

## **NNMI RFI Response**

**This document contains our response to:**

**Request for Information on Proposed New Program: National Network for  
Manufacturing Innovation (NNMI)**

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## **Executive Summary**

The Columbia River Gorge is a natural economic region bordering the Columbia River in Oregon and Washington. Congress designated the Gorge as the nation's first national scenic area (PL 99-663) in 1986, with the twin purposes of environmental protection and economic development. Scenic area management is assigned to the US Forest Service and a bi-state compact, the Columbia River Gorge Commission. Regional economic development is coordinated by the Mid-Columbia Economic Development District, a five county, bi-state agency affiliated with the US Department of Commerce Economic Development Administration. With our strong value and culture for innovation as a way of life, balanced by our deep commitment to environmental stewardship, and our strong history of public/private collaboration across organizational and state boundary lines, we have created the ideal environment for a NNMI to prosper in a rural setting.

Traditional industries that comprised the economic base of the region – timber, aluminum smelting, agriculture and tourism -- are either seasonal or have diminished through regulation and off-shoring. However, at the turn of the millennium, the region gained notoriety for a burgeoning and diverse technology sector that includes aerospace, advanced composites, robotics, data processing, and renewable energy generation. Our aerospace cluster is widely touted by the U.S. Department of Defense as one of the most agile and innovative in the country in its technology sphere. We are a 45 minute drive from Portland/Vancouver, connecting us to their growing tech cluster and educational institutions.

To maintain and grow our reputation for technology innovation and performance, it became clear that we needed to identify the factors that affect our ability to attract, retain, educate and grow key talent in the region. We embarked on several journeys together, one of which was the USDA-sponsored Stronger Economies Together program, where we established strategies to overcome barriers to bi-state regional economic growth and jobs creation. As a template, we used existing industry partnerships with Columbia Gorge Community College to develop a skilled workforce using curriculum design, program support, internships and preceptors. We will apply comparable tools to the technology sector, where local workforce skills do not match tech sector job openings.

The attached response to the National Network of Manufacturing Institutes Request for Information provides many examples of successful public-private partnership, governance and business models that combine the best of both worlds, providing the opportunity for public agencies and private industry to do what each does best while building a self-sustaining model for advanced technology manufacturing innovation and education in a rural, bi-state region.

Out of the numerous recommendations discussed in this RFI response, the following are proposed as most critical for success of the NNMI initiative:

- 1) Selection criteria that give preference to multi-state regional innovation centers.
- 2) Selection criteria that emphasize proven working relationships between public/ educational/ and industry stakeholders.
- 3) Selection criteria which give preference to rural regions with the ability and capacity to fulfill the NNMI mission.
- 4) Selection criteria which require leveraging existing and emerging high-technology clusters.
- 5) Selection criteria that give preference to regions with proven track records in public-private cooperation and engagement.

## **Answers and Discussion of Key RFI Questions**

### **Technologies With Broad Impact**

#### *1. What criteria should be used to select technology focus areas?*

The following criteria for choosing technologies and organizations for funding and research will contribute to the success of the NNMI initiative:

- Technologies with a broad range of application across manufacturing processes.
- Technology clusters in rural communities with a proven track record of innovation in a selected area with existing industrial base nationally noted for innovation.
- Technologies that can support development repair, maintenance, monitoring and storage of clean/green energy.

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

The Columbia Gorge region has a strong record of private and public investment in the following technology focus areas:

- Robotics, autonomous systems, embedded technologies.
- Remote sensing.
- Renewable energy generation and clean technologies.

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

- Increased national gross annual value of manufactured goods and services in the advanced manufacturing sector.
- Increased international exports of advanced manufacturing products from the regional technology cluster.
- Reduced reliance upon imported components needed for advanced manufacturing processes.
- Increased national employment in the advanced manufacturing sector.

