An American Manufacturing Movement: Productivity

The Council on Competitiveness [1]'s Make: An American Manufacturing *[2]* report issues a call to the American people to keep manufacturing a cornerstone of American independence, economic prosperity, and national security. This series was recently presented to the government as a non-partisan strategy to resolve issues facing American manufacturing, which remains a driver of innovation and job creation, even as automation and technology make manufacturing more efficient. A new era of manufacturing excellence offers hope for good jobs, new innovations, and a higher standard of living. America would benefit from faster economic growth, a more secure industrial and defense base, and an ability to produce solutions to national challenges in energy, health, environment, and the economy.

Americans have lost production of cutting-edge innovations developed in America because of tax, regulatory, skill, finance, and infrastructure limitations that make production elsewhere more competitive. Americans have always been pioneers, risk-takers, and makers. The Council's task is to set those impulses free and embrace production. Americans have proven adept at rising to the economic challenge of their time. Such a time is now for manufacturing—and Americans can set in place the policies to ignite a new era of competitive and sustainable manufacturing.

CHALLENGE: Achieving next-generation productivity through smart innovation and manufacturing.
SOLUTION: Create national advanced manufacturing clusters, networks, and partnerships. Prioritize R&D investments; deploy new tools, technologies, and facilities; and accelerate commercialization of novel products and services.

Recommendation: Congress and the administration should leverage R&D investments across the federal research enterprise to solve challenges in sustainable smart manufacturing systems and ensure a dynamic discovery and innovation pipeline.

- Sustain federal investment in key agencies that support basic research, infrastructure, and STEM education. Agencies include the National Science Foundation, the National Institute of Standards and Technology, the National Aeronautics and Space Administration, the Department of Defense, the Department of Energy Office of Science, and the National Institutes of Health.
- Establish cross-sector research collaborations and public-private partnerships to develop and commercialize breakthrough advanced manufacturing tools, processes, and applications. These include “materials by design,” automation and intelligent robotics, modeling and simulation, complexity and data analytics, sub-atomic to extreme systems engineering, cyber security, and operation logistics and business management.

Recommendation: Congress, the administration, industry, academia, and labor should develop partnerships to create a national network of advanced manufacturing clusters and smart factory ecosystems.

- Develop blueprints for smarter factories and industrial communities. Modernize the aging industrial base with information technology-enabled smart manufacturing processes
- Create incentives for multi-user advanced manufacturing facilities, capable of rapid reconfiguration to support fabrication of a wide range of products. Provide broad access to cost-effective prototyping, testing, and low volume manufacturing for small businesses, entrepreneurs, and small innovators.
- Use cross-sector consortia with industry, academia, national laboratories, and federal agency partners to identify and solve critical technical challenges in developing advanced manufacturing tools, technologies, and processes.
- Develop and deploy agile manufacturing techniques to transition all levels of U.S. industries from one technology generation to the next, faster and more efficiently than competitors.

Recommendation: Congress, the administration, national laboratories, and universities should advance the U.S. manufacturing sector’s use of computational modeling and simulation, and move the nation’s high performance computing capabilities toward Exascale.

- Develop and increase access to simplified, cost-effective design and engineering tools, visualization technologies, modeling and simulation, and collaborative platforms that can be used more widely by U.S. innovators and manufacturers through open and virtual campus facilities.

- Facilitate and measure progress in adopting these technologies through the Manufacturing Extension Partnership (MEP) at the National Institute of Standards and Technology. MEP should report that more than 15,000 small and medium-sized manufacturing enterprises are using these tools by 2015.
- Sustain federal investment in moving the nation's computational capabilities to the exascale level and incent private investment as needed to ensure that the United States maintains international leadership in high performance computing.

Recommendation: The U. S. Department of Commerce, through the Economic Development Administration and in partnership with the Council on Competitiveness, should expand the Midwest Project for SME—OEM Use of Modeling and Simulation through the National Digital Engineering and Manufacturing Consortium (NDEMC).

- Establish operational modeling and simulation pilots for small and medium-sized enterprises in all six economic development agency regions of the United States by 2015.
- Develop a strategic partnership between the Manufacturing Extension Partnership and NDEMC to engage SMEs across the United States in 2012.
- Develop strategic partnerships between large U.S. OEMs and NDEMC to support collaboration with SMEs on the use of advanced modeling and simulation manufacturing.
- Use NDEMC to support Department of Defense programs such as Advanced Manufacturing Enterprise, Model Based Engineering, and Open Manufacturing.

Recommendation: Accelerate innovation from universities and national laboratories by facilitating greater sharing of intellectual property and incentivizing commercialization.

- Shift a greater percentage of investments at national laboratories and research universities to end-use inspired basic research.
- Amend the missions of federal R&D agencies to support U.S. industry as stipulated in the National Competitiveness Technology Transfer Act and associated legislation.
- Facilitate access to labs and universities to engage potential partners and make information on research projects more widely available.
- Coordinate federal funding streams to innovation hubs that center on a particular set of challenges and condition hub location on funding and policy support by state and local governments.
- Establish formal procedures for laboratory and university employees that ease their ability to establish firms and transition to the private sector.
- Establish a process for rapid identification, assessment, and removal of unnecessary regulatory barriers to new technology commercialization and establishment of manufacturing facilities.

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