

The Network for Manufacturing Innovation

Updated January 8, 2015

Congressional Research Service

<https://crsreports.congress.gov>

R43857

Summary

In December 2014, Congress passed the Revitalize American Manufacturing and Innovation Act of 2014 (RAMIA), as Title VII of Division B of the Consolidated and Further Continuing Appropriations Act, 2015 (P.L. 113-235). President Obama signed the bill into law on December 16, 2014. RAMIA directs the Secretary of Commerce to establish a Network for Manufacturing Innovation (NMI) program within the Commerce Department's National Institute of Standards and Technology (NIST). The act comes about two years after President Obama first proposed the establishment of a National Network for Manufacturing Innovation in his FY2013 budget.

RAMIA includes provisions authorizing NIST, the Department of Energy, and other agencies to support the establishment of centers for manufacturing innovation and establishing and providing for the operation of a Network for Manufacturing Innovation. NIST is authorized to use up to \$5.0 million per year of appropriated funds for FY2015-FY2024 to carry out its responsibilities under the act. The Department of Energy is authorized to transfer to NIST up to \$250.0 million of appropriated funds over the same FY2015-FY2024 period. The Secretary of Commerce is also authorized to accept funds, services, equipment, personnel, and facilities from any covered entity—federal department, federal agency, instrumentality of the United States, state, local government, tribal government, territory, or possession of the United States, or of any political subdivision thereof, or international organization, or any public or private entity or individual—to carry out the program. The act also establishes a National Office of the Network for Manufacturing Innovation Program (also referred to in this report as the National Program Office) at NIST to oversee and carry out the program.

Each center receiving financial assistance under the NMI program must submit annual reports to the Secretary. The Secretary must submit annual reports to Congress on the performance of the program. And the Comptroller General of the United States is directed to perform biennial assessments of the program, with a final assessment due by December 31, 2024.

Several factors could affect the implementation of the NMI program. Although the act authorizes funding for establishment of the centers and the network, the act does not appropriate any funds. Funding availability for the program will depend on congressional appropriations, priorities, and allocations. In addition, the Department of Energy is authorized, but not required, to transfer funds to NIST to carry out the program.

Another program uncertainty relates to the network of centers. While the act specifies which new and existing centers are eligible to be a part of the network and designates the National Program Office as “a convener of the Network,” it does not further specify the purpose, federal role, and activities of the network.

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Overview

In December 2014, Congress passed the Revitalize American Manufacturing and Innovation Act of 2014 (RAMIA), as Title VII of Division B of the Consolidated and Further Continuing Appropriations Act, 2015 (P.L. 113-235). President Obama signed the bill into law on December 16, 2014. RAMIA directs the Secretary of Commerce to establish a Network for Manufacturing Innovation (NMI) program within the Commerce Department's National Institute of Standards and Technology (NIST). The act comes about two years after President Obama first proposed the establishment of a National Network for Manufacturing Innovation in his FY2013 budget.

Executive Proposal and Legislative Action

President Obama first proposed the establishment of a National Network for Manufacturing Innovation (NNMI) in his FY2013 budget, requesting \$1 billion to support the establishment of up to 15 institutes. Shortly thereafter, he formally introduced the concept in a speech at a manufacturing facility in Virginia on March 9, 2012.

No legislation to enact the President's proposal was introduced in the 112th Congress. In 2013, the President renewed his call for an NNMI in his FY2014 budget request, again seeking \$1 billion in mandatory funding. The President's FY2015 budget proposal also sought authority and funding to establish the NNMI. The request was not part of the President's FY2015 base budget request, but rather a part of an adjunct \$56 billion Opportunity, Growth, and Security Initiative (OGSI) proposal. The OGSI request included \$2.4 billion to establish up to 45 NNMI institutes.

In August 2013, bills entitled the Revitalize American Manufacturing and Innovation Act of 2013 were introduced in the House (H.R. 2996) and the Senate (S. 1468) to establish a Network for Manufacturing Innovation. H.R. 2996 passed the House in September 2014. S. 1468 was reported by the Senate Committee on Commerce, Science, and Transportation in August 2014.

