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July 19, 2013

Ms. Diane Henderson
National Institute of Standards and Technology
diane.henderson@nist.gov

Dear Ms. Henderson:

The UW-Stout Manufacturing Outreach Center (SMOC, formerly NWMOC) would like to offer the attached responses to the "Request for Information on Pilots to Inform the Creation of Potential New Manufacturing Technology Acceleration Centers (M-TACs)". We are excited about the opportunities to advance global manufacturing competitiveness that the proposed M-TACs would bring to small and mid-sized manufacturers across the US. The SMOC and its parent UW-Stout Discovery Center have been actively engaged in impacts-focused technical assistance and applied research with these important manufacturers for the past twenty years, and understand first-hand the value of these opportunities.

The UW-Stout Discovery Center organization advances productivity, innovation and entrepreneurship through a unique combination of focus areas: its NIST MEP center SMOC; its innovation activities of the Discovery Center's faculty/student/staff/company collaborative projects; its in-house advanced manufacturing and digital fabrication laboratory (FabLab); and its Small Business Development Center and Technology and Business Incubator, specializing in product development and start-up business support.

The Discovery Executive Director, Randy Hulke, and I are actively engaged in integrating advanced manufacturing and innovation within small and mid-sized manufacturers. These attached responses offer our informed perspectives and input on the strategic planning for potential M-TACs.

Should you require additional clarification or have questions regarding these responses, please contact either Randy Hulke (hulker@uwstout.edu 715-505-7016) or me (blackledgel@uwstout.edu 715-505-7015).

Sincerely,

Larry Blackledge
Director
UW-Stout Manufacturing Outreach Center

Overview:

This response to the *Request for Information on Pilots to Inform the Creation of Potential New Manufacturing Technology Acceleration Centers (M-TACs)* is from the Stout Manufacturing Outreach Center (SMOC), the University of Wisconsin-Stout (UW-Stout, Wisconsin's Polytechnic University), the UW-Stout Discovery Center (DC) and the DC FabLab. The respondents have a track record of constructing and rapidly deploying results-focused applied research and technical assistance partnerships within the NIST MEP and higher education networks that successfully address and impact broad regional industry and economic development initiatives. These teams effectively:

- Leverage dynamic industry collaborations that fuel technology transition and technology adaption between and among industry leaders and small and mid-sized manufacturers in their strategic supply chains;
- Streamline small and mid-sized manufacturers' access to optimal technology transition and commercialization services;
- Link small and mid-sized manufacturers with the technologically promising research discoveries and ideas that bolster their product and process development; and
- Identify technology advancements that match the commercialization needs of small and mid-sized manufacturers.]

Additionally, the DC FabLab (digital fabrication laboratory) augments the strengths of the NIST MEP center (SMOC) with a dedicated in-house digital and advanced manufacturing laboratory for project-based activities, demonstrations, and linkages to emerging practices and industry applications within the global fablab network.

Following are responses intended to assist in the development of the anticipated 2014 FFO for the creation of M-TACs and to inform future strategic planning. As an underlying theme in these responses, it is essential to frame this FFO and strategic planning around the processes and strategies that provide effective gateways for small and mid-sized manufacturers and that encourage engagement, implementation and achievement of impacts as a result of the M-TAC tools and services. Too often, large initiatives are perceived as top-down and confusing to the intended beneficiary, resulting in suboptimal program participation and impacts. While it is assumed that the pilot centers will work through some of these engagement issues, this respondent has built its engagement framework and processes around technology transition and technology transfer working specifically with small and mid-sized manufacturers. As such, these responses assume proven effective engagement and rapid deployment models are in place at resultant awardees.

Responses:

1. What are the specific types of technology transition and commercialization tools and services that should be provided by M-TACs? Emphasis is on the alignment of these tools and services with the most pressing needs of small and mid-sized U.S. manufacturers.

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Tools and services that should be provided:

- Applied Research – M-TACs should target expertise and implement problem solving methods to identify and prioritize manufacturing challenges, advance innovative product designs and implement optimal advanced manufacturing technologies and processes in small and mid-sized manufacturers. These activities could include materials characterization (right materials and right conditions), equipment capacity assessment, and process knowledge transfer (awareness of options outside direct industry).
- Technology Transfer – In the M-TAC model, technology transfer relates to efficiently moving technology from basic and applied research and development (polytechnic universities and collaborative institutional and industry labs) to actual application within production processes or downstream product development. This includes raw technology and product patents, assisting in the development of trade secrets, and reverse engineering.
- Technology Transition - M-TACs should employ scientific methods and virtual modeling, referred to as technology transition, to assure new innovative prototypes are integrated within the design for manufacturing. Utilizing simulation software, project teams will adapt technology from diverse industries to develop prototype models that link to actual production processes utilizing cross-disciplinary laboratories and real-world project experiences.
- Technology Diffusion – M-TACs should scout for new advanced manufacturing technologies from across industries and match them back to the identified needs of targeted manufacturers.
- Manufacturing Adoption and Manufacturing Process Improvement – M-TACs should identify and implement manufacturing, marketing and supply chain strategies that improve productivity, efficiency, and global competitiveness of client companies. Partnering with NIST/MEP centers, universities and OEMs will help close gaps in technology adoption and innovation commercialization. These activities will include innovation marketplace software that helps connect inventors and innovations with manufacturers, concept testing software that evaluates an innovative product's overt benefit and commercial viability, and ExporTech to develop and deploy an effective export plan.

Tools and services summarized:

- Commercialization:
  - Technology-driven market intelligence
  - Tech scouting
  - Clear access and pathways to fund innovative technologies
- Workforce development:
  - Refined curricula
  - Demonstrable equipment for training

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- Emerging and best practice design factors and criteria
- Proven processes that incorporate advanced manufacturing techniques
- Apprentice and on-site industry training opportunities

- Technology integration:
  - Innovation engineering
  - Equipment and technology expertise
  - Direct equipment and technology access
  - Applications engineering support
  - Solutions-focused project support

a. How would M-TAC services complement the services currently offered by MEP Centers?

The M-TAC services should enhance existing MEP service offerings by leveraging advanced manufacturing technologies and practices, as well as proven Lean manufacturing practices to: accelerate speed to market (e.g. additive manufactured replacement parts to reduce down-time, additive manufactured assemblies to improve machine performance); improve product quality (e.g. advanced manufacturing technologies to narrow statistical process capabilities around design specifications); and optimize value stream performance (e.g. advanced manufacturing technologies to reduce scrap, rework, and other major categories of waste).

Further technology and advanced digital process and material development should lead to increased opportunities in the Innovation Engineering area of practice to employ these technologies, processes and materials in new product development, current product enhancement and improvement, total cost reduction, and ultimately supply chain risk reduction. This should result in increases in sales and investment metrics.

2. What role should future M-TACs play with respect to supply chain needs? How should OEMs participate? How can industry associations, professional societies, and other appropriate national organizations participate?

Since by definition, the work of MEP's (particularly those focused primarily on small and mid-sized manufacturers) is focused on improving the supply chain of OEMs. Strategically positioned M-TACs should strengthen their regions' manufacturers' capacity and capabilities to produce high-quality, low-risk, responsive and profitable products and services.

Effective M-TACs should have broad formal and informal networks and proven capacity to execute a scalable systems approach to problem solving. These networks should include private and public partnerships that engage OEMs and applied research entities (eg. applied and polytechnic universities, industry research and development facilities, national laboratories) in their collaborative efforts to infuse advanced manufacturing technologies into small and mid-sized manufacturers. OEM engagement will include (but is not limited to) design requirements, engineering support, mentoring and real-world laboratory

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experiences for M-TAC partners and users, as well as financial support to further develop and apply advanced manufacturing technologies and processes in their supply chains. University-based applied research will include faculty, graduate student staff expertise, research rigor and access to relevant laboratories, with an emphasis on operating within the expressed timelines and outcomes of small and mid-sized manufacturers.

By definition, applied and polytechnic universities have developed results-focused relationships with industry associations, professional societies and other appropriate national organizations. MEPs participating in any M-TAC award should possess or be capable of rapidly developing integrated and effective relationships with applied institutions to efficiently access these relationships and networks.

3. Is there a particular long-term scalable and financially sustainable business model that should be implemented by future M-TACs that will enable small and mid-sized U.S. manufacturers to effectively access and benefit from the technology transition and commercialization assistance and other resources they need?

   An effective and scalable M-TAC business model should leverage identified, dynamic and sustainable funding from a broad range of public and private sources. Sustainable funding models should include scalable membership dues and rates (based on level and extent of services provided in the engagement and size of the enterprise), as well as the following funding model employed by this respondent: small and mid-sized manufacturers (contributing fee-for-service); OEMs (contributing in-kind executive and engineering support, fee-for-service, funded research); universities (contributing facilities, researchers, applications engineers, active learners, dynamic research funding partners); and research partners (contributing intellectual and physical resources, and in-kind) to sustain and grow the M-TAC's capabilities and capacity to address existing and emerging manufacturing needs. Priority should be given to dues-paying members and to small and mid-sized manufacturers investing in advanced manufacturing technologies.

