

From: Schmit, Amy [<mailto:amschmit@buffalo.edu>]
Sent: Thursday, October 25, 2012 6:44 PM
To: nnmi_comments; Schen, Michael A. Dr.
Subject: NNMI Comments

Dear Dr. Schen & Colleagues:

We are pleased to provide feedback to the Request for Information (RFI) for the National Network for Manufacturing Innovation (NNMI) public-private partnership initiative. We were initially made aware of this opportunity when colleagues from local industry approached us about assembling a meeting for industry, academia and non-profit officials to discuss a collaborative initiative to pursue an Institute for Manufacturing Innovation (IMI) designation. What ensued has been an enlightening and enthusiastic conversation that is resulting in the development of a multi-faceted, yet focused effort the working title of which is – the Regional Institute for Materials and Manufacturing: Accelerating Growth through Innovation and Engagement (ReIMMAGInE).

ReIMMAGInE is a materials and manufacturing innovation center that will focus on ceramic materials and ceramic-enabled technologies spanning scale, form, and functionality. It will leverage existing strengths of the Buffalo Niagara “Ceramics Corridor,” which is populated by leading ceramics manufacturers, and complementary capabilities of our academic institutions, University at Buffalo and Alfred University.

ReIMMAGInE will address a broad spectrum of manufacturing needs including but not limited to: precursors for ceramics, identification of novel ceramic materials to meet emerging technology needs, design and identification of substitute ceramic materials to address global supply chain vulnerabilities, informatics driven high-throughput screening, nanostructuring of ceramic materials, novel sintering technologies, development of ceramic thin films and coatings, non-destructive evaluation of ceramic components, life cycle assessment and recycling, pilot scale manufacturing, and fabrication of prototype devices.

The center will have a substantial technological footprint and will tackle industry’s pressing technological challenges including ceramic membranes for fuel cells and gas separation, armor, thermal insulation, structural materials, piezoelectrics, and permanent magnets. It will bring together ceramic manufacturers with developers of ceramic components and manufacturers of ceramic processing equipment.

We appreciate the opportunity to provide feedback to the RFI and are eager to learn more about the Request for Proposal/Federal Funding Opportunity process. Please do not hesitate to contact either of us should you have questions or concerns with regard to anything in our message or the attached.

Sincerely,

Alexander N.
Cartwright

Doreen Edwards
Vice President for Research and Economic
Development
n, Kazuo Inamori School of Engineering
Executive Director NYS Center of Excellence in Materials
Informatics
Materials Science and Engineering
Professor of Electrical and Biomedical
Engineering
Alfred University
University at Buffalo

Dea

Professor of

TECHNOLOGIES WITH BROAD IMPACT:**1. What criteria should be used to select technology focus areas?**

The technology focus areas should have demonstrated or projected market relevance, be those in which we can hope to gain advantage over foreign competitors, those that are of vital importance to the nation's security, and those with a substantial existing US manufacturing presence.

Broad technology platforms that have the potential for impact on a variety of different manufacturing sectors should be accorded priority over more narrowly defined thrusts. The historical strengths of the region in a specific technology focus area and the existence of current manufacturing operations should be given considerable weight. Demonstrated support and buy-in from local and state economic development agencies, particularly support that has already been committed, should also be taken into consideration.

In addition we need to develop challenging and promising fields that will retain postgraduates in the United States, and encourage students to pursue careers in these disciplines.

2. What technology focus areas that meet these criteria would you be willing to co-invest in?

We are willing to co-invest in ceramic materials and ceramic-enabled technologies spanning scale, form, and functionality. We are particularly interested in the confluence of "big data" analytics with the design, processing, and sustainable manufacturing of advanced ceramics.

3. What measures could demonstrate that Institute technology activities assist U.S. manufacturing?

- Involvement of US industry partners in institute activities
- Benefits US industry realizes because of institute activities
- Engagement of traditional and non-traditional students in manufacturing-centered education
- Engagement of students with US industry
- Employment of graduates by US industry
- Creation of new manufacturing industries in US
- Creation of new standards to benefit manufacturing
- Jobs created/retained
- New revenues
- New funds acquired
- Increased intellectual property developed jointly
- Increased intellectual property licensed to industry partners by academic/non-profit institution partners.