In December 2014, provisions of H.R. 2996 were incorporated in the Consolidated and Further Continuing Appropriations Act, 2015 (P.L. 113-235) as Title VII of Division B, the Revitalize American Manufacturing and Innovation Act of 2014 (RAMIA). P.L. 113-235 was signed into law by President Obama on December 16, 2014. RAMIA includes provisions establishing and providing for the operation of a Network for Manufacturing Innovation.

NMI Program Provisions of RAMIA

RAMIA, in part, amends the National Institute of Standards and Technology Act (codified at 15 USC 271 et seq.) establishing the NMI program, setting forth its purposes, and authorizing its structure, funding, and operation. The act also establishes a National Program Office to support the NMI program.

NMI Purposes

RAMIA articulates eight purposes of the NMI program:

- to improve the competitiveness of U.S. manufacturing and to increase the production of goods manufactured predominantly within the United States;
- to stimulate U.S. leadership in advanced manufacturing research, innovation, and technology;

- to facilitate the transition of innovative technologies into scalable, cost-effective, and high-performing manufacturing capabilities;
- to facilitate access by manufacturing enterprises to capital-intensive infrastructure, including high-performance electronics and computing, and the supply chains that enable these technologies;
- to accelerate the development of an advanced manufacturing workforce;
- to facilitate peer exchange and the documentation of best practices in addressing advanced manufacturing challenges;
- to leverage non-federal sources of support to promote a stable and sustainable business model without the need for long-term federal funding; and
- to create and preserve jobs.

NMI Structure

The act directs the Secretary of Commerce to establish a Network for Manufacturing Innovation program in the Commerce Department’s National Institute of Standards and Technology. The Secretary, acting through NIST, is directed to support the establishment of centers for manufacturing innovation and to establish and support a network of centers for manufacturing innovation.

Centers for Manufacturing Innovation

The act defines a “center for manufacturing innovation”—including centers established prior to the act, as well as ones established under the provisions of the act—as one that meets each of the following criteria:

- has been established to address challenges in advanced manufacturing and to assist manufacturers in retaining or expanding industrial production and jobs in the United States;
- has a predominant focus on a manufacturing process; novel material; enabling technology; supply chain integration methodology; or another relevant aspect of advanced manufacturing, such as nanotechnology applications, advanced ceramics, photonics and optics, composites, bio-based and advanced materials, flexible hybrid technologies, and tool development for microelectronics;
- has the potential, as determined by the Secretary of Commerce, to improve the competitiveness of U.S. manufacturing; to accelerate non-federal investment in advanced manufacturing production capacity in the United States; or to enable the commercial application of new technologies or industry-wide manufacturing processes;
- includes active participation among representatives from multiple industrial entities, research universities, community colleges, and such other entities as the Secretary of Commerce considers appropriate, which may include industry-led consortia; career and technical education schools; federal laboratories; state, local, and tribal governments; businesses; educational institutions; and nonprofit organizations.

Center Activities

The act authorizes activities of a center to include

- research, development, and demonstration projects (including proof-of-concept development and prototyping) to reduce the cost, time, and risk of commercializing new technologies and improvements in existing technologies, processes, products, and research and development (R&D) of materials to solve precompetitive industrial problems with economic or national security implications;
- development and implementation of education, training, and workforce recruitment courses, materials, and programs;
- development of innovative methodologies and practices for supply chain integration and introduction of new technologies into supply chains;
- outreach and engagement with small and medium-sized manufacturing enterprises, including women- and minority-owned manufacturing enterprises, in addition to large manufacturing enterprises; and
- such other activities as the Secretary of Commerce, in consultation with federal departments and agencies whose missions contribute to or are affected by advanced manufacturing, considers consistent with the purposes specified in the act.

