Project Planning Document
Call for White Papers

DMDII-15-12
Technologies Enabling Supply Chain Visibility

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1 Record of Change

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<td>Original</td>
<td>16-Jul-2015</td>
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2 Summary

2.1 Purpose
Digital Manufacturing and Design Innovation Institute (DMDII) Project Calls are issued to address research and development needs in digital design and manufacturing technology that are aligned with the technical objectives of the DMDII (also referred to as the Institute). This Project Planning Document (PPD) is a description of a specific technology objective. A separate document, the Proposal Preparation Kit (PPK), offers detailed instructions on the White Paper and Cost Proposal organization, format and submission instructions. The PPK can be found at [http://dmdii.org](http://dmdii.org).

2.2 Key Dates

<table>
<thead>
<tr>
<th>Event</th>
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<tr>
<td>Call for White Papers released</td>
<td>16-Jul-2015</td>
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<tr>
<td>Workshop</td>
<td>10-Sep-2015</td>
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<tr>
<td>White Papers due</td>
<td>8-Oct-2015</td>
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<td>Selection / Cost Proposal solicitations released</td>
<td>29-Oct-2015</td>
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<td>Cost Proposals due</td>
<td>Est. 3-Dec-2015</td>
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<tr>
<td>Project kickoff meetings</td>
<td>Est. 3-Feb-2016</td>
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2.3 Submission Information

White Paper submissions in response to Project Call DMDII-15-12 are due no later than 12:00PM Central Time, October 8, 2015. Submissions should be made electronically to DMDII@uilabs.org. Please include the Project Call designation (e.g., “DMDII-15<xx> – <Project Call Title> - <Offeror Name> - WP”) in the subject line of the email.

2.4 Project Summary

This topic considers the visibility of parts, processes, and capabilities for a variety of supply network functions. Supply chain optimization is difficult given today’s globally distributed businesses and marketplace, where businesses experience increased complexity in market demand, transportation, and distributed manufacturing. Managing this complexity requires real-time, dynamic insight into the status of current operations, including asset locations, manufacturing schedules, and emerging capacity constraints anywhere in the enterprise. Furthermore, rapid reaction to emerging
complexities in the marketplace requires a broader insight into the capabilities, capacity, and availability of prospective partners and suppliers.

The goal of this project, “Technologies Enabling Supply Chain Visibility,” is to demonstrate technologies that can provide real-time, dynamic visibility into the status of key information to facilitate efficient response to rapidly changing conditions.

3 Requirements

3.1 General Requirements
DMDII’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. White Papers should provide a crystal clear explanation of the problems that are to be solved, and how the project success will benefit the manufacturing organizations.

DMDII is interested in supporting projects that offer a significant advancement over state-of-the-art. Successful White Papers will clearly explain the present state of the technology as well as the desired future state of the technology. This technology advance must create a clear business benefit. White Papers should explain the business benefit that is being created in the project. They should also explain the metrics to be used – both technical and business – that can measure project success.

If the proposed project were to be successful and eventually implemented at scale, it should have the potential to impact the manufacturing competitiveness of the United States. Projects that demonstrate benefits to small manufacturing businesses are particularly encouraged.

Each White Paper is evaluated by a specific set of criteria. The PPK defines a general list of project call evaluation criteria, all of which are applicable to this project call.

<table>
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<tr>
<th>Evaluation Criteria</th>
<th>Points Available</th>
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<tr>
<td>Problem Statement and DMDII Relevance</td>
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<tr>
<td>Methodology</td>
<td>0-25 Points</td>
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<td>Innovation</td>
<td>0-10 Points</td>
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<tr>
<td>Program Management Plan</td>
<td>0-15 Points</td>
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<tr>
<td>Technology Transition and Impact to Industrial Base</td>
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<tr>
<td>Workforce Development and Education</td>
<td>0-5 Points</td>
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<tr>
<td>Team Qualifications</td>
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<tr>
<td>Cost Factors</td>
<td>0-10 Points</td>
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<tr>
<td><strong>Total Points Possible</strong></td>
<td><strong>100 Points</strong></td>
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3.2 Problem Background
As supply networks have increasingly become global and dispersed, companies have greater and greater
difficulty making informed decisions in the most time-optimal manner. Information required to support various supply chain decisions (e.g. sourcing or partnering choices, or shifts in production or distribution) is not current enough to optimize a response. Product demand patterns are becoming more volatile with increasing customization. Traditional supply networks require significant assets be dedicated to inventories to avoid supply interruptions, which is both a financial burden and causes enormous waste. Customer dissatisfaction occurs when demand exceeds supply. Dynamic visibility into current information is needed to support critical supply network decisions.

The present state is affected by the following issues:

- Sourcing decisions are often made based on broad policy or buyer familiarity, and not on real-time insight into the capabilities, capacity, quality, and cost history of prospective suppliers. Current supplier ‘exchanges’ offer only superficial insight and only capture suppliers currently known to that market sector.

- Typically, OEMs do not have sufficient visibility into their own or their suppliers’ production processes and inventory levels to predict supply availability with enough confidence to reduce surplus inventories or to make real-time distribution decisions.

- Supply systems are not structured for efficient exchange of information with and/or visibility into lower tiers. Current integration technologies are difficult to implement across a network of facilities and companies to be effective. As needs change rapidly in most industries, traditional technological silos are not able to keep up. Collaborative technologies for end-to-end supply network synchronization can change the industrial collaboration paradigm.

