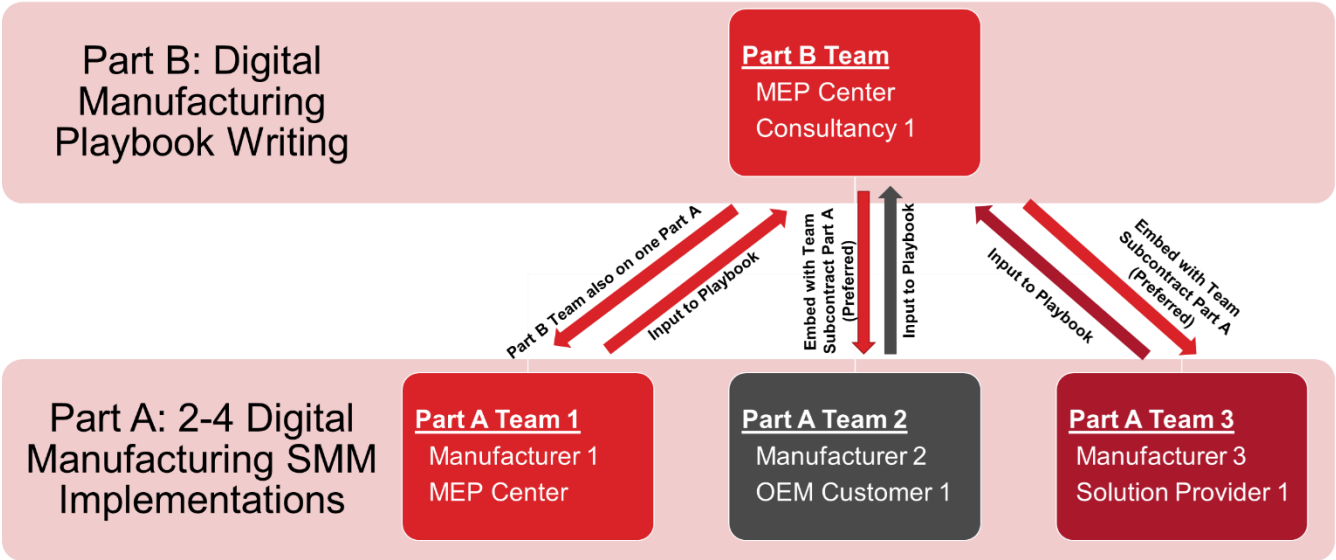

Figure 1: Potential team and program organization highlighting different Part A Team compositions.

Teams that wsh to lead the development of the manufacturing playbook (Part B) should also include team members/participants who will perform an implementation (Part A). **It is advantageous for a single proposal to cover the complete intended scope of work for Part A and Part B** to increase efficiency and ensure that the team(s) performing the implementations are well-positioned to collaborate on the creation of the playbook.

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.

Part A: Digital Manufacturing SMM Implementations

Each team which proposes to Part A will perform an implementation of digital manufacturing technology at an SMM to address current business challenges/opportunities These implementations will form the basis of case studies that are incorporated into the larger playbook.

MxD expects to award a project team or combination of proposals to complete 2-4 implementations of digital manufacturing technology.

1. **Identify Use Case and Define Requirements:** Identify target manufacturer challenges, baseline current process, evaluate available digital technologies, determine success criteria & KPIs.

   The requirements for this objective are as follows:
   - Implementation solution space must be from within the digital manufacturing/Industry 4.0 technology area

- Team should target digital manufacturing use cases which have high transferability to other industries and manufacturers
    - Some examples of high transferability use cases include but are not limited to digitizing/automating inspection, machine tending/cobots, machine monitoring, networking of legacy machines, analytics including overall equipment effectiveness (OEE), shop-floor data visualization, machine vision, and process automation
- Establish current process baseline and determine relevant KPI's, capture their current state, and develop new KPI goals that will indicate a successful project
- Team should perform digital maturity, digital manufacturing readiness, or other industry-available assessment as part of early project activities to characterize the SMM against the broader manufacturing industry
- Use case should be selected from those where enough supporting systems/prior data are available to determine the degree of improvement
- Manufacturer must be defined as a small or mid-sized manufacturer (SMM), having less than 500 employees

2. **Execute Digital Manufacturing Implementation:** Create architecture and integration plan, configure selected tools/services, integrate with business systems, iterate through development process.

