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A Vision for the Manufacturing USA Program in 2030 and 2035

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Overview

Why Manufacturing Matters &
Statement of Task

American Manufacturing Challenges

International Program Benchmarking

Technology Transfer

Interagency Collaboration &
Cross-network Coordination

Regional Manufacturing Ecosystem

Education & Workforce Development

Vision for the Future & Next Steps

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Why Manufacturing is Important

Manufacturing is critical to U.S. **national security and economic well-being.**

The last 15 years have witnessed the rise of the **techno-economic** state with competitor nations practicing systematic **industrial policy**.

The U.S. lacks a coherent program for rapid adoption of new manufacturing technologies into a system for corresponding **economic development and growth**.

This report recommends that Manufacturing USA "Go Bigger" and take on this role.

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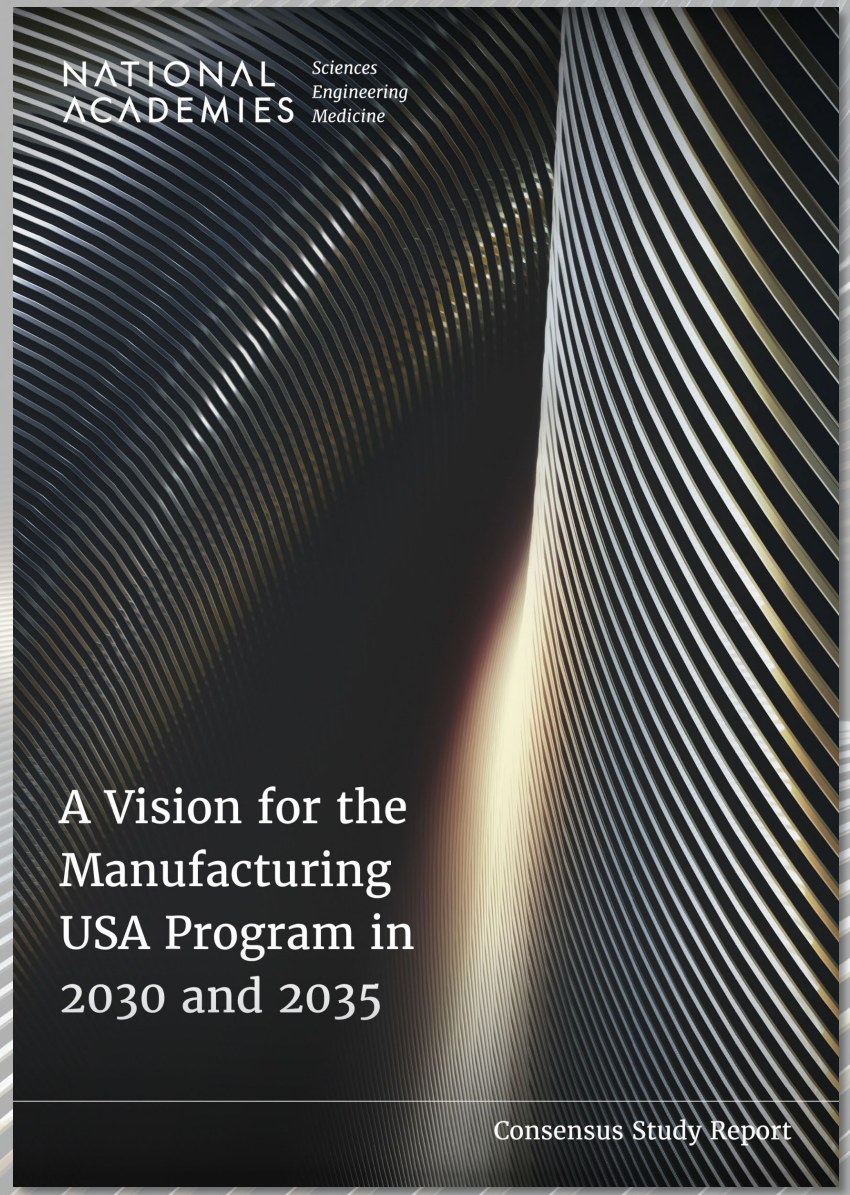

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Key Takeaways

The Manufacturing USA institutes have established important **manufacturing technology development programs**, supported significant advanced technology **R&D**, embarked on **innovative workforce education** efforts, and most importantly, supported the **growth of nascent manufacturing sectors**.

However, the Manufacturing USA program has been **under-resourced**, **limiting its potential for driving the scale and pace of systematic change** needed for U.S. manufacturing to reassume a leadership role.

The report recommends a coordinated **strategy for alignment and adoption of advanced manufacturing across agencies and organizations**.

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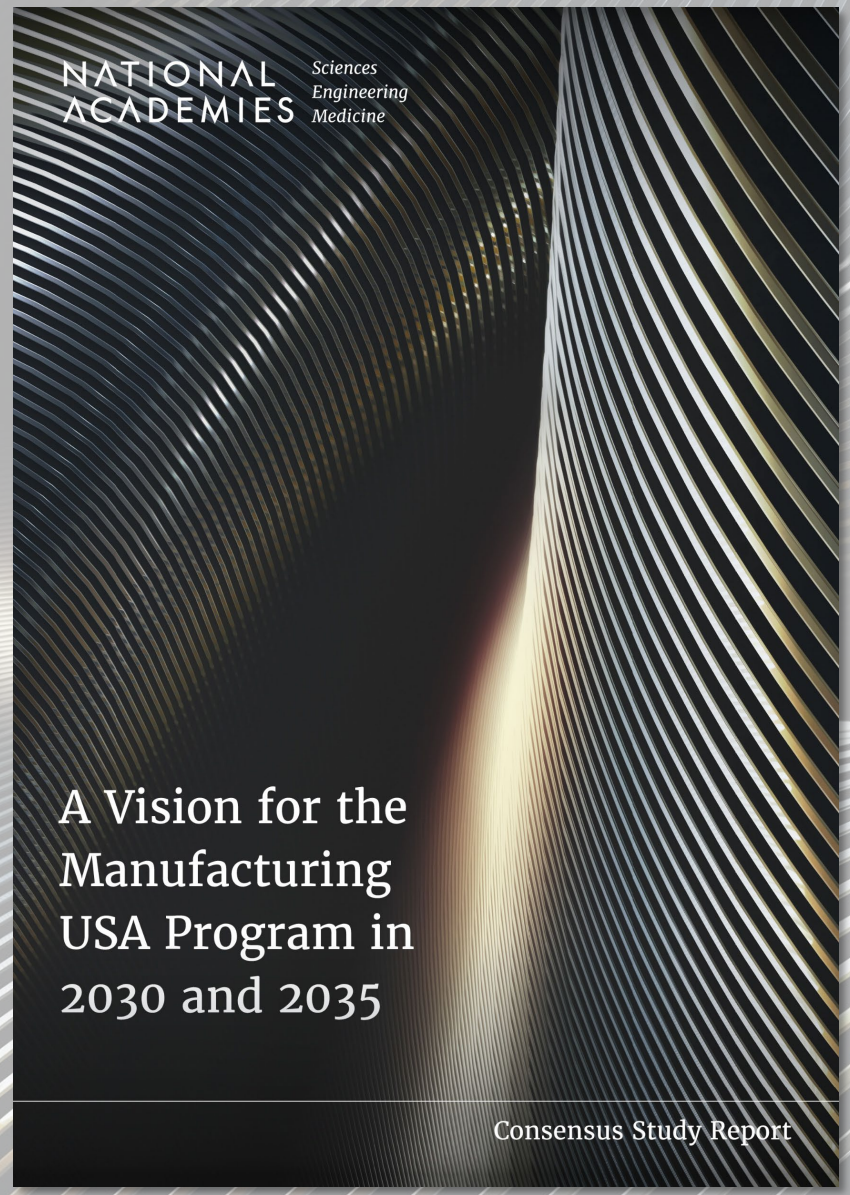