Identification of Existing Centers for Inclusion in the Network

The act allows a number of existing manufacturing centers to be classified as a center for manufacturing innovation for participation in the network of centers. President Obama initiated the establishment of several such centers prior to enactment of RAMIA under the existing general statutory authority of several agencies, including the Department of Defense and Department of Energy. In particular, the act incorporates

the National Additive Manufacturing Innovation Institute and other manufacturing centers formally recognized as manufacturing innovation centers pursuant to Federal law or executive actions, or under pending interagency review for such recognition as of the date of enactment of the Revitalize American Manufacturing and Innovation Act of 2014.¹

However the act prohibits such centers from receiving any financial assistance authorized under the act's Financial Assistance to Establish and Support Centers for Manufacturing Innovation provisions (described in the next section).

The National Additive Manufacturing Innovation Institute (NAMII) is led by the Department of Defense (DOD). In addition, DOD and the Department of Energy (DOE) have established, are in the process of establishing, or have announced plans for several other manufacturing centers since the President's original NNMI proposal. Several of these centers include the participation of other federal agencies, including the Department of Commerce, the National Aeronautics and Space Administration, and the National Science Foundation. These centers include

- Digital Manufacturing and Design Innovation Institute (DOD-led);
- Lightweight and Modern Metals Manufacturing Innovation Institute (DOD-led);
- Next Generation Power Electronics National Manufacturing Innovation Institute (DOE-led);
- Clean Energy Manufacturing Innovation Institute for Composite Materials and Structures (DOE-led);

¹ P.L. 113-235.

- Integrated Photonics Institute for Manufacturing Innovation (DOD-led);
- Flexible Hybrid Electronics Manufacturing Innovation Institute (DOD-led); and
- Clean Energy Manufacturing Innovation Institute on Smart Manufacturing: Advanced Sensors, Controls, Platforms and Modeling for Manufacturing (DOE-led).

These centers may be considered candidates for inclusion in the Network for Manufacturing Innovation.

Financial Assistance to Establish and Support Centers

RAMIA authorizes the Secretary of Commerce to award financial assistance to a person or group of persons to assist in planning, establishing, or supporting a center for manufacturing innovation. The act requires an open process for the solicitation of applications that allows for the consideration of all applications relevant to advanced manufacturing, regardless of technology area, and competitive merit-based review of the applications that incorporates peer review by a “diverse group of individuals with relevant experience from both the public and private sectors.”² Political appointees are prohibited from participating on any peer review panel, and the Secretary of Commerce is required to implement a conflict of interest policy that ensures public transparency and accountability, as well as full disclosure of any real or potential conflicts of interest of individuals participating in the center selection process.

The Secretary of Commerce is required to make publicly available at the time of any award of financial assistance to a center a description of the bases for the award, including the merits of the winning proposal relative to other applicants. The Secretary must also develop and implement performance measures to assess the effectiveness of the funded activities.

In making center selections, the act requires the Secretary, working through the National Program Office (discussed later in this report), to collaborate with federal departments and agencies whose missions contribute to or are affected by advanced manufacturing.

Center Selection Considerations

RAMIA requires the Secretary to apply certain considerations in the selection of centers for manufacturing innovation. The considerations specified in the act include

- the potential of a center to advance domestic manufacturing and the likelihood of economic impact, including creation or preservation of jobs, in the predominant focus areas of the center for manufacturing innovation;
- the commitment of continued financial support, advice, participation, and other contributions from non-federal sources to provide leverage and resources to promote a stable and sustainable business model without the need for long-term federal funding;
- whether the financial support provided to the center from non-federal sources significantly exceeds the requested federal financial assistance;
- how the center will increase the non-federal investment in advanced manufacturing research in the United States;

² Section 703(d)(4)(A).

- how the center will engage with small and medium-sized manufacturing enterprises to improve the capacity of such enterprises to commercialize new processes and technologies;
- how the center will carry out educational and workforce activities that meet industrial needs related to its predominant focus areas;
- how the center will advance economic competitiveness and generate substantial benefits to the United States that extend beyond the direct return to participants in the program;
- whether the predominant focus of the center is a manufacturing process, novel material, enabling technology, supply chain integration methodology, or other relevant aspect of advanced manufacturing that has not already been commercialized, marketed, distributed, or sold by another entity;
- how the center will strengthen and leverage the assets of a region; and
- how the center will encourage education and training of veterans and individuals with disabilities.