   The requirements for this objective are as follows:
   - Create implementation plan to perform digital manufacturing technology project at SMM aligned with needs captured in prior requirements gathering
   - Collaborate to ensure that the needs, voice, and goals of the SMM are kept at the forefront of the technology solution
   - Document decisions made and their rationale especially for critical points like vendor selection and technologies implemented
   - Verify all "must have" requirements have been achieved, complete as many "nice to have" requirements as practicable
   - Project team is encouraged to utilize off-the-shelf solutions where appropriate and to incorporate low or zero up-front cost tools like SaaS, open source, etc.

3. **Determine Outcomes & Lessons Learned:** Implement outcome measurements, evaluate against target KPIs, interview participants, capture lessons learned.

   The requirements for this objective are as follows:
   - Implement measurement methodology to evaluate quantitative project outcomes such as increased efficiency, greater throughput, improved quality, etc.
   - Explore indirect impacts of project among workforce, customers, ownership etc. such as increased appetite for further digital transformation, skills and experience development, or new project concepts
   - Obtain testimonials/impact statements from key project participants (development team) and stakeholders who will utilize the new system/process
   - Capture lessons learned to assist other manufacturers in avoiding similar pitfalls and maximizing their value gained

4. **Contribute to Case Studies & Playbooks:** Provide data & outcomes, participate in playbook design workshops, provide editorial & content review.

   The requirements for this objective are as follows:
   - Assist Part B team in creation of case studies and playbooks by contributing the voice, perspective, and experience of an SMM
   - Provide outcomes, KPI attainment, testimonials, or other content to Part B team for inclusion in the playbook
   - Participate in playbook design workshops and provide comments, corrections, and guidance to making the playbooks the highest value possible for SMMs
   - Participate in final playbook review, ideally soliciting input from organizational stakeholders both on the shop floor and in the front office

Part B: Digital Manufacturing Playbook

The team which proposes to Part B will utilize learnings from Part A implementations as well as their own expertise to create case studies and playbooks to assist SMMs in their digital transformation journeys. Teams proposing to Part B are required to also propose as a member of at least one Part A team and implementation.

MxD expects to award a single project team for Part B.

1. **Embed with SMM Implementation Teams:** Attend kickoff & team meetings, participate in design reviews, contribute to workshops, shadow technical work.

   The requirements for this objective are as follows:
   - Attend Part A team weekly meetings, design reviews, technical presentations, and project kickoff workshop
   - Capture lessons learned, challenges, decision points, and other information for later use in case studies/playbooks

2. **Develop Case Studies:** Estimate project impact & outcome, model ROI, capture voice of the manufacturers.

   The requirements for this objective are as follows:
   - Analyze technical and financial impact data/statements provided by Part A teams
   - Create or use an existing ROI model to evaluate project outcomes, payback period, and other financial outcomes
   - Model and estimate key outcomes such as jobs created/retained, efficiencies achieved, new business created, new customers engaged, or standards met
   - Perform interviews with Part A team project participants and organizational stakeholders to capture their experiences and perspectives
   - Highlight indirect project outcomes and articulate their value, such as increased worker engagement, technical skills development, etc.
   - Create case studies which are compelling accounts of project outcomes that help other SMMs envision the value digital transformation can have in their operations

3. **Develop Playbooks:** Generalize learnings, articulate business needs/rationale for I4.0 adoption, collect tools/resources, create path for other SMMs to follow.

   The requirements for this objective are as follows:
   - Break down the process of ideating opportunities, estimating resource needs, prioritizing initiatives, building business cases, executing on scope, and sustaining a digital manufacturing technology implementation at an SMM into discrete, clear, progressive steps
   - Provide easy-to-use assessments, worksheets, brainstorming templates, ROI models, or other project assets to SMMs that serve as companions to playbook
   - Link playbook steps to resources or tools which are publicly available, available to MxD members, or which are sufficiently low-cost to be of interest to SMMs
   - Incorporate prior expertise along with case study outcomes
   - Generalize learnings from specific technology implementations into more broadly applicable insights for similar technologies
   - Primary target audience of the playbooks are SMM brownfield facilities who have yet to begin or are in the early stages of their digital transformation journey
   - Playbook should represent the voice, perspective, motivations, and concerns of SMMs and should place them at the forefront of narrative
   - Playbooks must incorporate expected roadblocks and pathways to overcome them such as a digitally non-native workforce, need to maintain current production during implementation, or needed infrastructure

4. **Disseminate Playbooks & Transition Outcomes:** Define communication partners, develop marketing plan, create usage tracing, execute post-project transition.