   M-TAC MEPs should be integrated within financially stable and vest institutions and networks (eg.: OEMs that require a viable and efficient supply chain; universities that desire industry linkages, technology integration, knowledge transfer, skills development and advanced applied research). Those MEPs with direct access to multiple programs and resources are the most viable candidates to operate at the core of the M-TAC network. These resources include physical equipment, space, and responsive expertise to serve as technology transition "incubation" tools with small and mid-sized manufacturers as they advance through the technology adaption cycle.

   If executed properly, the share of funding resulting from non-federal sources (memberships, fee-for-service, education/training, royalties) should reduce the level of federal support within 5 years of operation. It is likely that a share of federal funding for the M-TACs will be required to help maintain infrastructure and sustain operations through cycles.

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a. Because of the programmatic connection to the NIST MEP Program, M-TACs may require cost share. Are there cost share models for future M-TACs that promote scale up to reach nationally dispersed clusters of small and mid-sized manufacturers? If so, what are those models, and why might they be successful?

Above funding model addresses scalability and programmatic connections to NIST MEP.

b. The generation of intellectual property is possible, and even likely as a result of M-TAC operations. What types of intellectual property arrangements and management constructs would promote active engagement of industry in these pilots, especially among small and mid-sized U.S. manufacturers that would be supportive of the business model? As appropriate, please include a set of potential options, and please explain your responses.

Depending on the circumstances of IP creation, M-TACs should have transparent pathways for IP ownership, licensing and access:

- IP brought into the M-TAC by members or users should be protected by agreements in place in advance of collaboration with the M-TAC. It is unlikely that members or users would contribute their IP otherwise.
- IP created collaboratively at the M-TAC should be available for licensing at pre-negotiated or no royalties from collaborators. It is important to encourage rapid commercialization of IP that benefits key collaborators.
- IP created collaboratively at the M-TAC may be made available outside of the M-TAC collaborators, with resultant royalties contributed back to the M-TAC. It is important that M-TAC IP is marketed and commercialized effectively by an agreed upon agent, and that the proceeds are used to sustain and build M-TAC capacity and capability.

4. How should an M-TAC's performance and impact be evaluated? What are appropriate measures of success for future M-TACs? Please explain your response including the value of the performance measure to business growth.

Technology acceleration and advancement of manufacturing processes is often expensive, with a period of time between deployment and financial benefit. As such, M-TACs should adopt metrics that are early indicators of success, including:

- Number of companies made aware of the possibilities of the new technologies and processes (information dissemination and marketing through seminars, conferences, digital fabrication laboratory tours, etc.);
- Number of M-TAC projects completed;
- Level and extent of service provided;
- Number and type of technologies or processes adopted by a small and mid-size manufacturer (client);
- Expected financial impact to client resulting from above adoption; and

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- Client investment in new technologies, process, or people as a result of M-TAC project(s).

5. Are there any other critical issues that NIST MEP should consider in its strategic planning for future M-TAC investments that are not covered by the first four questions? If so, please address those issues here and explain your response.

   The RFI indicated expectations that M-TACs should: operate as locally driven and nationally connected; create teams of experts emphasizing technology integration, engineering, new product development, supply chain development and other technology transition and commercialization services; and collaborate with research consortia and technology-based economic development intermediaries. While they may be assumed in these expectations, the following issues should be considered in strategic planning for future M-TAC investments:

   - Optimal and easily understood pathways from research to market, including IP considerations, should be identified and implemented to encourage small and mid-sized manufacturers to engage and trust the M-TAC model.
   - Assessing, translating and transferring emerging technologies from the abstract to the applied should be a primary focus of M-TAC research and development. The role of research and problem solving in this environment should be one of identifying critical problems, translating research questions into industry challenges, then deploying solutions to exploit opportunities.
   - Capability to quickly bring M-TACs into operation should be a primary consideration. Existing efficient infrastructure and proven formal and informal networks that assist small and mid-sized manufacturers is essential.
   - Track record in successfully engaging with small and mid-sized manufacturers in technology acceleration projects and delivering a range of complementary services;
   - Workforce demand, requirements and training should be a strong consideration, including number, profile, skills requirements, and ongoing support.

Conclusion:

M-TACs present a significant opportunity to streamline the integration and implementation of advanced manufacturing technologies and processes within small and mid-sized manufacturers. While this integration and implementation is underway in many large OEMs in leading industry clusters, M-TACs and their focused technical assistance and applied research will improve the performance of small and mid-sized manufacturers throughout the supply chain. Responses to this RFI should assist in the strategic planning for M-TACs moving forward.

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