In addition, the act allows for other factors to be considered.

Center Funding

RAMIA includes several provisions related to center funding:

- Financial assistance may not be awarded to a center more than seven years after the date the Secretary of Commerce first awards financial assistance to that center.
- Total federal assistance awarded to a center, including funding made under the provisions of RAMIA, may not exceed 50% of the total funding of the center in that year. The Secretary of Commerce may make exceptions in circumstances in which a center is making large capital facilities or equipment purchases. The Secretary is directed to give preference to centers seeking less than the maximum federal share of funds allowed.
- Centers are to receive decreasing levels of funding in each subsequent year of funding. The Secretary may make exceptions to this requirement when a center is otherwise meeting its stated goals and metrics, unforeseen circumstances have altered the center's anticipated funding, and the center can identify future non-federal sources of funding that would warrant a temporary exemption.

NMI Funding

RAMIA authorizes NIST to use \$5 million per year for FY2015-FY2024 from funds appropriated to its Industrial Technology Services account to carry out the Network for Manufacturing Innovation program. The act also authorizes the Department of Energy to transfer to NIST up to \$250 million over the FY2015-FY2024 period from funds appropriated for advanced manufacturing R&D in its Energy Efficiency and Renewable Energy account.

The Secretary of Commerce, in addition to amounts appropriated to carry out the NMI program, may accept funds, services, equipment, personnel, and facilities from any covered entity to carry out the NMI program, subject to certain conditions and constraints.³

National Program Office of the NMI Program

RAMIA directs the Secretary of Commerce to establish, within NIST, a National Program Office of the Network for Manufacturing Innovation to oversee and carry out the program.

The act specifies the following functions of the National Program Office:

- to oversee planning, management, and coordination of the program;
- to enter into memoranda of understanding with federal departments and agencies whose missions contribute to or are affected by advanced manufacturing, to carry out the authorized purposes of the program;
- to develop a strategic plan to guide the program no later than one year from the date of enactment of the act, and to update the strategic plan at least once every three years thereafter;
- to establish such procedures, processes, and criteria necessary and appropriate to maximize cooperation and coordination of the activities of the program with programs and activities of other federal departments and agencies whose missions contribute to or are affected by advanced manufacturing. The act, in particular, calls for the Secretary to ensure that the NIST Hollings Manufacturing Extension Partnership (MEP) is incorporated into NMI program planning to ensure the results of the program reach small and medium-sized entities;
- to establish a clearinghouse of public information related to the activities of the program; and
- to act as a convener of the Network for Manufacturing Innovation.

In support of the development and updating of the strategic plan, the Secretary of Commerce is directed by the act to solicit recommendations and advice from a wide range of stakeholders, including industry, small and medium-sized manufacturing enterprises, research universities, community colleges, and other relevant organizations and institutions on an ongoing basis. The Secretary is directed to transmit the strategic plan to the Senate Committee on Commerce, Science, and Transportation and the House Committee on Science, Space, and Technology.

The act authorizes any federal government employee to be detailed to the National Program Office without reimbursement and without interruption or loss of civil service status or privilege to the employee.

Mandated Reports and Audits

RAMIA requires several reports and audits to be conducted with respect to the NMI program.

³ For purposes of this provision, a covered entity is any federal department, federal agency, instrumentality of the United States, state, local government, tribal government, territory or possession of the United States, or of any political subdivision thereof, or international organization or any public or private entity or individual.

Annual Center Reports to the Secretary

RAMIA directs the Secretary of Commerce to require each recipient of federal assistance under the act to submit an annual report to the Secretary that describes the finances and performance of the center for which assistance was awarded. Each report is required to include an accounting of expenditures of amounts awarded under the program to the center; a description of the performance of the center with respect to its goals, plans, financial support, and accomplishments; and an explanation of how the center has advanced the purposes of the NMI program as specified by the act.

