



RESEARCH, INNOVATION AND TECHNOLOGY: Powering Manufacturing 4.0

Manufacturers in the United States have created an innovation engine that has reshaped the world around us. New technologies and processes have brought us energy independence, new lifesaving medicines and medical devices and more efficient automobiles, to name a few. Countless other products are being developed and refined constantly to make people's lives better and secure our nation's global leadership position in manufacturing. Every day, manufacturers across the country are transforming their own operations to achieve greater efficiency, productivity and competitiveness while working to create a better tomorrow.

Manufacturers in the U.S. account for about 53% of private-sector spending on R&D, and manufacturing has been awarded more patents than any other industry.⁶ Innovation is the lifeblood of our economy, the foundation of a globally competitive manufacturing base here at home and the driver for U.S. leadership in manufacturing abroad. Building on this history of innovation, manufacturers are leading the charge in the digital economy of the 21st century. Machine learning and artificial intelligence, additive manufacturing, the Internet of Things, robotics, 5G, cloud computing, augmented reality, advanced

materials and other innovations are attracting significant attention and investment that will propel manufacturing into the future.

AI in particular is changing the way manufacturers do business—from the production line to the back office and across the supply chain. By leveraging data and enabling greater efficiency, AI will improve communication, increase collaboration across disciplines and stimulate innovation. AI can even inform the workforce's creativity by working with it to design a new product or system.

In addition to requiring workers to be skilled in programming, data science and machine learning, manufacturers will also need to expand their bench of critical thinkers and problem-solvers to capture fully the benefits of AI: investing in upskilling programs to make the AI integration process smoother and develop preexisting talent, recruiting for and teaching skills that enable individuals to adapt easily to changing demands and environments and building partnerships with local schools, community colleges and technical and vocational schools to develop talent pipelines that will meet manufacturing needs.

⁶<https://nces.nsf.gov/surveys/business-enterprise-research-development/2020#data-tables>



While AI will take over monotonous, repetitive tasks, the industry will continue to center around human labor. Meanwhile, AI adoption will likely lead to an increase in available jobs, as more skilled workers will be needed to guide and inform these new processes.

As modern manufacturing in the U.S. races toward the new economic era and pursues future technologies to lead new operational advances, federal policies must keep up with the industry's needs, prioritizing both investment and innovation. The application of advanced and digital technologies on the factory floor will contribute to a significant transformation already underway known as Manufacturing 4.0.

A Research, Innovation and Technology Agenda for the Future Must:

- Adopt policies that will attract and retain investment in R&D and other activities that drive innovation.
- Vigorously protect all forms of manufacturers' IP at home and abroad and strengthen enforcement against counterfeiting and other forms of IP theft.
- Foster the growth of connected technologies, digital infrastructure and data-driven innovation across all manufacturing industry segments.
- Include cybersecurity policies that draw on industry best practices.

ACTIONS FOR LEADERS TO TAKE:

- ✓ Deliver strong IP protections for manufacturers by advancing pro-innovation domestic policies; negotiating strong IP provisions in trade and other bilateral and regional agreements; and strengthening, not weakening, critical global IP rules.
- ✓ Pursue a federal approach to data privacy that provides flexibility for innovation, addresses domestic and global inconsistencies and maintains U.S. economic growth and technological leadership.
- ✓ Enact policies that curb abusive patent lawsuits while respecting IP rights for all industry segments.
- ✓ Modernize our communications laws to reduce unnecessary regulations, spur investment in our digital infrastructure and promote the deployment of next-generation wireless technology.
- ✓ Maintain a strong mechanism for the public and private sector to share real-time cyberthreat information and support reasonable reporting requirements for those under attack.