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

NNMI success will be characterized by:

- Robust co-investment by industries that will benefit from advanced manufacturing technologies, as measured by increase year-over-year in the number of companies participating and an increase in the dollar value of private funding commitments.
- Pervasive national and industrial use of developed processes as demonstrated by the number of licenses issued for technology developed by the NNMI.
- Increased international competitiveness on quality, cost and price as demonstrated by GDP and other international trade metrics.
- Increased workforce capability as demonstrated first by decreasing local unemployment rate, and later by national unemployment rates.
- Displaced workers retrained and skilled workers hired by industry from the local workforce region.
- Increased median average income.
- Increase in the number of students pursuing STEM higher education as demonstrated by increased enrollment with declared STEM majors and increase in graduation rates.

## **Institute Structures and Governance**

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

#### **Assumptions:**

- To make this public-private partnership work, all parties will have to see an appropriate return on investment.
- Educational institutions Pre-K through grade 12 will need to see improved student performance in the STEM disciplines and improved graduation and matriculation rates.
- Post-secondary educational institutions must demonstrate evidence of local and non-local job placement for graduates/certification and licensing recipients, opportunities to engage students in research, and opportunity for publication in peer-reviewed publications to enhance standing in communities of higher education and attract highly-talented students.
- States will need to see all of the above, plus opportunities for replication and increasing revenue and jobs due to an increase in the manufacturing base.
- Federal government will need to see all of the above, plus an increase in GDP.
- Businesses will need to see financial ROI, increasing global competitiveness, skilled workforce, stronger talent pools, and enhanced innovation capacity.
- The business model must create a sustainable revenue stream year-over-year.

#### **Proposed Business Model Attributes:**

- Metrics that account for each return on investment to be kept by vested organization and reported regularly to all Institute “investors.”
- Research projects that are directly tied to business investor challenges and opportunities.
- Three to five year protection of proprietary technologies and IP commercialization rights for business investors prior to public domain. Post-investment industries pay fair market value or NRE offset for licensing rights after the three-year protection period expires.
- Student researchers and university faculty will share in IP credit.
- Publication in peer-reviewed journals is required/encouraged.
- When one partner is not achieving the desired return on investment, all partners engage in “root cause discovery.”
- Institute board of directors will integrate and guide all related activities.
- Institutes will share successful practices related to Institute functions, but not necessarily replicate each other as business markets, regulatory environments, and customers may require very different practices to be successful.

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

Flexibility within the governance model will allow development of National Network for Manufacturing Institutes which are responsive to the individual geographic areas and needs of the place in which they are located. To ensure a smooth and quick start-up of the Institutes, an existing agency should act as the initial umbrella organization (Local Institute Board of Directors) for the governing structure of each Institute. Existing organizations can take advantage of well developed public-private partnerships, building from a history of collaboration in both public and private sectors. This initial model can also help to reduce administrative costs, ensuring that funding of the Institutes is primarily utilized to support the essential function and purpose of the Institutes: accelerating US advanced manufacturing.

We recommend that the following be allowed as eligible governing bodies/Local Institute Board of Directors:

- Agencies formed through intergovernmental agreements, such as economic development districts, special districts and councils of government. One such example is the Mid-Columbia Economic Development District, a five-county, bi-state organization in the Columbia Gorge affiliated with US Department of Commerce EDA.
- Institutes of higher education, including community colleges such as Columbia Gorge Community College.

The Local Institute Board of Directors governing organization should be able to demonstrate that its board is composed of both public and private members and includes private industry in the advanced manufacturing sector, higher education and workforce representatives.

In order to support the Local Institute Board of Directors, the governance structure should encourage the development of advisory boards with expertise in individual topic areas. Composition of the advisory boards should be broadly representative of the proposed institute's principal purpose. The following committees are recommended:

- Education Advisory Committee to include *at least* one representative from each of the following: higher education, K-12, workforce development, private industry and public sector/economic development.
- Technology and Business Advisory Committee to include *at least* one representative from an industry association, a CEO in private industry, university researcher, an R/D organization such as the Pacific Northwest National Laboratory and the economic development/public sector.
- Additional advisory committees as deemed necessary by each Institute to effectively carry out their purpose.