Annual Reports by the Secretary to Congress

RAMIA requires the Secretary of Commerce to report annually to Congress through December 31, 2024, on the performance of the program during the most recent one-year period. Each report is to include a summary and assessment of the annual reports provided by each center; an accounting of the funds expended by the Secretary under the program, including any temporary exemptions granted; an assessment of the participation in, and contributions to, the network by any centers for manufacturing innovation not receiving financial assistance under the NMI program; and an assessment of the NMI program with respect to meeting the purposes described in the act.

Biennial Assessment by the U.S. Government Accountability Office to Congress

RAMIA requires the Comptroller General of the United States to conduct an assessment of the NMI program at least once every two years during the operation of the program, covering the two most recent years of the program on the overall success of the NMI program, and a final assessment to be made not later than December 31, 2024.

Each assessment is to include, for the period covered by the report: a review of the management, coordination, and industry utility of the NMI program; an assessment of the extent to which the program has furthered the purposes identified in the act; such recommendations for legislative and administrative action as the Comptroller General considers appropriate to improve the NMI program; and an assessment as to whether any prior recommendations for improvement made by the Comptroller General have been implemented or adopted.

Additional NMI Program-Related Authorities

Other provisions of RAMIA authorize:

- the Secretary of Commerce to appoint such personnel and enter into such contracts, financial assistance agreements, and other agreements as the Secretary considers necessary or appropriate to carry out the program, including support for R&D activities involving a center for manufacturing innovation;
- the Secretary of Commerce to transfer to other federal agencies such sums as the Secretary considers necessary or appropriate to carry out the program—however, such funds may not be used to reimburse or otherwise pay for the costs of financial assistance incurred or commitments of financial assistance made prior to the date of enactment of RAMIA;
- agencies to accept funds transferred to them by the Secretary of Commerce, in accordance with the provisions of RAMIA, to award and administer, under the

same conditions and constraints applicable to the Secretary, all aspects of financial assistance awards under RAMIA; and

- the Secretary of Commerce to use, with the consent of a covered entity⁴ and with or without reimbursement, land, services, equipment, personnel, and facilities of such covered entity.

RAMIA also specifies that the provisions of 35 USC 18, Patent Rights in Inventions Made with Federal Assistance, shall apply to any funding agreement⁵ awarded to new or existing centers. This chapter of the U.S. Code is widely known as the Bayh-Dole Act and formally titled the University and Small Business Patent Procedures Act of 1980.⁶

Issues for Consideration

While RAMIA establishes the NMI program; sets forth its purposes; and authorizes its structure, funding, and operation; a number of broad policy issues and ones related to the program's implementation remain.

Appropriate Role of the Federal Government in Manufacturing

The appropriate role of the federal government in fostering technological innovation or supporting a particular company, industry, or industrial sector (e.g., manufacturing) has been the focus of a long-running national policy debate. Views range from those who believe that the federal government should take a hands-off or minimalist approach to those who support targeted federal investments in promising technologies, companies, and industries. And while there has been broad agreement on federal support for fundamental research, the consensus in favor of federal support frays as technology matures toward commercialization.

Advocates for a strong federal role in advancing technologies and industries often assert that such interventions are justified by the economic, national security, and societal benefits that generally accompany technological advancement and U.S. technological and industrial leadership. For such reasons, the manufacturing sector has received the attention of the federal government since the nation's founding.⁷

Critics of a strong federal role provide a variety of arguments. For example, some contend that such interventions skew technology development and competition by replacing market-based

⁴ See footnote 3.

⁵ As defined in 18 USC 35, section 201, the term "funding agreement" means "any contract, grant, or cooperative agreement entered into between any Federal agency, other than the Tennessee Valley Authority, and any contractor for the performance of experimental, developmental, or research work funded in whole or in part by the Federal Government. Such term includes any assignment, substitution of parties, or subcontract of any type entered into for the performance of experimental, developmental, or research work under a funding agreement as herein defined."

