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response to:

Request for Information

Pilots to Inform Potential New manufacturing Technology Acceleration Centers (M-TACs)

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Question 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.**

Small/mid-sized manufacturers seeking help with technology transition and commercialization often require more diverse, multi-disciplinary combinations of expertise and capability not generally found in any one organization or region. They often face a very time-intensive, circuitous and costly path sorting through a daunting array of potential resources in their quest to answer questions such as "where could I source a new technology?" and "what would I do with a new technology?" The major types of challenges for S/MEs in technology transition and commercialization include:

- The strategic assessment of the opportunity costs versus the uncertain real value or payback period associated with investing time and money into the transition and commercialization of new technology.
- The ability to undertake and carry the associated costs and risks associated with pursuing a new technology commercialization opportunity.
- The ability to identify, access and/or coalesce the right combination of the additional required resources, capabilities and expertise that are reliable and affordable. Specific resource and expertise hurdles include market analysis and planning, engineering and product development, manufacturing systems, facilities and equipment, integrated information systems, IP strategies and services, component/material sourcing, technology sourcing, research and industry partnership development, and funding.

To address these specific challenges M-TAC Centers should be positioned to provide:

- Comprehensive expertise for needs analysis and fast access to the full landscape of relevant existing resources;
- Pre-qualification and vetting of resources for SMEs
- Ability to facilitate in-person, person-to-person collaborations and consultations between multi-disciplinary teams and manufacturing companies;
- Strategic gap analysis to identify areas of need not well-addressed by the existing MEPs and landscape of resources;
- Program, expertise, services and support to address specific resource gaps not already effectively and affordably addressed by existing MEP and other resources;
- New models and ideas to scale and deliver services more cost-effectively to a greater number of SMEs;
- Market and supply chain services and intelligence;
- Access to Research and Industry partnership opportunities;

- Access to world-class advanced technologies and IP
- Affordable access to specialized equipment and facilities through shared-purchase models or other means;
- New mechanisms and/or pools of funding and/or better access to capital for new SME technology commercialization projects and activities;
- Marketing services and support for MEPs and SMEs
- Information systems support for MEPs and SME's
- Access to capital to provide project-level and early-stage funding for SMEs

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

M-TAC Centers would complement the services currently offered by MEP Centers in the following ways:

- Provide or facilitate shared services, equipment and expertise that is very specialized, does not exist, is not widely accessible or cannot otherwise be affordably delivered through the current MEP structure and delivery platform.
- Broaden expertise of and access to the comprehensive resource and service landscape
- Source of market, industry, and supply chain research and intelligence
- Resource gap analysis
- Develop or lead industry, state-wide or national level consortiums for complex, specialized initiatives
- Provide support and efficiencies of scale to MEPs and SMEs including additional marketing and outreach, IT services, and potential consolidation of selected administrative operational activities
- Establish and expand industry and research partnerships and opportunities
- Development of best practices, standardization and systemization of MEP processes and services

Question 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?**

Future M-TAC Centers should have a role in addressing supply chain needs by providing:

- Supply chain research and analysis capability and key supply chain and market intelligence
- Supplier and customer development opportunities and services
- Development or facilitation of education and certification services, programs and events
- Consortia partnership development to address supply chain initiatives
- OEM needs assessment and partnership development

- Development of supply chain and stakeholder communities through marketing and social media, collaboration and communications platforms, activities and events

OEMs have a significant, strategic role to play that includes:

- Financial support and active participation in supply chain research, education and development initiatives, consortiums and activities
- Increased corporate investment in and purchase from domestic suppliers
- Development of mechanisms and business models to enhance domestic supplier development and opportunities such as shared/leased equipment and facility options, open innovation practices, and supplier procurement practices.

Industry associations, professional societies and other appropriate national organizations can participate in addressing supply chain needs in many ways. It will be critical for M-TAC Centers to leverage the knowledge and subject matter expertise of relevant associations, societies, and organizations and their respective memberships. These organizations can participate in M-TAC-hosted forums and can share with SMEs their knowledge of markets, supply chains, OEM needs and innovation trends to name a few.

Question 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?**

Successful and sustainable models would likely include public-private partnerships, would engage a wide and diverse stakeholder and resource group, would require an actively managed common web-enabled platform or system adopted by all network stakeholders, and would employ systemized and standardized processes.

Utilizing a common collaboration platform and systemized processes, M-TAC centers could draw from all of the existing critical component partners, programs, services, infrastructure and resources and drive affordable effective service delivery at the local level with cost-effective scale capability. This proposed consortium partnership model could successfully operate and effectively serve thousands of SMEs in a defined multi-state footprint (depending on the state size and demographics); and conceivably the number of M-TAC Centers specified by NIST could effectively serve a national footprint with a per-center funding and budget of approximately $1.5m - $2m per center - per year.

M-TAC Centers could sustain operations and meet any potential required cost-share through the following fund generators:

- Strategic and Marketing Partnerships (national/local associations/organizations, industry OEMs, academia)
- Other grants, state gov't and local economic development organizations and sources
- Network and referral fees from participating stakeholders and resource providers
- Success fees from SMEs
- For-fee services not available or effectively/affordably provided to small/mid-sized companies
- Sponsorships and events revenues

FuzeHub (www.fuzehub.com) is an example of this model currently being developed in New York. It has evolved from a National Institute of Standards and Technology (NIST) funded initiative for developing a technology, new product development and commercialization solutions matching service and resource database to its current form. The model, platform and service delivery process have been in development as a pilot project for over 2 years and is well on the way to demonstrating sustainability and success in serving small/mid-sized manufacturing companies.