Institutes should be allowed to develop their own legal governance in the future, but also remain with the forming organization as necessary. Collective resources should be committed for purposes of legal organization. It is critical that the organization charged with governing the Institute demonstrates proficiency in connecting with industry on both the workforce/education side as well as the technology/business side.

*8. How should a network of Institutes optimally operate? (sharing best practices, opportunities for non-Institute participation and sharing)*

The Institutes should be broadly reflective of the nation's manufacturing capacity; the Network should strive to develop both a sustainable and replicable model. The US economy is a collective of local and regional economies. In order to achieve national competitiveness, all areas of the country need to thrive in the advanced manufacturing sector. Best practices and opportunities for developing a replicable model for NNMI across the nation can be achieved by designating the first set of 15 Institutes to assure diversity in:

- technology specialties;
- geographic distribution across the United States; and
- inclusion of both rural (outside of metropolitan) and urban Institutes.

### **Strategies for Sustainable Institute Operations**

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

Initial co-investment of the federal government should be provided across a multi-year timeframe, with at least a three to five year horizon. Annual competition for funds would reduce sustainability for Institutes and inhibit their ability to plan and act. Co-investments should require contributions from private industry and public partners. However, for rural and distressed areas, the federal government should recognize the limitation and constraints of local resources, particularly cash match, and allow some in-kind flexibility for investments at a local level when establishing the Institutes. In structuring match and contributions to the Institutes, those proposing to host an Institute are best organized to propose a financial structure that works for their area.

One reporting mechanism and one set of requirements, even though multiple federal agencies may be involved, provides the simplest and most cost-effective means for oversight, without unnecessarily burdening Institute operations.

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

Economic development authorities should be included within the governance structure of the Institute as either the host organization, as a member of the Local Institute Board of Directors and/or serving on an advisory committee.

### **Education and Workforce Development**

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

The first requirement for success is an established, closely-aligned network linking industry, education and training partners, such as exists in the Columbia Gorge region of Oregon and Washington, to ensure that K-20 learning outcomes support advanced manufacturing workforce development. In turn, this requires the identification of “natural economic regions” where such networks are nurtured by common industry skill sets, workforce training providers, transportation systems, telecommunications and physical geography. Beginning no later than the sixth grade, there should be clear connections between classroom study and practical application of math and science. Examples would include:

- Field trip learning opportunities for Pre-K to 3<sup>rd</sup> grade students.
- Learning spaces for elementary school projects.
- Project space and equipment for middle and high school-level technology clubs, such as robotics teams, for hands-on applied STEM demonstrations. A model program is the Columbia Gorge Robotics Club (<http://gorgerobotics.org/get-involved/>).
- Grade-level project design in STEM disciplines for teachers.
- Project space and shared equipment for industry-sponsored research (undergraduate and graduate-level students).

Hands-on learning should include career trades (welding, mechanics, and carpentry) through high school. While many students will go on to other careers, they will gain fundamental knowledge of applied math, basic engineering principles, reading, writing and problem-solving; these skills are preparatory to all advanced manufacturing. Job shadowing opportunities with industry partners should be introduced at these grade levels. Community college classes should be made available at the 11<sup>th</sup> and 12<sup>th</sup> grades through dual enrollment, thus reducing the cost of a college degree and encouraging post-secondary studies. Private sector internships, career mentoring and assignment of industry professionals as adjunct faculty encourage students to enter advanced manufacturing fields and expand education and training capacity. Finally, university and community college dual-enrollment partnerships streamline the path to advanced manufacturing careers.

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

Institutes should embrace a mix of traditional and innovative communications avenues to ensure that training responds to fast-changing industry needs. Traditional mechanisms include industry needs assessments (marketing studies) to determine skill gaps, forecast emerging technologies, and offer recruitment projections; these data should help guide program deployment. Community colleges should invite industry representatives to serve on STEM advisory committees responsible for instructional program review and curriculum development. In addition, a “rapid response” communications channel should be established among industry partners, community college and Title IB workforce training providers: this could be a web-based tool, an electronic newsletter, or a dedicated, regional listserv linking employers and trainers to ensure agility and responsiveness. A separate task should be the identification of stackable credentials and customized training opportunities. STEM membership should be representative of all major industry sectors in a given region in order to identify common core technologies and training requirements. In rural regions, community college service areas provide a logical framework for conducting these analyses; STEM committees have already been established, and typically represent a cross-section of regional industry partners who can help guide curricula. Close relationships exist with K-12 and workforce training partners. The service region itself is the “catchment area” for students, influenced by such factors as curricula, affordability and accessibility. One example is the catchment area of Columbia Gorge Community College, which serves a rural region of 80,000 people in five counties and two states (by comparison, a slightly smaller area than the State of Massachusetts).