⁶ For more information about the Bayh-Dole Act, see CRS Report RL32076, *The Bayh-Dole Act: Selected Issues in Patent Policy and the Commercialization of Technology*, by Wendy H. Schacht.

⁷ For example, the Constitution vests Congress with the power to "fix the Standard of Weights and Measurements" and to establish a patent system, functions central to manufacturing and trade in manufactured goods. In 1791, Treasury Secretary Alexander Hamilton presented his "Report on the Subject of Manufactures" to Congress with policy recommendations to foster the development of manufacturing in the United States. The Morrill Land-Grant Acts enacted in the 1860s granted states federal lands to use for the establishment of colleges "to teach such branches of learning as are related to agriculture and the mechanic arts" to provide, in part, knowledgeable engineers and technicians for manufacturing sector. A century later, Congress created programs such as the Manufacturing Extension Partnership and the Small Business Innovation Research program to help improve U.S. innovation and manufacturing in response to increased foreign innovation and competition.

decisions of companies, capital providers, and researchers with the judgment of government bureaucrats or politicians (sometimes referred to as the government “picking winners and losers”). Those who hold this view generally assert that this may result in inefficient allocation of capital, development and deployment of inferior technologies, and political favoritism (sometimes referred to as “crony capitalism”). Others assert that such interventions often represent a transfer of wealth from taxpayers to already-prosperous companies and their shareholders (sometimes referred to as “corporate welfare”).

Others may prefer an approach that is more technology- or industry-neutral, such as reducing costs and other burdens on manufacturers by reducing taxes, regulations, and frivolous lawsuits.

The NMI—with its focus on advanced manufacturing research, innovation, and technology—is likely at the intersection of these viewpoints.

National Need for the NMI Program

While RAMIA included a number of findings that highlight the role manufacturing plays in the U.S. economy, it did not identify specific shortcomings of the U.S. manufacturing sector that the NMI program is to address. Analysts hold divergent views of the health of U.S. manufacturing. While some may be supportive of the effort, others may question whether there is a compelling national need for the Network for Manufacturing Innovation program.

Some analysts believe that the U.S. manufacturing sector is at risk. Expressed concerns of those holding this view include

- a “hollowing-out” of U.S. manufacturing resulting from the decision of many U.S. manufacturers to move production activities and other corporate functions (e.g., research and development, accounting, information technology, tax planning, legal research) offshore;⁸
- focused efforts by other nations to grow the size, diversity, and technological prowess of their manufacturing capabilities and to attract manufacturing operations of U.S.-headquartered multinational companies using a variety of policy tools (e.g., tax holidays, worker training incentives, market access, and access to rare earth minerals); and
- a decades-long declining trend in U.S. manufacturing employment, punctuated by a steeper drop from 2001 to 2010. In January 2010, U.S. manufacturing employment fell to its lowest level (11.5 million) since March 1941, down more than 41% from its peak of 19.6 million in June 1979.⁹

In support of the President’s proposal for a National Network for Manufacturing Innovation, the Information Technology and Innovation Foundation, a Washington, DC-based think tank, articulated a variety of reasons why there is a need for an NMI-like federal program in a report titled *Why America Needs a National Network for Manufacturing Innovation*. Among the ITIF’s assertions:

- An NMI-like program would address two issues important to U.S. manufacturing competitiveness: technology and talent.

⁸ For more information, see CRS Report R41712, “*Hollowing Out*” in U.S. Manufacturing: Analysis and Issues for Congress, by Marc Levinson.

⁹ See, for example, CRS Report R41898, *Job Creation in the Manufacturing Revival*, by Marc Levinson.