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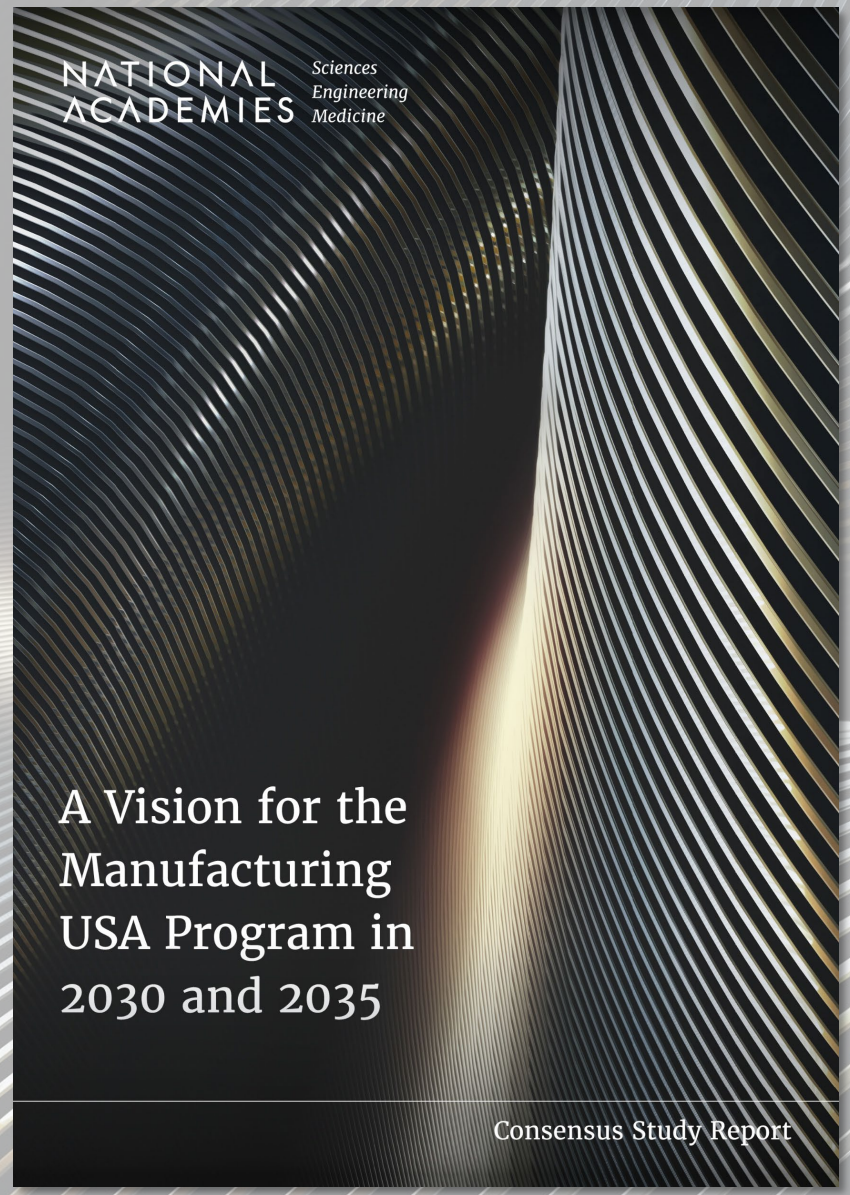
Key Takeaways

Go Bigger will Require

- ❑ New interagency governance & funding
- ❑ Business Development
  - Accelerate regional growth & development
  - Reach SMMs with new technologies, tools, and processes
  - Support entrepreneurship in manufacturing
- ❑ Deepen technology transfer & scaleup capabilities
- ❑ Expand workforce education



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About this Study

Informed by **international and domestic comparison benchmarking,** evaluate and analyze the mechanisms, effectiveness, and approaches of the institutes for—

- **technology transfer and scale-up** of new manufacturing technologies
- **interagency collaboration and cross-network coordination**
- **regional manufacturing ecosystems**
- **education and workforce development**

Recommend actions that AMNPO and the sponsoring agencies should implement by 2030 and 2035.

While the report notes current challenges, **the committee was tasked to develop a new vision for where the program should be in 2030 and 2035.** Hence, recommendations are **forward-looking.**

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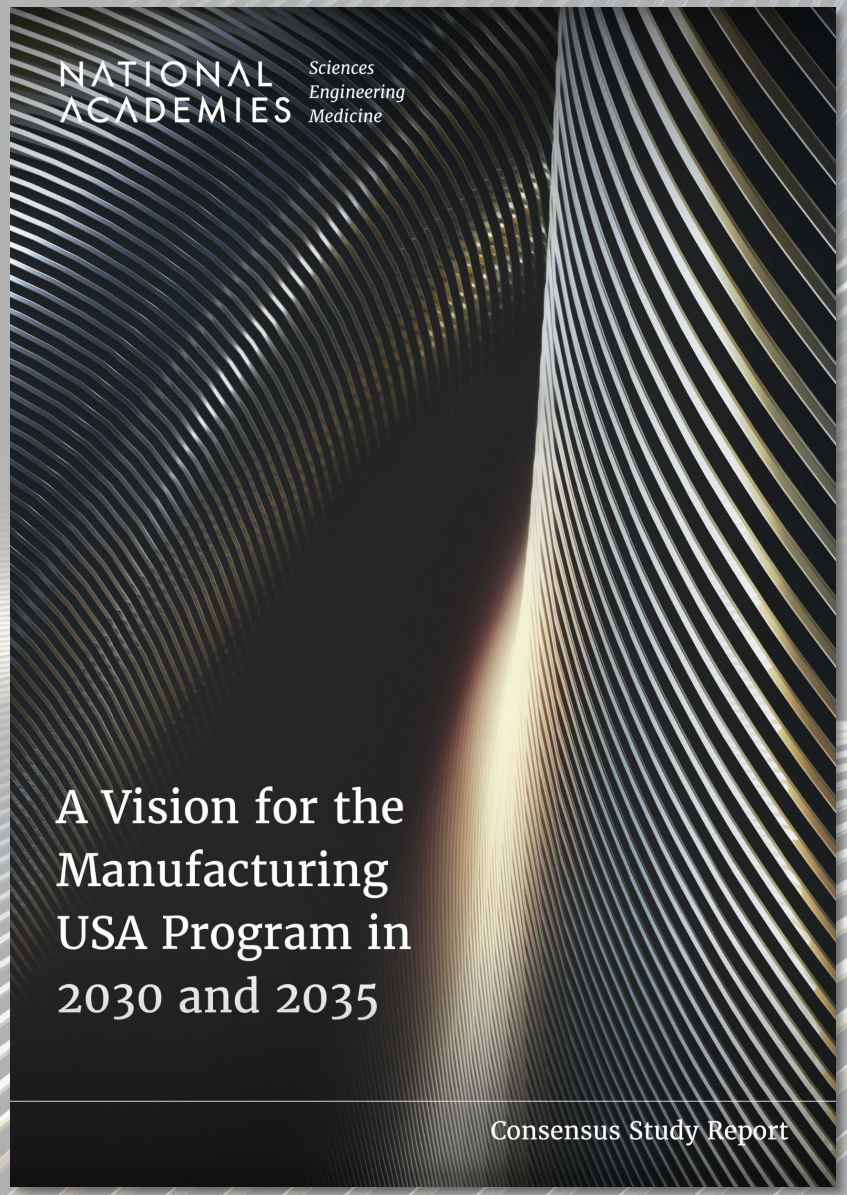