- Routine problem solving usually requires tracking down critical technical information for specific problem parts presenting as quality issues, or process data to support close analysis of causation. Interpersonal communication is central to support problem resolution, but the network information infrastructure is completely inadequate unless the precise point of origin (part, process, factory, company, etc.) in the network can be identified.

DMDII anticipates that dynamic insight into the status of assets, processes, and capabilities across the supply network will result in better synchronization of supply inventories with complex demand, and faster, more efficient response to new opportunities or emerging problems. This enhanced visibility is intrinsic to the adaptability of tomorrow’s digital enterprise.

### 3.3 Specific Requirements

DMDII is seeking White Papers to demonstrate visualization of a variety of information flows to support specific supply network decisions.

White Papers should describe one or more industry problems or opportunities that can be addressed through the use of real-time supply network visibility. White Papers should describe a specific product(s), process(es) or system(s) whose cost, quality, or schedule will be positively and measurably impacted by the implementation of real-time visibility into critical information.
DMDII has intentionally defined this topic broadly, to allow for proposing teams to propose innovative solutions.

The technology should be demonstrated on at least one application that has the potential for a broad-based impact to industry. The demonstration must be realized in an industry-relevant physical test bed and quantitatively assessed using both technical and business criteria. For the purposes of this call, “supply chain” is to be construed as invoking at least one intercompany relationship.

A variety of specific solutions may be appropriate. For example, asset status (location, completion, etc.) may be supported by standards-based information flows from the factory floor (e.g. MTConnect). Sourcing decisions may be supported by enhanced “supplier exchange” architectures to provide near real-time insight into suppliers and partners current capabilities, capacity, qualifications, and history of cost and quality performance. General capacity for problem resolution may be supported by more advanced communications infrastructure such as those typically associated with “web 2.0”. For the specific scenario chosen, White Papers should explain what information is critical to that scenario, how often this data will be updated and what “real time” means in context. Offerors should explain any links or data exchange with other manufacturing information systems – for example scheduling, maintenance, quality, and inventory management. Although many of these existing infrastructural components may be represented by propriety systems, solutions proposed against this call should be developed using open source methods to facilitate wide applicability.

DMDII is interested in the ways that modern computing hardware and software can be used in the manufacturing enterprise. Towards this end, proposers are encouraged to employ the state-of-the-art solutions in cloud computing and mobile computing.

DMDII encourages the participation of small manufacturing businesses on project teams, and especially encourages the development of technologies that can benefit these small manufacturing businesses. Small businesses can provide an excellent test bed for digital manufacturing technologies. Furthermore, technical solutions that can be disseminated across many small businesses have the potential for broad-based impact for the DMDII membership as well as the United States industrial base.

DMDII is interested in projects that significantly exceed current state-of-the-art solutions and capabilities, as assessed on a global-scale, with the long-range prospect of developing and maintaining U.S. leadership in the field. Proposed projects that describe incremental advances will be considered nonresponsive.

Offerors shall identify the project deliverables. White Papers should also explain how the deliverables will benefit the DMDII Membership and how those benefits will be realized.
Travel: At a minimum, White Papers should include funding for two trips per year for two people. These trips may be for travel to UI LABS or to another location at the request of DMDII (e.g. a conference, workshop, showcase, etc.).

4 Period of Performance
The Period of Performance may range between 12-24 months.

5 Award Information
The DMDII anticipates awarding up to $2,000,000 total to fund two to four projects under Project Call DMDII-15-12. This $2,000,000 is a target total award amount for this Project Call not inclusive of expected cost share commitments. Final award amounts will be adjusted accordingly based on White Papers received and subsequent evaluations. This project requires a minimum 1-to-1 Cost Share in aggregate by each Offeror team.

6 Team Composition
The proposing teams may be led by either industry or academia. DMDII strongly encourages the participation of small businesses. Regardless of the specific team composition, the proposed project must have meaningful participation from industry. Additionally, the requirement of at least 1-to-1 Cost Share does not need to match the individual contributions of each team member. Only the aggregate cost share value across the entire proposal team needs to meet or surpass the requested funding amount from DMDII.

To facilitate the formation of project teams, DMDII encourages manufacturing businesses, manufacturing services providers, and academic institutions to register their capabilities and interests on an online survey at https://www.surveymonkey.com/r/FGM5ZXD. This survey is also accessible from the DMDII Projects website page. Interested parties are requested to complete this survey by August 8, 2015. DMDII will provide a summary of the collected information via email one week after the requested completion date to all individuals who provide input. Survey completion is not required to submit a proposal to this project call.

Please note that answers to questions submitted to DMDII@uilabs.org will be posted on the DMDII webpage. Individuals interested in received updates related to this project call (e.g., PPD amendments, PPK amendments, Q&A postings, etc.) should submit their email address on the DMDII Projects webpage. Additional information regarding DMDII can be found at http://dmdii.org.

7 Workshop
In order to facilitate a common understanding of this technology and digital manufacturing in general, the DMDII will host a Project Call workshop in Chicago, IL on September 10, 2015. This event will allow participants to familiarize themselves with the DMDII mission, gather information on current state of the technology, and prepare for teaming arrangements. Attendees will hear from the DMDII leadership about our mission, vision, and goals, as well as how to do business with the Institute.
Attendees will have the opportunity to interact with the members of the Advanced Manufacturing Enterprise (AME) technology thrust team and learn more about the project objectives and requirements. There will also be opportunity for Offerors to discuss their technology development ideas, their suitability for the project and partnering arrangements. Membership in the DMDII consortium is not required to attend this workshop. Information on workshop attendance is available at http://dmdii.org.