- Spillovers from successful innovations resulting from a firm's investments can yield substantial benefits captured by competitors producing a market failure that results in underinvestment in manufacturing R&D and innovation.
- Other types of market failures—for example, the need for large-scale capital investments and training outlays that may require many years to pay off—may “limit the scale-up of innovative manufacturing processes, the installation of new capital equipment, and the full integration of manufacturing systems across supply chains.”
- Foreign governments engage in a variety of policy and programmatic activities designed to attract U.S. and other manufacturing firms to their countries; subsidize and protect domestic producers; or “repress labor, condone intellectual property theft, and manipulate their currency values in order to expand their manufacturing footprint.”
- The federal government provides little support for manufacturing-focused U.S. based research activities: such funding is scattered among multiple agencies and “has rarely been a priority for any of them.” This position contends that U.S. academia, in general, does not incentivize engineering advances and practical problem-solving, but rather “originality and breakthroughs.” The emphasis on “engineering as a science” in U.S. academic engineering programs contributes further to this bias.¹⁰

Other analysts see the U.S. manufacturing sector as vibrant and healthy. Those holding this view tend to point to, among other things, the sector's strong growth in output and productivity, as well as the United States' substantial share (17.4%) of global manufacturing value-added (second only to China, 22.4%).¹¹ In addition, between January 2010 and September 2014, manufacturing employment added approximately 707,000 jobs, growing to 12.2 million.¹² In addition, many analysts attribute U.S. manufacturing employment losses to broader global technology and business trends, such as technology-driven productivity improvements, increases in capital-labor substitution, movement of labor-intensive production activities to lower wage regions of the world, foreign competition in manufactured goods in both U.S. and foreign markets, and disaggregation of work processes resulting in the contracting of service work previously performed by employees of manufacturing firms as well as the offshoring of manufacturing activities.

Independent of their perspective on the health of the U.S. manufacturing sector, some analysts may believe that there should not be an NMI program. Some may assert that the role envisioned for the NMI should be performed by the private sector; that the federal government should not favor or subsidize particular companies, industries, or technologies; that the NMI would be ineffective or counterproductive; that the funds that would go to the NMI should be used to support manufacturing in other ways; that the funds should be used for different federal functions altogether; or that the funds should be directed toward deficit reduction.

¹⁰ David M. Hart, Stephen J. Ezell, and Robert D. Atkinson, *Why America Needs A National Network for Manufacturing Innovation*, Information Technology and Innovation Foundation, December 2012, <http://www.itif.org/publications/why-america-needs-national-network-manufacturing-innovation>.

¹¹ MAPI, <https://www.mapi.net/china-has-dominant-share-world-manufacturing>.

¹² Bureau of Labor Statistics, U.S. Department of Labor, Current Employment Statistics survey database, data for manufacturing employment, all employees, seasonally adjusted, <http://data.bls.gov/cgi-bin/surveymost>.

Some may also believe that the NMI is, in part or in whole, duplicative of other federal programs, such as the NIST Advanced Manufacturing Technology (AmTech) consortia program¹³ or the Manufacturing Extension Partnership; or, as a new and separate program, represents an increasing fragmentation of federal efforts to help manufacturers. Some may question whether additional federal funding will produce more innovation and whether and how the U.S. manufacturing base will effectively absorb such innovations.

Others may prefer an expanded direct role for the federal government. This could include increasing federal funding for manufacturing R&D, providing grants and loan guarantees for domestic manufacturing, and, in some cases, subsidizing production of products for which there are deemed positive benefits for the nation that cannot be captured by the manufacturer.

Still others argue that long-term employment losses in manufacturing are inevitable and that federal policy should focus elsewhere. In a July 2014 *Wall Street Journal* article, former Treasury Secretary Lawrence Summers argued that, “The economic challenge of the future will not be producing enough. It will be providing enough good jobs.” Summers described the loss of manufacturing jobs over the long-term as “inexorable and nearly universal,” a result of technology and market forces mirroring the earlier loss of agricultural jobs, only, he added, this “change will come faster and affect a much larger share of the economy.” Summers did not offer a prescriptive alternative, but rather stated the need for government policies and approaches that “meet the needs of the information age.”¹⁴

When considered in the context of the overall U.S. economy, manufacturing output, or federal spending, the NMI appropriations authorizations provided in P.L. 113-235 are relatively small. Nevertheless, both proponents and opponents of the NMI may see such appropriations authorizations as opening the door to future increases in funding for the NMI as well as establishing a precedent for the creation of additional programs of a similar nature for manufacturing or other sectors of the U.S. economy.

