National Network for Manufacturing Innovation: A Preliminary Design

Executive Summary

The Federal investment in the National Network for Manufacturing Innovation (NNMI) serves to create an effective manufacturing research infrastructure for U.S. industry and academia to solve industry-relevant problems. The NNMI will consist of linked Institutes for Manufacturing Innovation (IMIs) with common goals, but unique concentrations. In an IMI, industry, academia, and government partners leverage existing resources, collaborate, and co-invest to nurture manufacturing innovation and accelerate commercialization.

As sustainable manufacturing innovation hubs, IMIs will create, showcase, and deploy new capabilities, new products, and new processes that can impact commercial production. They will build workforce skills at all levels and enhance manufacturing capabilities in companies large and small. Institutes will draw together the best talents and capabilities from all the partners to build the proving grounds where innovations flourish and to help advance American domestic manufacturing.

Recognizing that a vibrant advanced manufacturing sector is vital to the American economy and national security, President Obama has proposed a $1 billion investment in a National Network for Manufacturing Innovation program. The NNMI program has the goal of advancing American domestic manufacturing. This program will seek to accomplish this by creating a robust national innovation ecosystem anchored by up to fifteen Institutes for Manufacturing Innovation. The Administration is committed to working with Congress to authorize and fully fund the President's request for the NNMI program. This report and the proposed program design included herein aims to support Congressional authorization and provide a guide for future program implementation.

The NNMI will fill a gap in the innovation infrastructure, allowing new manufacturing processes and technologies to progress more smoothly from basic research to implementation in manufacturing. The NNMI program has a scale and focus that is unique, and it is built upon concepts of a strong public-private partnership.

Because the challenges associated with manufacturing are multi-faceted, within the NNMI model, each IMI will have its own distinct manufacturing topic or technology focus, determined through a competitive proposal and review process managed by the AMNPO partners. This process will identify the highest value cross-cutting manufacturing challenges and opportunities, and proposals will bring together manufacturing stakeholders including government, industry, and academia. Stakeholders will consist of industry, academia (research universities and community colleges), relevant organizations (industry consortia, economic development organizations, labor organizations, national laboratories, etc.), and government bodies at all levels (Federal, State, and local). In their individual focus areas, institutes will act to anchor a region's innovation infrastructure, and will conduct research and demonstration projects.

IMIs will offer facilities comprising an "industrial commons" (the R&D, engineering, and manufacturing capabilities needed to turn inventions into competitive, manufacturable commercial products) to accelerate the formation and growth of small- and medium-sized enterprises (SMEs), and will integrate education and workforce training functions into their operations. IMIs will engage with many types of corporations, with particular emphasis on engaging small and medium-sized manufacturing enterprises. They will provide shared-use facilities with the goal of scaling up laboratory demonstrations and maturing technologies for manufacture. American companies and international corporations with significant holdings in the United States are envisioned as participants in these Institutes.

Institutes will be a partnership between government, industry, and academia, supported with cost-share funding from Federal and non-Federal sources. It is expected that institutes will typically receive $70-120 million in total Federal funds, depending upon the magnitude of the opportunity, maturity, and capital intensity of the technology, and scope of the focus area, over a 5-7 year timeframe. When combined with substantial non-Federal co-investment, for example 1:1, it is envisioned the total capitalization of an institute over this period will be $140 to $240 million. At greater ratios of non-Federal co-investment, an institute could achieve its goals with a lower level of Federal funding. Institutes will be expected to be sustainable within seven years of launch through income-generating activities including member fees, intellectual property licenses, contract research, and fee-for-service activities as examples. The proposed design is of a size and scale intended to provide long-term economic impact in the region and nationally.

IMIs are to be led by independent, not-for-profit institutions that strongly leverage industry consortia, regional clusters, and other resources in science, technology, and economic development. Institutes are intended to link and leverage all available resources, including institutions funded through existing Federal programs, so that they have national and global impact.

Institutes will be established through a competitive solicitation and evaluation process managed by the interagency Advanced Manufacturing National Program Office (AMNPO). Current participating agencies include the Departments of Commerce (DOC/NIST), Defense (DOD), Education (ED), and Energy (DOE); the National Aeronautics and Space Administration (NASA); and the National Science Foundation (NSF). Competitive solicitations will be sought and proposals will be peer-reviewed. Expected evaluation criteria include Institute focus and its importance for the American economy; the Institute plan to have significant production-scale manufacturing impact in its area of specialization from a research, commercialization, and workforce training standpoint; the effectiveness of the governance and management structures; the proposed Institute resources; the level of co-investment; engagement with SMEs and other community stakeholders; and the strength of the plan towards sustainability.

Leadership from the Institutes will formally collaborate through a Network Leadership Council made up of representatives from the Institutes, Federal agencies, and other entities as appropriate. The Leadership Council will oversee efforts to develop consistent and common approaches for matters such as intellectual property, contracts, research and performance metrics, and facilitating the sharing of best practices. Each Institute will also participate in the AMNPO-hosted Manufacturing Portal, a web-based resource to help manufacturers locate relevant research, research partners, and pertinent information within the Network. Each Institute's research and commercialization outcomes will be available to other IMI's as appropriate, through technology and knowledge transfer efforts.

Beginning in April 2012, a broad public engagement strategy by the Advanced Manufacturing National Program Office was used to "crowd source" the NNMI program design initiated by a Federally sponsored Request for Information (RFI) and series of regional workshops. In parallel, a pilot institute on additive manufacturing, the National Additive Manufacturing Innovation Institute (NAMII), was announced in August 2012 to move the IMI concept forward and to refine an architecture supporting the formation of the larger Institutes and Network. The RFI period has ended, and combined with the lessons learned from NAMII and rich discussions from the regional workshops, the proposed design for the NNMI is described in this report.