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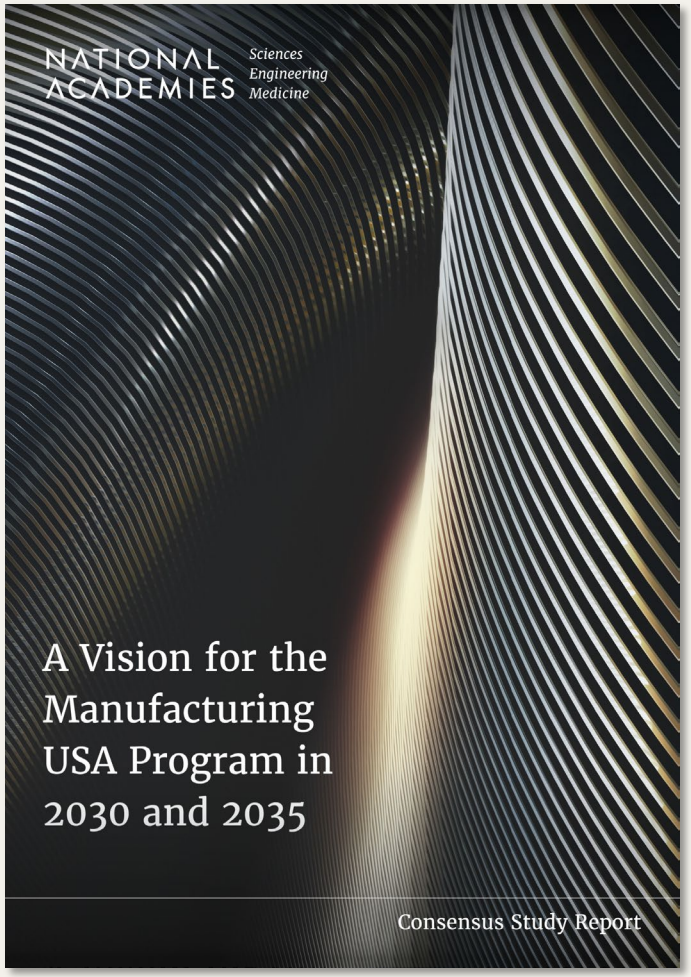

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Report Snapshot

- Summary
- 1: Introduction
- 2: International Program Comparison and Benchmarking
- 3: Technology Transfer and Scale Up
- 4: Cross-Institute and Cross-Agency Networking
- 5: Regional Economic Development
- 6: Workforce Education and Development
- 7: Vision for the Future
- 8: Study Recommendations

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Study Process and Information Gathering

- **38 closed sessions** for committee planning and deliberation
- **30 public meetings**, including **3 workshops** and **2 roundtables**
- Information gathering
  - Questionnaire sent to **institute directors**
  - Spoke with **96 experts across academia, government, and industry**, encompassing multiple perspectives
  - Site visit to the ARM Institute in Pittsburgh, PA
  - Virtual visit to NextFlex Institute and its key partners
- Report briefings to report sponsor, DOC/NIST, and institute sponsoring agencies—DoD and DOE; Congressional Staff

American Manufacturing Challenges

Economic Well-Being

Value chains that rely on manufactured goods account for **25% of U.S. employment**, **40% of U.S. GDP** and **80% of U.S. R&D**
– manufacturing is vital to the US economy.

China accounts for 31% of world manufacturing output and the U.S. 16%. The countries have **traded places** over 30 years.

COVID-19 pandemic and the Russia-Ukraine War underscored risks of weak manufacturing supply chains and resiliency.

Manufacturing was once a pathway to the middle class for those without college degrees, but that path has been significantly curtailed, and the rise in U.S. economic inequality has paralleled manufacturing decline.

The U.S. has fallen behind in advanced manufacturing. 2024 U.S. was ranked #10 in robotics.

U.S. Manufacturing Challenges

Missing **National Industrial Strategy**

- Our competitors have them, coordinated between industry, gov't agencies, universities

Our **financial model disfavors manufacturing** investment

- "Core competency" and "asset light" models disinvest in manufacturing
- There is a gap in governmental financing for manufacturing scale-up

Limited manufacturing R&D and Technology Development

- Disconnect between the US innovation system and manufacturing
- Government R&D for manufacturing is missing

Stagnating and declining productivity in manufacturing for 15 years

- signal of failure to innovate

Weak workforce education system

Current Challenges to Institute Model

No mechanism for ***interagency coordination***

- The 3 dept.'s operate separately, limits institute collaboration

Networking across institutes is limited

- But firms, especially SMMs, want integrated packages of technologies

Flawed self-sustaining 5-year funding model, ***limited resources***

- Bulk of funding on R&D and technical development
- ***Limited resources on workforce education, support of SMMs and regional manufacturing ecosystem development***
- ***Limited in-house pilot production and technical staff***

TRL 4-7 Constraints: *minimal bridging for lower & higher TRLs*

International Program Benchmarking

International Comparison

Country	Belgium	China	Germany	Japan	Singapore	Taiwan	United Kingdom	USA
Instiute Program Offerings	IMEC	MICs	Fraunhofer	METI	A*STAR	ITRI	Catapult	MFG USA
Standards Development								
Business Development								
SMM Service & Support								
In House Technical Staff								
In House Pilot Production Facilities								
Higher TRL Offerings								
Industrial Strategy								
Cross Disciplinary Strategies								
Role/ Influence Early TRL Funding								
Institute Financing Entrepreneurs								
Dedicated Scale-up Financing								
Rotating/ Permeable Technical Staff								
Foundational Technologies								

Key	
	Offers
	Offers at some institutes
	Does not offer

Industrial Policy Programs Aligned with Government Directives and Financial Systems

Recommendation 2-1

In concert with the National Security Strategy, the ***National Economic Council, the Office of Science and Technology Policy, the Department of Commerce, Department of Defense, Department of Energy and any other agencies supporting advanced manufacturing should convene and within the next 2 years issue a formal U.S. Industrial Strategy,*** integrating technology development, scale-up financing, standards leadership, trade, and workforce development to align resources and maximize the national impact of federal manufacturing programs, including Manufacturing USA institutes.

Successful Industrial Strategy Requires Investments

U.S. has gaps in government financing programs for TRLs 6–9 and scale-up

U.S. was ranked second to last in R&D tax credit support among 32 nations

Recommendation 2-2

By 2030, the United States ***Congress*** should take legislative action to ***define a globally competitive research and development tax credit*** for manufacturing processes and technologies and should actively explore expanding other tax reforms supporting manufacturing.

Targeted Tools for Financing Scale Up Using Multiple Investment Approaches

Recommendation 2-3

To address systemic capital gaps facing hardware-intensive technologies, the United States ***Congress***, working with relevant agencies, should, within the next 2 years, ***authorize funding and set policy to create new federal manufacturing and financing mechanisms that include patient-capital funds, a sovereign wealth fund with a strategic focus on manufacturing, intellectual property–backed lending programs, coordinated public–private guidance funds and other mechanisms.*** Manufacturing USA institutes should be formally integrated as advisors to manufacturing financing bodies, providing technical due diligence, scale-up roadmaps, readiness assessments, and first-of-a-kind validation data that de-risk future investments and inform investment decisions.

Competitor Nations Include Foundational Technologies and Capabilities as a Focus

Recommendation 2-4
Manufacturing USA **sponsoring agencies should immediately conduct a coordinated assessment to identify foundational manufacturing technologies** in which U.S. capabilities have eroded or are in danger of erosion relative to those of international peers. Within 2 years, agencies should either (a) **add foundational technology workstreams** to existing institutes or (b) **stand up new institutes** where critical gaps exist.