4. What measures could assess the performance and impact of Institutes?

- Number and profile of companies involved with Institute
- Development of intellectual property
- Licensing of technologies from academic partners to commercial entities
- Licensing revenue

- Products brought to market by partnering companies
- Revenue generated by partnering companies/Increases in revenue associated with Institute projects
- Funding provided by US industry
- Shortened product innovation cycle
- Creation of start-up companies
- Use of centralized institute capabilities (testing instrumentation and prototyping facilities) by commercial partners
- Increased regional investment and relocation directed from multinational companies
- Employment metrics for graduates of certificate, two-year associate's degree, four-year degree, and graduate programs aligned with the Institute's technical focus
- Jobs created
- Cost savings
- Capital expenditures on new, related manufacturing facilities
- Relocation of existing industry operations to co-locate with the Institute
- Utilization of Institute assets and capabilities by industry partners

INSTITUTE STRUCTURE AND GOVERNANCE:

5. What business models would be effective for the Institutes to manage business decisions?

Industrial advisory boards relevant to specific technology and business areas can provide valuable input.

6. What governance models would be effective for the Institutes to manage governance decisions?

Input from all stakeholders will be imperative. The governance model should reflect the extent of co-investment of funds and expertise from various partnering institutions and organizations. The organizational infrastructure for existing centers or partnerships should be leveraged. The lead institution should have an established track record of administering interdisciplinary projects of this magnitude.

The consortia could be incorporated into a non-profit entity that operates as an affiliate of the coordinating research university, but independent from it, which is particularly important especially as it pertains to IP issues.

The independent entity, which is run by an Executive Director and a small, but effective, professional management team would be governed by an Executive Board, consisting of relevant stakeholders as previously outlined, and advised by an Industrial Advisory Board.

7. What membership and participation structure would be effective for the Institutes, such as financial and intellectual property obligations, access and licensing?

- IP issues are frequently cited by industry as a barrier to cooperation with some government and university laboratories. A simple, clear and concise IP agreement template should be in place.

Strong IP protection for the sponsor of any project is imperative. Jointly sponsored projects could/should be shared by Institute members.

- Another approach to consider is “Assignee” positions. These positions are filled by the commitment of member company personnel to the organization for a pre-defined period of time. For example, a member company might agree to assign an expert on the sintering of ceramic materials for a two year period. The company would be responsible for continuing to pay salary, benefits, etc. There are multiple advantages to this approach, including but not limited to: 1) leveraging of a pseudo-sunk cost to member companies (i.e., making an in-kind contribution of personnel that is already on the payroll), 2) assignees provide a mechanism for the Institute to better capture the “voice of the customer,” 3) assuming that a rigorous application and vetting process is used, the assignees provide significant technical talent to the Institute, 4) the assignee positions allow the Institute to indirectly circumvent potential restrictions attached to the spending of government funds, and 5) given appropriate agreements for collaboration, the assignees can collectively accelerate technology transfer and best practices within the ceramics industry. The assignee approach of course requires buy in from company executives, but it also requires a major commitment from the people filling the positions – becoming an assignee should be considered prestigious and a good career move.

8. How should a network of Institutes optimally operate?

A complete and updated inventory of capabilities across the network should be maintained and used to facilitate ready access by commercial entities and academic institutions to capabilities and expertise throughout the network at a reasonable fee structure with minimal formal paperwork. A basic legal framework guiding the use of capabilities should be established collaboratively for the entire network.

The network also needs to establish a means to share enabling technologies and tools that have cross-cutting relevance such as for instance lifecycle assessment tools, “big data” analytics, supply chain optimization strategies, etc.

There should be meaningful incentives for collaboration, including increased funding for inter-Institute projects and initiatives.

It is recommended that each Institute employ a minimum of two liaison personnel: one to assist partnering companies, institutions and organizations in accessing the resources and capabilities of other Institutes, and the second to facilitate access to their Institute by other network members.

9. What measures could assess effectiveness of Network structure and governance?

Each Institute could be evaluated annually regarding the extent to which it has been responsive to both a) other Institutes and b) non-members seeking technical collaborations and assistance.

NIST could also hold an annual workshop or conference for Network members, which would facilitate collaboration and gain insight and feedback regarding effectiveness.

STRATEGIES FOR SUSTAINABLE INSTITUTE OPERATIONS:

10. How should initial funding co-investments of the Federal government and others be organized by types and proportions?