FuzeHub's model also meets many of the critical specifications and activities highlighted by recent studies conducted by the MIT PIE research group. The MIT PIE research group studies suggest the pathway to new growth focuses on rebuilding the industrial ecosystem with new capabilities that many firms of all kinds can draw on when they try to build their new ideas into commercial products and scale. Some of key principles and functions observed of those doing this successfully include:

- Convening – high value is derived from face-to-face presence
- Coordination – creating connections – as exemplified between firms, localities and educational institutions to develop coordinated training programs
- Risk-reduction and risk-pooling – for example, consortia investing in equipment or technology
- Creation of linkages between innovation and production – university and industry partnerships

To date, over 333 NY companies have received targeted connection and services to selected, vetted resources, programs and deep expertise between 2012 - 2013. Although it's still early in the implementation of FuzeHub, there are some measureable successes that have occurred as a result of this initiative.

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?**

The funding sources mentioned in the previous response should adequately generate funds to address a cost-share/match requirement.

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.**

- Optimally, M-TAC Centers should take a "work-for-hire" approach to IP with policy that stipulates all IP created through an M-TAC Center or with M-TAC contract services should belong to the participating company or SME. This could be established through an MOU between all participating consortium partners.
- Additionally, M-TAC Centers could directly provide or facilitate access to IP help-desks, contract negotiation/IP licensing services, and education and consultation services designed to help SMEs work with OEMs or other strategic partners.

Question 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.**

M-TAC Centers/ performance should be measured against metrics appropriate to the stage of Center operations and expected timeframe for development of outcomes. Potential types of metrics could include:

- User adoption rates - # of companies, # of Resources signing on/in, attending events
- Awareness/Outreach - website/social media activity, press & PR activities, survey results, # of companies "new" to MEP
- Ecosystem - # of referrals and % of referral to contract/project work, # and types of inter-regional/cross-discipline collaborations, survey results, activity/attendance trends at events/platform
- Partnership Development - # of institutional partners, # of Strategic/Marketing Partners or special projects

- Company/Economic Growth - # and value of projects and outcomes, value of project-related new investments, jobs and revenue growth, # new supplier connection, # and diversity of new products/customers/markets, # of MWBE related connections/growth
- Leverage of Existing Infrastructure – co-investment or outside investment leveraged, # and diversity of participating existing programs, in-kind services
- Workforce/Talent - # of communities/universities, # of interns, new training/curriculum, industry-workforce interfaces/partnerships
- Strategic Development – market intelligence mechanisms and analytics
- NIST MEP Survey metrics

Question 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.**

- Standardization/integration requirements for common collaboration and IT platforms and systems among/between all M-TACs
- Shared data requirements
- Additional funding for seed/new-product/new-market projects, proof-of-concept and co-investment mechanisms and models
- Additional funding for shared equipment purchases and "open foundry" facilities
- Require case studies and examples demonstrating past performance
- Consider allowance for confidentiality: submission of proposals or sections of proposals deemed and held confidential
- Broaden award funding criteria to include proposals submitted and led by non-MEP center organizations but require demonstrated partnership with a designated MEP center

Rational for broadening funding award criteria for M-TAC Centers

There is great precedent and notable success for pursuing "innovation" outside of the existing, long-standing constructs of an institutionalized organization exhibiting strong culture and a history of key "un-adaptive" behaviors and performance. Studies have shown that an industry's leaders are rarely at the forefront of commercializing new technologies that do not initially meet the functional demands of mainstream/current customers and which appeal only to small or emerging markets. Established organizations tend to invest and focus aggressively on the technologies, products and/or services to retain their current customers and fail to make certain other investments for customers of the future. Why is this case? There are many reasons. Undoubtedly, bureaucracy, arrogance, tired executive blood, and short-term investment horizons have all played a role. But even more so it is a company's revenue and cost structure that plays the most critical role. It is very difficult to build a cogent case for

diverting resources from known customer needs in established markets; and often meeting the needs of established customers takes all of the resources a company has.

One could argue that this paradox applies to the MEP system and MEP centers as well. By staying close to their customer base, the MEP centers within the MEP system have aligned resources and developed business models and service delivery around a customer base that has, by all measures, been slow to adopt innovation for new products and processes. Much of what has been and is demanded by the current customers of existing MEP centers has root in addressing efficiencies more so than growth and innovation. Further, most MEP centers do not have a revenue or cost structure that allows them to easily or rapidly shift to anticipate or address the urgent but still emerging need by SMEs who likewise face revenue and cost structure hurdles as impediments to their adoption of innovation and commercialization. For the same reasons, it is challenging for MEP centers to focus downstream on the start-ups and early-stage customers which represent perhaps a large future impact and revenue opportunity but which also comprise a smaller paying market with unattractive margins requiring significant upfront investment from MEPs to serve them.

One of the most effective solutions for an organization seeking to develop "innovation" is to create organizations that are completely independent and protected from the established, embedded organizational structures, behaviors, processes, and incentives. The strategy of forming small teams into skunk-works projects to protect them from the demands and established patterns of its current organization is widely known. And while it may seem attractive to award the development and leadership of a M-TAC Center to an existing MEP center (to share resources and optimize fixed costs) – it will create an inherent and potentially debilitating conflict of focus, interest, incentives and structure that may prove disastrous to the effort. The authors respectfully propose that NIST consider awarding funding to a new organization whose sole focus and purpose will be to sustainably achieve the goals of an M-TAC center as outlined by NIST. This proposed M-TAC Centers RFP seems to represent an ideal opportunity for NIST to apply this approach.