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

Each Institute should coordinate its efforts with a national steering committee that would align major existing initiatives in the state, federal and non-profit sectors and identify opportunities to magnify resources and capacity. The primary role of this committee would be to make more efficient use of limited resources by pooling professional expertise, coordinating program support, identifying opportunities to leverage private and NGO assistance, providing shared technical guidance, streamlining reporting requirements, and by identifying areas of existing overlap among national programs. Representatives should be invited from the Career Pathways program; US Department of Labor Employment and Training Administration Business Relations Group, National Science Foundation’s Advanced Technology Education program, US Department of Education Office of Vocational and Adult Education, US Department of Energy national laboratory network, the American Association of Community Colleges, Aspen Institute

Skills for America's Future, the Association for Career and Technical Education, Jobs for the Future, Oregon Career Pathways (based in the Columbia Gorge region) Truman Institute, and Workforce Investment organizations. Specific representatives from each of these agencies and organizations have been identified by local officials in the Columbia River Gorge through on-going delegations to Washington, DC. A steering committee could be readily organized through this existing network.

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

At annual intervals following the establishment of an NNMI Institute, data would be collected in each of the following performance areas, and be compared with readily available, three-year-averaged baseline data collected prior to Institute establishment: Job placement rates in targeted careers; job advancement rates; student persistence leading to completion of certifications and degrees in selected careers; high school graduation rates; competency test outcomes in basic math, reading and writing. These data are already being collected for the Columbia Gorge region (defined for this purpose as the community college student catchment area) and can serve as a baseline reference. One additional data point would be the number of community college students who are attracted to the NNMI Institute from outside the community college's service area.

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

The Advanced Manufacturing Partnership provides the opportunity for more efficient alignment between theoretical and applied research leading to forecasting of specific skills sets. A mechanism for doing so would be the creation of a national R&D information clearinghouse providing non-proprietary, regular updates via abstract compilations on private and public sector advanced manufacturing research. This could be implemented through the Department of Energy's national network of research laboratories and the Advanced Manufacturing Partnership. An immediate opportunity to pilot this concept exists in the Columbia River Gorge, where all the key elements are already in place: advanced manufacturing industrial base with emphasis on cutting-edge research, university partners from two states, and proximity to Pacific Northwest National Laboratory operated by Battelle, part of the USDOE research network. An interdisciplinary team would regularly review these abstracts to forecast workforce needs in the advanced manufacturing sector, which would be conveyed to community college STEM advisory committees to help inform curricular modifications and new program development. Grade-level projects would integrate relevant applied, hands-on learning opportunities into the curriculum at all educational levels. A model for doing so is the Gorge Robotics Program, which establishes a direct connection between industry skills and grade-level applied learning.

### **Objectives and Attributes Discussion; Additional Responses**

Preference for Institute selection in communities should be provided to:

- Institutes that would serve multiple jurisdictions and bi-state or multi-state areas.
- Applicants with a history of successfully working with federal government programs and delivering nationally-recognized models and programs.
- Communities and organizations which have successfully demonstrate the ability to develop industry partnership with education, workforce, and economic development initiatives.

To better enable Institutes serving bi-state and multi-state regions, Institutes should be allowed to have multiple physical locations. This would allow for more cross-cutting partnerships through a flexible support system that enables the Institute to bring together a variety of public and private resources, ranging from industry partners to K-12 school districts, national labs, community colleges and regional universities, such as the partnerships demonstrated in the Columbia Gorge region.