Initial investments should be targeted toward capital expenditures for the establishment of testing and prototyping facilities as well as for focused technical research and hiring of personnel to create and establish the Institute's core expertise. Personnel expenditures are often neglected in initiatives of this type but are imperative for NNMI's inception, development, and vigorous growth. Small and medium scale enterprises are often unable to afford the expense of hiring personnel with specialized technical knowledge-the networked Institutes should thus also serve as repositories of technical knowledge through maintaining a fully staffed research, testing, and prototyping facility.

This could be achieved through a combination of the National Science Foundation Center and Fraunhofer Institute models – initial, fixed funding for five years (contingent on annual reviews), and then a linear reduction in support for the second five years to allow for transition to support from industry and other sources.

Emphasis should be placed on existing manufacturing sectors, particularly those with a significant footprint remnant in the United States instead of technology areas that remain primarily academic in nature. While advanced technologies pioneered by academic institutions undoubtedly play an important role in the innovation pipeline, it is imperative that the networked initiative focuses significant resources on technologies with a clear market pull and near-term prospects of product implementation.

A particular focus area should be regions with a strong history of advanced manufacturing that have struggled to maintain competitiveness but could benefit from a substantial investment.

11. What arrangements for co-investment proportions and types could help an Institute become self-sustaining?

Support from local and state economic development agencies and the participation of a robust core of large companies as well as small and medium enterprises is imperative for the Institute's self-sustainability.

Other funding streams include membership fees; fee for service; and contract research agreements.

12. What measures could assess progress of an Institute towards being self-sustaining?

Financial measurement is the most direct method. This would include non-federal revenues, particularly contributions from corporate partners.

13. What actions or conditions could improve how Institute operations support domestic manufacturing facilities while maintaining consistency with our international obligations?

This is difficult in an internationally networked world. It may be better for the country to network with an overseas firm that will manufacture in the US rather than an American firm that will outsource to

Asia. There should be guidelines in any grant-funded or subsidized programs indicating that for the first x years a minimum % of manufacturing should be carried out in the US.

14. How should Institutes engage other manufacturing related programs and networks?

- Host annual conferences together or on a regional basis
- Participate in relevant professional organizations (e.g., in this case, the United States Advanced Ceramics Association – USACA)

15. How should Institutes interact with state and local economic development authorities?

Strong support from regional and state economic development agencies should be a prerequisite for a region to be awarded an Institute. Institutes that have substantial regional and state support to leverage the federal co-investment should be accorded particular priority. State and local economic development authorities should be required to be listed explicitly as partners.

16. What measures could assess Institute contributions to long term national security and competitiveness?

Institutes that directly address global supply chain vulnerabilities and the emerging criticality needs in part should be especially prioritized. For instance, replacement of rare-earth materials with earth abundant ceramics for manufacture of the active components of permanent magnets and solid-state lighting represents a critical need for country's energy security.

EDUCATION AND WORKFORCE DEVELOPMENT:

17. How could Institutes support advanced manufacturing workforce development at all educational levels?

The institutes should ideally involve the direct participation of academic institutions ranging from community colleges and primarily undergraduate institutions to research universities. These institutions should be listed explicitly as partners in the manufacturing consortia and should be tasked with developing dynamic curricula for addressing the country's advanced manufacturing needs.

Institutes could partner with local school districts and leverage the work of partner university faculty in the community.

Internships with Institute member companies for students of all ages are also important.

18. How could Institutes ensure that advanced manufacturing workforce development activities address industry needs?

The workforce development plans should be drafted in close cohesion with industrial partners. Partner company representatives should serve on Institute strategic planning and executive committees that determine the scope and nature of workforce development activities.

19. How could Institutes and the NNMI leverage and complement other education and workforce development programs?

Particular priority should be accorded to consortia seeking to leverage large NSF initiatives in STEM education. The partners should have an established track record of managing large educational K-12 outreach programs. Particular priority should be accorded to consortia with members that are in a position to reach a large proportion of the regional workforce.

Institutes must be involved with their local business ecosystem and engaged with other businesses, institutions and organizations in the area. They must be “in the know” in order to make those connections necessary to achieve the Institute’s mission and objectives.

20. What measures could assess Institute performance and impact on education and workforce development?

Institute academic institution partners should track graduate performance. Traceability should be a condition of financial and academic support.

21. How might institutes integrate R&D activities and education to best prepare the current and future workforce?

- Identify initiative industries; develop a roadmap; plan a program; monitor progress; get feedback on a regular basis from the community
- Funded projects that employ students in internships.