Leveraging the Institute Roadmaps for Standards Setting Priorities

Recommendation 2-5
The setting of standards is increasingly a geopolitical consideration; hence, within 2 years, Manufacturing USA institutes and the ***Advanced Manufacturing National Program Office should highlight the standards roadmaps*** that different institutes are generating, encourage the new National Institute of Standards and Technology–funded Standardization Center of Excellence to leverage these roadmaps, ***and obtain funding for actual standards writing*** as part of the institutes' projects.

Beneficial International Collaboration

Recommendation 2-6
With on-going sponsoring agency review and approval, starting in 2026, Manufacturing USA institutes should ***pursue structured collaborations with leading international manufacturing institutes in areas where complementary strengths exist***. These partnerships should focus on shared research, pilot-scale demonstration, standards development, and knowledge exchange that advances domestic technology transfer and scale-up.

Technology Transfer

Defining Technology Transfer in the Context of Manufacturing USA

Because institutes operate across diverse technological domains, they employ several readiness-level frameworks to measure progress toward application.

Each institute defines technology transfer differently according to its technology domain, end-use markets, and operational norms.

Recommendation 3-1

Within a year, each Manufacturing USA institute should ***define "technology transfer" in its roadmap with measurable milestones***. These should be updated annually and where possible aligned with existing Manufacturing USA performance metrics and reporting frameworks used by the Advanced Manufacturing National Program Office and sponsoring agencies.

Readiness Level Transitions

Differences in missions and stakeholder expectations lead to inconsistent decisions on when to hand off technologies for commercialization.

Recommendation 3-2
Within a year, each Manufacturing USA institute should specify and clearly and consistently ***document its initial and target readiness levels*** (Technology Readiness Level [TRL], Manufacturing Readiness Level, or Adoption Readiness Level, generally expressed as, XRL) ***and demonstrate and document transitions to TRLs 7–9 using consistent reporting metrics*** coordinated through the Advanced Manufacturing National Program Office. These should be updated annually.

Pilot and Scale-Up Facilities Serve as the Critical Bridge Between Lab Validation and Industrial Implementation

Many institutes face challenges in maintaining and upgrading equipment, funding skilled technical staff, and ensuring that these facilities remain accessible to SMMs are unevenly distributed across technology domains and regions.

Recommendation 3-3

Manufacturing USA institutes, in conjunction with sponsoring-agency support, should ***begin immediate planning and initial implementation of pilot-scale and scale-up facilities, with defined milestones and early operational capability established by 2030 and full-scale operations***, broadly accessible to small and medium – sized manufacturers, achieved by 2035. Implementation will require sustained federal funding and coordinated co-investment from industry and regional partners. Manufacturing USA institutes and such facilities should be supported through ***long-term, renewable federal sponsorship that reflects their role as enduring national manufacturing infrastructure*** rather than short-term projects, with periodic performance-based review rather than assumptions of self-sufficiency within a single award cycle.

Formalize Technology Transfer Teams

Institutes require teams with technical, business, and program-management skills to coordinate projects, engage partners, and manage the complex process of moving technologies into industrial use.

International models illustrate how **formalized transfer teams** contribute to sustained innovation. For example, embedding cross-functional teams directly within projects, ensuring continuity from research through commercialization. These organizations demonstrate the **importance of maintaining teams with both technical depth and strong industry experience to navigate the handoff between R&D and production** efficiently and consistently.

Recommendation 3-4

Within 2 years, Manufacturing USA institutes and the Advanced Manufacturing National Program Office should ***establish dedicated, well-staffed technology transfer teams and long-term staffing plans***, leveraging existing federal technology transfer expertise and programs where appropriate.

Technology Transfer Metrics

Metrics must balance near-term, leading indicators—such as the number of pilot projects launched, companies engaged, or technologies advancing through readiness levels—with long-term, lagging indicators, such as technology commercialization, job creation, export growth, and productivity gains.

Recommendation 3-5

Within 2 years, the Advanced Manufacturing National Program Office, with sponsoring agencies, should ***implement a standardized network-wide technology transfer metrics framework***. If necessary, Congress should consider clarifying statutory reporting authorities to enable consistent performance metrics across all Manufacturing USA institutes.

Technology Transfer Best Practice Office

Opportunities remain to expand AMNPO's leadership role in aligning institute practices, facilitating data sharing, and disseminating best practices.

The absence of a formalized structure for coordinating technology transfer efforts limits the potential for collective impact across the network.

Recommendation 3-6

Within a year, the Advanced Manufacturing National Program Office should ***establish a Technology Transfer Best Practices Office and formal cross-agency coordination mechanisms***, building on lessons identified in previous National Academies and GAO studies of Manufacturing USA institutes.

Interagency Collaboration and Cross-Network Coordination

Expanding Collaboration Opportunities

Formal policies, processes, and incentives for interagency collaboration that could provide synergistic benefits with broader, national impact are not built into the Manufacturing USA network.

Cross-institute collaboration faces the same barriers as interagency engagement: differing mission focuses, administrative barriers, insufficient funding and/or staff, limited technical overlap, and differing maturity levels of the institutes.

Recommendation 4-1
Within the next 2 years, Manufacturing USA institute-sponsoring agencies (currently Departments of Commerce, Energy, and Defense) should ***create an Interagency Council*** as a formal, overarching directive body to set an integrated strategy for the manufacturing institutes.

Reducing Administrative Barriers Across Agencies

Recommendation 4-2: The Advanced Manufacturing National Program Office, working with the Interagency Council and sponsoring agencies, should ***establish harmonized procurement, funds-transfer, intellectual-property, and data-management policies that enable seamless collaboration across agencies and institutes***. This effort should be undertaken in consultation with the United States Manufacturing Innovation Council, as appropriate, and aim for harmonized policies and processes by 2030.

Real & Perceived Barriers in Use of Funds and Collaboration

Additional funding beyond current levels is needed to enable a focus on integration of technologies across institutes that would provide broad and impactful capabilities and make them more accessible to SMMs.

Recommendation 4-3

By 2030, ***Congress should appropriate funding on par with comparable international programs*** to the Manufacturing USA institutes to ***create an interagency initiative that would competitively award dedicated funds to incentivize cross-institute collaboration*** by addressing grand challenges in manufacturing. A project source selection team should comprise representatives from the Departments of Commerce, Energy, and Defense to ensure broad applicability across mission spaces and alignment with national manufacturing priorities.

Coordinating with MEPs

The lack of cross-institute collaboration to develop integrated packages of advanced manufacturing technologies limits the ability of institutes to provide meaningful support to SMMs, a core Manufacturing USA constituency that has been slow in adopting advanced manufacturing.

Recommendation 4-4

The Advanced Manufacturing National Program Office should work with the Manufacturing Extension Partnership (MEP) program to create a process by 2030 that ensures that these integrated packages of advanced manufacturing technologies developed by institutes are disseminated to MEPs nationwide for implementation by small and medium-sized manufacturers.

Digital Manufacturing Across Manufacturing USA

Pervasive technological needs, integration points, and standards across digitally native manufacturing technologies which largely focus on horizontal technologies.

Recommendation 4-5
Within the next 2 years, the Advanced Manufacturing National Program Office, in coordination with the Interagency Council, should lead an interagency effort to ***develop a robust strategy specifically focused on digital manufacturing across the Manufacturing USA network***.

Enhance Interagency Engagement

Recommendation 4-6

Within the next 2 years, the Advanced Manufacturing National Program Office, in coordination with the Interagency Council, should **create a multiprong strategy that enhances use of the Manufacturing USA network's capabilities across federal and state government agencies and small and medium-sized manufacturers (SMMs), including coordination with the Manufacturing Extension Partnership (MEP)** network, and provides resources as to how agencies and SMMs can work with institutes to enhance interagency engagement.