   The requirements for this objective are as follows:

   - Research where SMMs currently seek guidance on digital manufacturing implementations, evaluate best media and platforms to distribute playbook
   - Identify communication and channel partners such as Manufacturing Extension Partnership (MEP) centers, industry groups, regional development agencies, small business support organizations, training/development programs, or others
   - Engage with channel partners to develop a dissemination plan for the digital manufacturing playbook with the goal of delivering playbook to SMMs on both a push (marketing) and pull (hosting) basis
   - Optimally the method for delivering playbooks to SMMs should also incorporate non-invasive options for tracking receipt/download, reading, and progressive use of the playbooks—for instance utilizing a download landing page, unique embedded hyperlinks in the document, voluntary SMM self-reporting that allows benchmarking against peers, etc.
   - Propose a transition plan to MxD that provides guidance on how best to utilize and deploy the playbooks on a long-term basis

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

- *As an engineering manager, I want to follow a playbook for my digital manufacturing project in order to minimize risk and develop internal competence for future transformations.*
- *As a production manager, I want to target the highest-impact digitization efforts that fit with my needs in order to build buy-in among my workforce with quick, tangible results.*
- *As the owner of an SMM, I want to evaluate relevant case-studies of digital transformations in order to ensure sufficient ROI and business impact prior to investment.*

RFP Scope of Work

The above objectives must be completed within the following project constraints:
Period of Performance: 9 months
Anticipated MxD Funding: $250,000
Minimum Cost Share Contribution: $250,000

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 #)
Part A Deliverables		
Requirements Documentation	Documentation of core system and technology requirements to meet SMM needs, stack-ranked and segmented into "must have" and "nice to have"	Month 2
System and Network Architecture	Documentation of the network architecture including approach, diagrams, and considerations for compliance and security	Month 3
Implementation at SMM Site	Implement the selected solutions/technologies at SMM pilot to validate their effectiveness	Month 5
Test & Validation Report	Technical report on testing results for the digital technology developed and implemented	Month 6
User Manuals	Includes user manuals for operation; also includes installation and configuration instructions	Month 6
Participation in Playbook Development Workshop	Workshop held with SMMs in-person at MxD or another facility to align on best practices, review playbook draft, discuss lessons learned, and refine transition approach	Month 7

Part B Deliverables		
Detailed Case Studies	Case studies providing a detailed account of each of the Part A digital manufacturing implementations with a focus on best practices and lessons learned.	Month 7
Playbook Development Workshop	Workshop held with SMMs in-person at MxD or another facility to align on best practices, review playbook draft, discuss lessons learned, and refine transition approach	Month 7
Digital Manufacturing Playbook	Document providing step-by-step guidance to SMMs implementing similar digital manufacturing technologies	Month 8
Technical Demonstrations at MxD	Demonstration of playbook alongside case study results and discussion of outcomes in MxD's factory or via remote presentation	Month 9
Dissemination and Transition Plan	Plan with key partners, channels, media, actions, and timing to deploy playbook to SMM community.	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.**

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PROGRAM OVERVIEW

V. PROGRAM REQUIREMENTS

COLLABORATION

Participation in this program requires collaboration with a team of organizations with diverse capabilities. This RFP focuses on small to mid-sized manufacturers and thus is especially relevant to those who provide guidance, solutions, or training to SMMs.

Each Part A team must include participation by a small to mid-sized 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 the pilot manufacturer for test and validation of the solution.

Some examples of competitive Part A team compositions are:

- An SMM and their regional manufacturing extension partnership (MEP) center
- An SMM and a solution/software provider of low-cost or as-a-service digital tools
- An SMM and a consultant who has implemented other digital transformation projects
- An SMM and their larger OEM customer, with OEM customer providing technical guidance

There are no specific compositional requirements of the Part B team, but it is paramount that the playbooks be written with in the voice of the SMM. Organizations with a strong history of working alongside SMMs to implement digital transformation are highly desired. As previously mentioned, those who wish to propose to Part B must also propose to Part A, requiring robust collaboration and manufacturer relationships.

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 MxD PMO Senior Director, 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 PMO Senior Director, the Government, the Project Manager and other authorized MxD staff members in the course of their official duties. Technology advancements will be summarized at least annually in order to support reporting to

the Executive Committee, Technical Advisory Committee, MxD Members, and the Government, when applicable.

Table 2. Program Deliverables

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

TRAVEL REQUIREMENTS

Teams proposing to Part A should include funding for two (2) trips for two (2) people for each member of the Proposal Team. Teams proposing to Part B should include funding for five (5) trips for two (2) people for each member of the Proposal Team. An in-person, full-day project kickoff will be organized at MxD's facility or a proposing team member's facility and a further full-day workshop focused on playbook refinement will be held near project completion. These expected trips are summarized below.