Availability and Prioritization of Appropriations

The act provides for the Secretary of Commerce to use up to \$5 million in funds appropriated to the NIST Industrial Technology Services account to carry out the NMI program. The availability of funds from this authorization, however, will depend on the level of annual appropriations made to the NIST ITS account. In addition, whatever appropriations are made to the ITS account may be subject to congressional prioritization and restrictions included in report language accompanying the appropriations bill. In FY2015, Congress appropriated \$138.1 million for the ITS account, directing NIST to spend \$130.0 million on the Hollings Manufacturing Extension Partnership and \$8.1 million on NIST’s Advanced Manufacturing Technology Consortia program. It did not provide explicit funding for the NMI in FY2015. For FY2016, if Congress desires to provide funding to NIST to carry out the NMI program under the act’s authorization, it may choose to increase funding for the ITS account in an amount equal to the level of funding it wishes to provide for the administration of the NMI program, reduce funding for one or both of

¹³ On July 18, 2013, the Senate Committee on Appropriations reported S. 1329, the FY2014 appropriations act for the Department of Commerce, Department of Justice, and Science and Related Agencies. In the report accompanying the bill (S.Rept. 113-78), the committee asserted that there is “no significant distinction” between the proposed NNMI institutes and the Administration’s Advanced Manufacturing Technology (AMTech) consortia. The report directed NIST to report within 60 days of enactment of the legislation “on how NNMI-related efforts can be merged into AmTech.”

¹⁴ Lawrence Summers, “Lawrence H. Summers on the Economic Challenge of the Future: Jobs,” *Wall Street Journal*, July 7, 2014.

the existing programs being funded by this account, or leave the determination of the allocation of the ITS appropriation to the Secretary of Commerce or NIST.

A second source of funding provided for by the act is authority given to the Department of Energy to transfer to NIST up to \$250 million for the period FY2015-FY2024. However, the availability of funds provided by the DOE to NIST depends, in part, on the level of annual appropriations made to the DOE's Energy Efficiency and Renewable Energy account specifically for advanced manufacturing R&D. This source of funding for the NMI may also be subject to prioritization and potential restrictions included in report language accompanying the appropriations bill. In addition, the availability of these funds to NIST will depend on DOE's willingness to transfer funds to NIST for the NMI program.

A third possibility for funding the program is the authority given to the Secretary to accept funds, services, equipment, personnel, and facilities from any covered entity to carry out the program.

The act does not specify how the funds provided by NIST, DOE, or other agencies are to be allocated between program management activities and funding for the centers. In the absence of such specifications, it appears that the funds from these sources may be used for either or both of these purposes.

The Role of the Federal Government in the Network

In addition to authorizing the establishment of centers for manufacturing innovation, the act authorizes the establishment of a network of these centers. In this regard, the act specifies which centers are eligible to be a part of the network and designates the National Program Office as "a convener of the Network."¹⁵ However, the act does not further specify the purpose, federal role, or activities of the network. Congress may opt to consider amending the act to clarify these points or to authorize NIST and participating agencies to do so.

The Role of the Federal Government After FY2024

The act authorizes the NMI through FY2024 and requires the Comptroller General of the United States to make a final assessment by December 31, 2024. No specifications are made for a federal role after the end of FY2024. As the program progresses, Congress may opt to consider whether to continue the NMI beyond FY2024 or to allow it to expire.

Congressional Oversight

Congress may opt to conduct oversight hearings on the implementation of the NMI program to ensure that it is operating as Congress intends, with respect to funding, interagency cooperation, the establishment of new centers, the incorporation of existing manufacturing centers as part of the network, the integration of the NMI with existing federal manufacturing activities, and other related issues.

¹⁵ Section 703(f)(2)(F).

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