Collaboration With National Labs

Barriers:

- Laboratories' requirement for cost reimbursement
- Lack of dedicated project funding available to the national laboratories to work with the institutes
- Terms and conditions in national laboratory management and operations contracts

Recommendation 4-7

Within the next 2 years, the Department of Energy (DOE) should work with national laboratories to ***explore modifying management and operations contractual agreements to be compatible with institute agreement terms and conditions***. Additionally, DOE should **make funding available** to national laboratories for the specific purpose of **collaborating with institutes** on DOE priority projects.

Model: High-Performance Computing for Advanced Manufacturing program

Regional Manufacturing Ecosystems

Sustaining Global Leadership Requires Robust Domestic Ecosystem

- **Assets are local**

  Each institute—working alongside regional development agencies—has a role in **taking stock of available regional assets** and **contributing to the establishment of additional capabilities**, the **repurposing of others**, and when gaps exist, **developing new proficiencies**.

- **Connecting assets requires local cooperative network**

  Cooperation can stall when there is missing information or when incentives are misaligned.

- **Local stakeholder buy-in is needed**

  Each manufacturing institute has a role in helping drive local employment and economic growth. Rooting the institute in the region, helps sustain the institute.

Institutes as Ecosystem Integrators

Key Challenges:

- Narrow focus on technical missions
- Missing strategic perspective & business development expertise
- Fragmented & subcritical funding structures
- Lack of skilled workforce & training resources

Need Dedicated Resources:

- Regional Economic Development
- Business Development
- Technology Transfer
- Scale-Up
- Workforce Development

Institutes as Ecosystem Integrators

Regional Business Development

Offices Should:

- Identify business growth opportunities & investment partners
- Connect small and large companies
- Engage with state & regional economic development officers
- Support new business development & entrepreneurship
- Provide technology adoption & business advisory services for SMMs
- Attract regional, as well as national & international investments to facilitate rapid scaling and dissemination of institute technologies
- Partner with philanthropic organizations
- Partner with universities
- Engage state and local governments
- Draw in private investments

Accelerating Domestic Adoption and Production of Institute-Developed Technologies

Recommendation 5-1

By 2030, Congress should provide sustained ***dedicated funding above current appropriations to establish business development offices*** at each Manufacturing USA institute to support commercialization, scale-up, and regional ecosystem integration for entrepreneurs and small and medium-sized manufacturers, working in coordination with regional economic development organizations and federal manufacturing programs.

As with workforce development, Advanced Manufacturing National Program Office could staff and support sharing business development best practices.

Education and Workforce Development

The Overall Manufacturing Workforce Education Problem

- **Transition from school to work U.S. problem**
  - Contrast: Germany, Austria, Switzerland – **apprenticeships missing**
  - H.S. diplomas not enough and **vocational H.S. largely ended**
  - Community Colleges underfunded, completion too low
- **Missing career path in manufacturing**
- **Weak labor market information system:**
  - Workers don't know what skills they need
  - Educators don't know what skills to educate for
  - Employers don't know what skills workers have
- **Missing curricula in advanced manufacturing**
- **No transferable skills certification system**
  - approved by industry in most manufacturing fields
- **Ed and Labor Dept programs are not aligned**
  - Labor Dept. : Programs focused on unemployed and underemployed, not upskilling,
  - Incumbent workers not reached
  - Education Dept.: Pell grant programs focused on degree-only programs

Institutes can play a role in addressing these problems

Broad Adoption of Best Practices for Education and Workforce Development

After a decade of program development many institutes have developed successful workforce education programs. Rather than offer one or two programs, the program offerings at each institute need to be expanded.

Recommendation 6-1

By 2030, Manufacturing USA institutes should adopt a **broad range of programs** to address workforce education needs in advanced manufacturing, **based on best-practice programs developed by various institutes**, including to develop **advanced manufacturing curricula**, develop **online education**, create **advanced manufacturing credentials**, support **workforce education delivery**, **collaborate across institutes**, and **broaden the manufacturing talent base**. These broadened programs should be executed in **collaboration with regional stakeholders**, such as area companies and education institutions, and should include efforts to **reach small manufacturers** with workforce education advisory services and training programs.

Unified Advanced Manufacturing Curriculum Across Institutes

Challenges:

Manufacturing institutes generally develop curricula in their particular technology areas.

However, manufacturers, particularly **SMMs, need curricula that cut across specific technologies** and provide more generalized advanced manufacturing

Community colleges don't have the resources to **develop advanced manufacturing curricula**.

Recommendation 6-2

Within approximately 2 years, agencies sponsoring the Manufacturing USA institutes working with the Advanced Manufacturing National Program Office should **network to develop a unified advanced manufacturing curriculum available online** that combines and unifies curricula and materials developed by institutes along with other successful education and workforce development programs. Supporting this, they should develop an outcomes measurement and a **credentialing system coordinated with industry and aligned with Manufacturing USA workforce metrics and programs**.

Develop the Technologist Career Pathway

A "technologist" fills the gap between engineers and technicians and is oriented toward the new skill sets required for integrating advanced manufacturing systems into the production process.

- A new career path is needed to run a factory floor as a system not as isolated equipment and tasks.
- A new career path is also needed to draw talent into manufacturing.

Recommendation 6-3

By 2030, Manufacturing USA institutes should ***implement new technologist curricula,*** *such as the Department of Defense's Industrial Base and Sustainment funded pilot projects*. They should work toward implementing it ***in cooperation with regional partners in industry and community colleges*** and, if deemed appropriate, incorporate it into the recommended Manufacturing Academy.

Catalyze Cross-Agency Partnerships at Depts of Labor and Education and NSF

Manufacturing institutes are helping fill a **gap in the workforce education** system largely **not met by** existing programs at the **Departments of Labor** (focus on underemployed) **and Education** (focus on college education). However, programs at these agencies can help boost and scale institute efforts.

Recommendation 6-4

The White House Office of Science and Technology Policy and the Domestic Policy Council should convene a cross-agency workforce education project and **implement within the next 2 years a strategy to coordinate efforts across agencies to enhance Manufacturing USA institute and other agency manufacturing education programs**. This would include relevant programs at the three institute-sponsoring agencies (currently Departments of Commerce, Defense, and Energy), as well as at the Departments of Labor and Education and the National Science Foundation's Advanced Technological Education Program.

Help Foster Apprenticeships

- To tackle the fundamental ***work–learn divide in U.S. education, apprenticeships*** are a key answer.
- Manufacturing ***institutes, which can bring together groups of regional employers with community colleges,*** are well positioned to help enable manufacturing apprenticeships, also providing curricula and support certifications in advanced manufacturing skills.

Recommendation 6-5

Given the need for apprenticeships in manufacturing, and especially to enable the scale-up of advanced manufacturing, within the next 2 years, Manufacturing USA institutes should ***become active promoters and enablers of manufacturing apprenticeships*** as part of their regional engagements.

Form an Advanced Manufacturing Academy Using Online Education and XR/AR/VR

The current workforce education system is limited in the numbers it can reach and has been slow to adopt education for incumbent workers or for advanced manufacturing technologies and processes.

Recommendation 6-6

A collaboration across Manufacturing USA institutes enabled by the proposed Interagency Council and the National Institute of Standards and Technology's Advanced Manufacturing National Program Office should build out a ***robust online Manufacturing Academy portal of advanced manufacturing online courses and programs.*** By 2030, the online portal should **include simulations, virtual reality, and augmented reality material,** developed by manufacturing institutes. The online portal should include materials and links from other verified sources, as well as new material.