Event/Trip Description	Participants
Project Kickoff	All Teams/Proposers
Playbook Authors (Part B) Visit Each SMM Facility	Part B
Playbook Development Workshop	All Teams/Proposers

Additional 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 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 or a combination of **one Part B and two to four Part A projects** for no more than $250,000 of Federal Funding **in total**, not inclusive of required cost share, under the MxD-22-03 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.

It is advantageous for a single proposal to cover the complete intended scope of work for Part A and Part B to increase efficiency, ensure that the team(s) performing the implementations are well-positioned to collaborate on the creation of the playbook, and to make the best use of available project funding.

This project requires a **minimum** 1-to-1 Cost Share in aggregate by the Proposal Team. For every dollar of Federal funding awarded, the Proposal Team must contribute at least a dollar of in-kind effort or cash. Thus, the Proposal Team in aggregate will need to provide at **minimum** 50% of the total project cost (inclusive of labor, equipment, materials, indirect, etc.) in cost share. This

cost share can be in-kind or cash and can be distributed among the members of the Proposal Team however the team decides. Cost share must be accounted for in the cost proposal, as described in the Cost Development Guide found in the Proposal Preparation Kit.

Neither MxD nor the U.S. Government has any responsibility for costs associated with Technical Proposal or Cost Proposal development, submissions, or pre-award negotiations.

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

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

VI. ELIGIBILITY

MxD Membership

This RFP is open to the public; any organizations regardless of membership status may submit a Technical Proposal and Cost Proposal in response to this RFP. However, the MxD Membership Agreement must be fully executed with every Proposal Team member within 30 days of notification of project down select; acknowledgement of this is required in the Technical Proposal submission. Any non-MxD members are strongly encouraged to conduct a legal pre-review of the Membership Agreement prior to submission as this is a common source of delay during negotiations with proposal teams that have been chosen during down selection. Please direct questions to MxD's Director of Business Development, Tony Papke (tony.papke@mxdusa.org). For more information on how to become a MxD Member, please visit the MxD Membership page on our website.

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

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

Government agencies interested in participating in MxD RFPs as part of Proposal Team should notify MxD in advance of Proposal submission. For RFPs utilizing Federal funding, special agreements and considerations may need to be implemented to enable participation.

Notification of Participation by Foreign Firms & Non-U.S. Citizens

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

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

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

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

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

It is a requirement that work related to the project must be completed in the U.S. by people legally authorized to work in the U.S. If any member of the proposal team is not either a U.S. citizen or a lawful permanent U.S. resident (green card holder), please reach out to MxD at projects@mxdusa.org before submitting a proposal. 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 MxD PMO Senior Director, 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 MxD PMO Senior Director, with the consultation of other MxD representatives, will determine which subset of the proposed Technical Proposals deemed “selectable for negotiation” will be down selected for negotiations. This determination will take into account the EB’s recommendation, funding availability, alignment with MxD’s SIP as well as external stakeholder requirements (when applicable).

EVALUATION CRITERIA

MxD’s primary goal is to apply digital manufacturing technologies to solve business problems. To this end, successful proposers must demonstrate an understanding of both the business needs as well as the technology solutions. Proposals should provide a clear explanation of how the solutions address business problems and technical requirements outlined in the RFP, any assumptions, and considerations for deployment of developed solution through a pilot.

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

Proposal Evaluation Criteria	Order of Importance
Requirements Compliance • *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

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

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PROPOSAL PREPARATION INFORMATION

IX. PROPOSAL PREPARATION INFORMATION

This Proposal Preparation Information section offers detailed instructions on how to respond to this RFP; the Proposal Preparation Kit (PPK) includes the required proposal templates and reference documents on how to complete the templates. Together, the Proposal Preparation Information and PPK are intended to provide the basic information necessary for assembling complete proposals.

NOTE: MxD recommends Proposal Teams review the Request for Proposal Technical Summary & Program Overview prior to the PPK.

X. TEAM FORMATION OPPORTUNITIES

TEAM FORMATION LIST

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

> ***"Subject: MxD-XX-XX RFP Team Formation***
>
> *[Organization Name]*
>
> *[Name of Contact]*
>
> *[Email address of contact]*
>
> *[1 sentence description of expected contributions to Proposal]*
>
> *I agree to have the information herein disseminated to other organizations that have indicated interest in forming a team for MxD's RFP 22-03."*

TEAM FORMATION OPPORTUNITY

Additionally, MxD will host a **Team Formation Opportunity** on Thursday, June 30, 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, Thursday, August 18, 2022. All submissions must be made electronically to projects@mxdusa.org. Please include the RFP designation (e.g., "MxD-22-03 – Digital Manufacturing Playbook - <Proposal Team> - <Proposal Title>") in the subject line of the email.

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**

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.