Model: SME's Tooling U provides extensive manufacturing curricula in a wide range of manufacturing skills

Vision for the Future

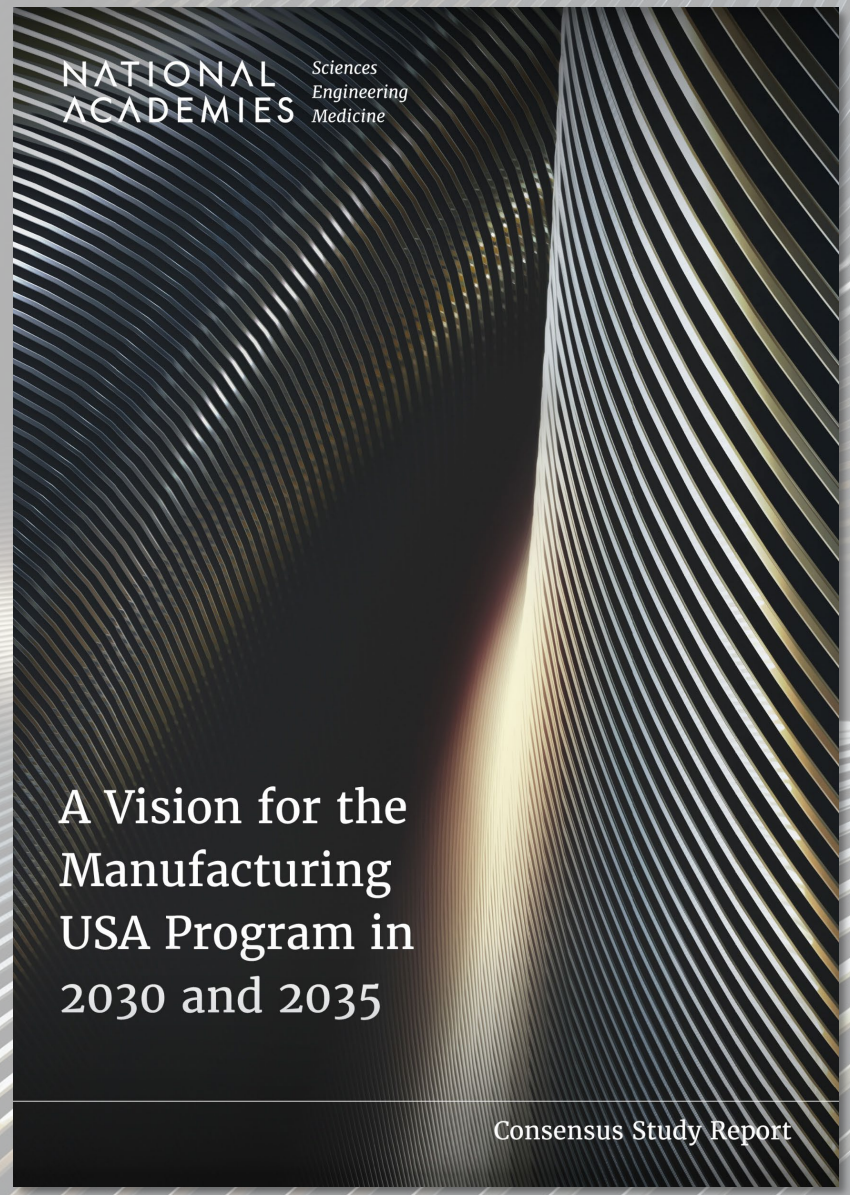
Key Takeaways – Vision for the Future

Manufacturing USA Proven Model

- Established important manufacturing technology development programs
- Supported significant advanced technology R&D
- Embarked on innovative workforce education efforts
- Supported growth of nascent manufacturing sectors

Go BIGGER!

- US manufacturing challenge is huge
- Opportunity to reimagine the program to provide additional scale and national impact



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Long-Term Vision for Manufacturing USA

- Manufacturing USA institutes serve as reliable & sustainable institutional anchors enhancing regional capabilities to innovate and scale up a variety of technologies that advance regional economic development & employment.

- The network of these locally focused efforts collectively contributes to the nation's competitiveness and national security objectives.

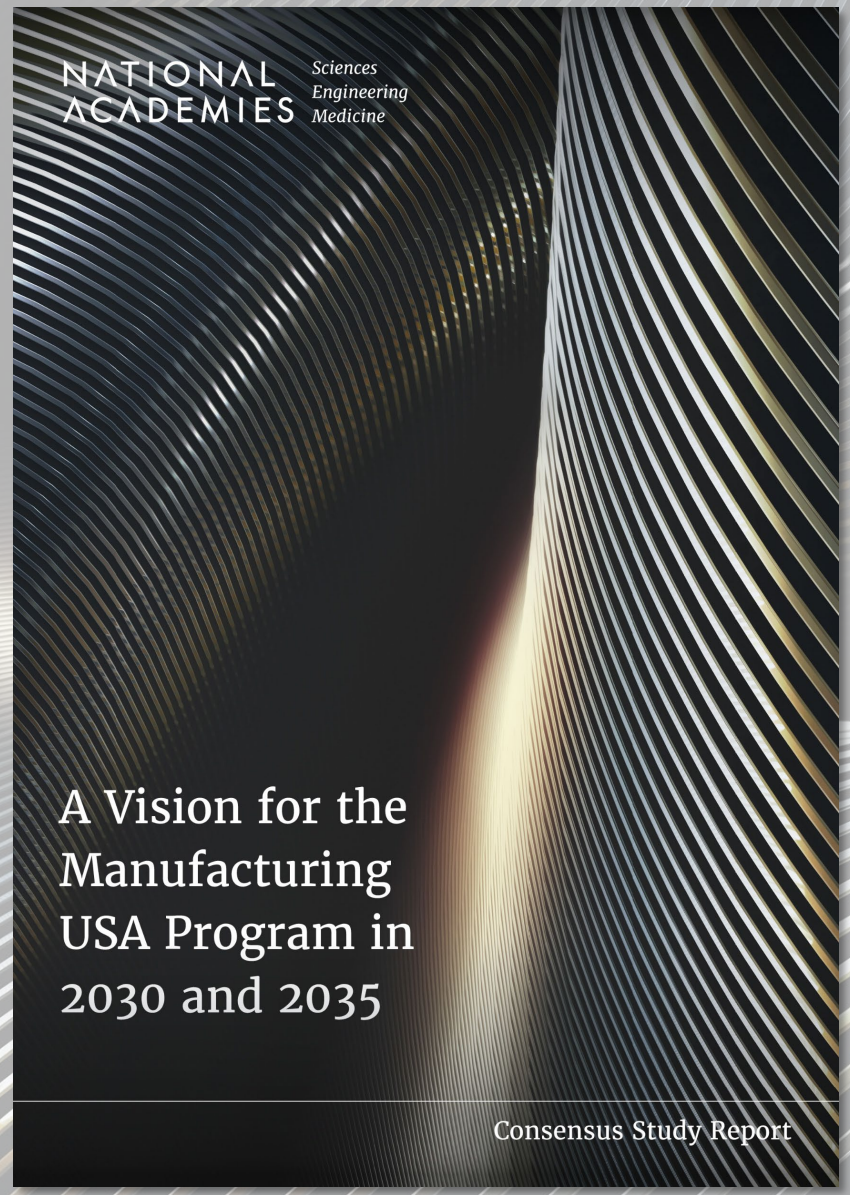
- Success depends on sustained efforts over the long term and at sufficient scale.

Key Takeaways – Vision for the Future

The current federal sponsorship model for Manufacturing USA institutes, particularly its **reliance on 5-year award cycles and uniform cost-sharing expectations, does not meet the requirements** for manufacturing scale-up, pilot-scale infrastructure, coalition-based technology development, and workforce development.

Nearly all leading competitor nations have advanced manufacturing strategies aligned to their economic strategies. Although the United States has in recent years moved manufacturing near the top of its policy agenda, it has no overall **manufacturing industrial strategy. It needs one!**

Institutes cannot remain stove-piped. Manufacturing USA needs an overarching strategy. **A new Interagency Council shared between the agencies** supporting the institutes is now needed to undertake this strategy & develop institute collaboration.



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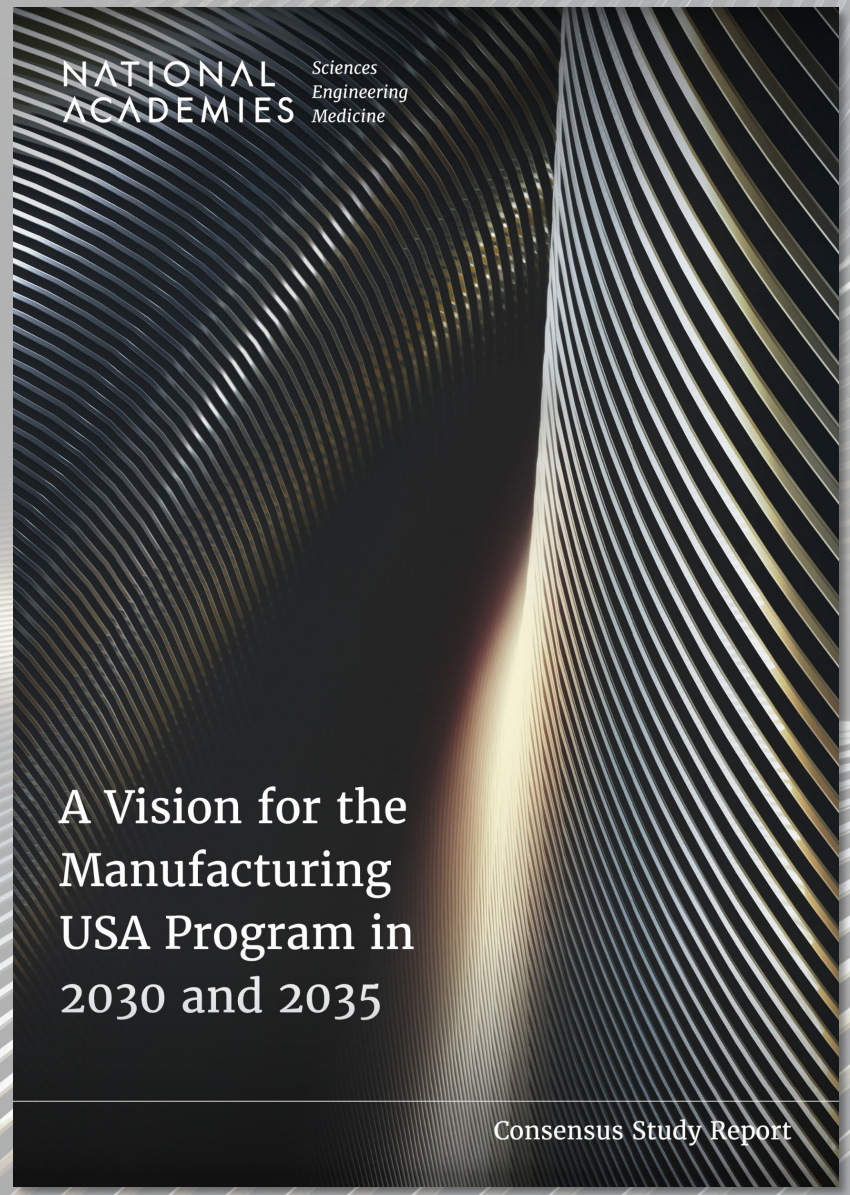
Key Takeaways – Vision for the Future

Institutes have lacked the resources for significant outreach to the SMM "Main Street" manufacturing firms. Institutes need to provide **technology adoption and business development advisory services for SMMs**, working with them to identify productivity and efficiency savings from the advanced manufacturing technologies that best fit their processes.

In addition to providing **facilities** for testing, demonstration, validation and pilot production, institutes can also **support entrepreneurship** in manufacturing by providing business development and advising services.

Institutes need to continue late-stage technology development (TRL 4-7), and when warranted, go further into technology demonstration and pilot production testing—**reaching TRL 4-9, effectively crossing over the so-called valley of death**.



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Key Takeaways – Vision for the Future

To make an impact, Manufacturing USA institutes must be **engaged in the regional manufacturing economies** in which they operate. Dedicated business development resources are needed.

Multiple best-practice workforce programs developed at institutes need to be adopted along with the new **"technologist"** curriculum to create a new manufacturing career path between engineers and technicians trained in adopting advanced manufacturing.

Unified advanced manufacturing curricula that cuts across specific technologies is needed. Institutes working with AMNPO should network to develop this and make it available **an online,** ultimately creating the **Advanced Manufacturing Academy** for workforce education.

Collaboration with companies and community colleges is important for devloping **apprenticeship programs**, which offer a strong entry pathway.

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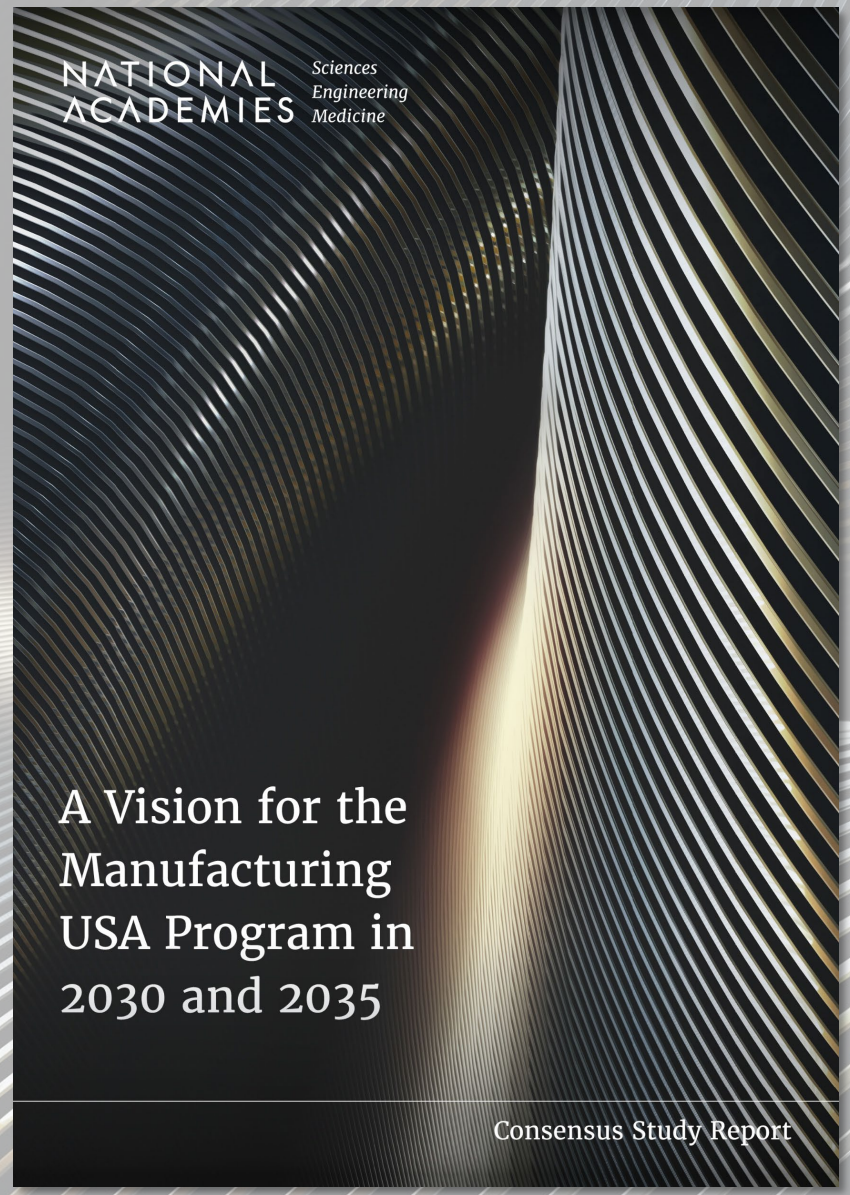

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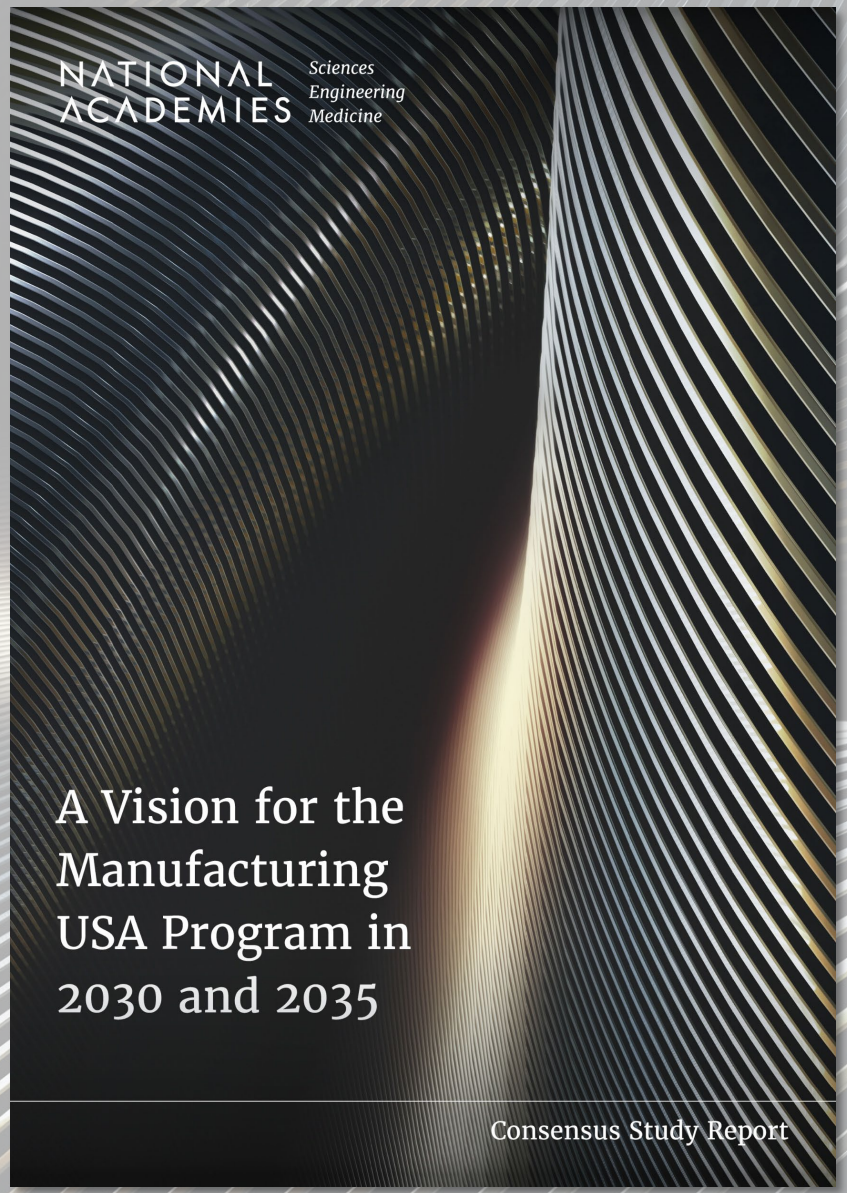
Key Takeaways – Vision for the Future

Digital manufacturing technologies are pervasive. A **strategy focused on digital manufacturing** across the Manufacturing USA network is needed. AMNPO should lead this effort.

A new level of both **cross-agency and cross-institute collaboration** is needed. This will require cross-agency leadership from the Interagency Council, supported by AMNPO.

Congress should appropriate **funding** on par with comparable international programs to create an interagency initiative that would **competitively award** dedicated funds to **incentivize cross-institute collaboration** by addressing **grand challenges in manufacturing.**



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Key Takeaways

Go Bigger will Require

- ❑ New interagency governance, funding & cross-institute collaboration
- ❑ Business development
  - Accelerate regional growth & development
  - Reach SMMs with new technologies, tools, and processes
  - Support entrepreneurship in manufacturing
- ❑ Deepen technology transfer & scaleup capabilities
- ❑ Expand workforce education programs

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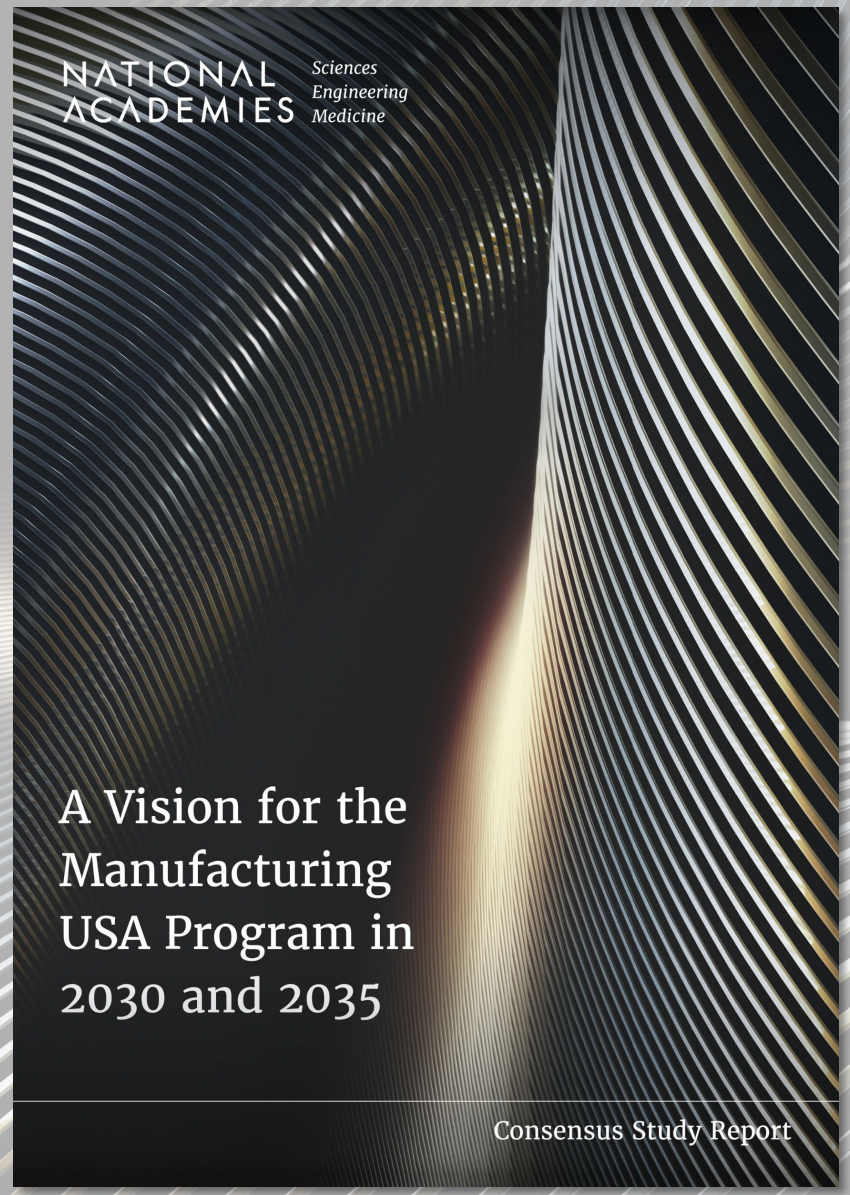

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A Vision for the Manufacturing USA Program in 2030 and 2035

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