

December 15, 2025

Ms. Stacy Murphy
Deputy Chief Operations Officer/Security Officer
The White House Office of Science and Technology Policy (OSTP)

Re: Comments on Notice of Request for Information; National Strategic Plan for Advanced Manufacturing (FR-2025-11379, Document Number: NIST-2025-0004)

Dear Ms. Murphy:

The National Defense Industrial Association (NDIA) appreciates the opportunity to provide comments on the request for information on the development of the National Strategic Plan for Advanced Manufacturing (“Plan”) by the National Science and Technology Council (NSTC).

NDIA is the nation's oldest and largest defense industry association, representing over 1,450 corporate and over 67,000 individual members from small, medium, and large contractors, a majority of which are small businesses. NDIA members design, manufacture, apply, and maintain the cutting-edge technologies, systems, and platforms that our armed forces rely upon, and our views reflect the complexity of the issues under discussion.

There are key differences between the commercial and defense manufacturing sectors that have influenced the NDIA response. First and foremost, the primary customer of the defense industry is the U.S. Government, primarily the Department of War (DoW). Government programs, budgets, regulations, and policies highly influence how the defense manufacturing considers capital investments in advanced manufacturing. Increasing adoption of advanced manufacturing in the defense sector will require more partnership between government and industry rather than transactional relationships defined solely through supply and service contracts.

Our members’ responses to OSTP’s specific questions begin on the next page.

Responses to Specific Questions

1a. Which emerging science and technology areas (e.g., artificial intelligence) will be key to the next generation of innovative advanced manufacturing technologies, and how will they impact advanced manufacturing?

To secure U.S. leadership, the nation must innovate across multiple foundational fronts. Key areas include:

- **Advanced Materials and Processes.** Innovation in lightweight alloys, bio-derived polymers, nano-engineered composites, and materials for extreme environments (e.g., hypersonics) is essential. Accelerated materials discovery, augmented by artificial intelligence (AI) and quantum computing, will significantly shorten development and scale-up timelines from the current decades and reduce dependency on scarce resources.
- **Artificial Intelligence, Autonomy, and Machine Learning (ML).** AI/ML will enable "intelligent production" through predictive maintenance, automated quality control, generative design, and optimized logistics. For AI-driven optimizations to be trusted, manufacturers must have absolute confidence in the integrity of their underlying operational technology (OT) data and control logic.
- **Advanced robotics** will be central to creating more autonomous and flexible factory floors. Advances in sensing, actuating, and controls are needed to make robots more adaptable and to increase human and robot collaboration in manufacturing.
- **Microelectronics, Packaging, High-Density Printed Circuit Boards, Integrated Photonics, and Flat Panel Displays.** Re-establishing domestic leadership in these areas is critical for all advanced systems. These technologies are foundational to computing, sensing, communications, and human-computer interfaces. Beyond reshoring existing capabilities, positioning U.S. manufacturers to gain next-generation market share will depend on technology advances.
- **Cyber-Physical and Networked Systems.** Integrating edge computing, real-time sensing, digital twin technologies, and next-generation wireless (**FutureG**) will enable adaptive, autonomous manufacturing systems. These smart systems will empower manufacturers to rapidly optimize processes, reduce energy consumption, and respond dynamically to disruptions.
- **Advancement of software-defined manufacturing and cyber-physical infrastructure,** including integrating edge computing, real-time sensing, and AI-enabled digital twin technologies to enable adaptive manufacturing processes, facilities, and supply chains. These smart systems will empower manufacturers to rapidly optimize processes, reduce energy consumption, and respond dynamically to supply chain disruptions. This also includes:

- **Interoperable manufacturing data architecture.** The ability to collect, share, and act on industrial data securely across platforms and suppliers is vital for productivity, resilience, and cyber-resilience. This includes investment in machine-readable standards, consensus-based data governance protocols, post-quantum encryption, and industrial cybersecurity solutions that protect OT environments.
- **Industrial DevOps & Automated System Recovery:** As factory floors become more software-defined, the ability to rapidly recover control system logic (PLCs, robots, SCADA) after a failure or cyber-attack is paramount to ensuring uptime.
- **Git-Based Version Control for OT:** This provides an auditable trail of all changes to control processes, securing intellectual property (IP) and enabling rapid error identification.
- **Technology for Managing IP.** This area includes Distributed Ledger Technology (DLT) and Blockchain Technology. DLT supports encrypted selective disclosure, letting companies prove compliance or origin without exposing full proprietary data, boosting participation in federal programs. Blockchain Technology offers granular data property controls, enabling companies to safely leverage, license, and monetize innovations, encouraging broader industry adoption and investment.
- **Biotechnology and Biomanufacturing.** Leveraging synthetic biology to produce novel materials, chemicals, and sustainable energy sources offers a transformative path to a circular bioeconomy and reduced reliance on foreign supply chains.
- **Space Technology.** On-orbit and in-space manufacturing will be critical for future space exploration and defense by reducing launch costs and simplifying logistics.
- **Use-Inspired Basic Research.** Federal funding should incentivize convergence research that integrates the above fields. Aligning breakthrough science with scalable manufacturing pathways is essential for ensuring the U.S. is not only an innovator but also the world's most agile producer.

1b. What are the primary challenges and barriers that need to be addressed to ensure the successful integration and widespread adoption of emerging technology in manufacturing?

- **R&D Investment.** The U.S. must prioritize R&D in cross-cutting technologies like AI, quantum, and biomanufacturing. Investment should focus on bridging the mid-range technology readiness levels (TRLs 4–7) where innovations often stall, particularly for small and medium-sized manufacturers (SMMs).

- **Technical Barriers.** A lack of interoperability between legacy and emerging platforms, fragmented data ecosystems, and poor data quality hinder progress. Integrating legacy Programmable Logic Controllers (PLCs) with cloud-based AI solutions is a prime example.
- **Policy and Regulatory Barriers.** Ambiguities in IP and data rights frameworks, coupled with slow regulatory pathways for new technologies, create uncertainty and disincentivize adoption.
- **Infrastructure Gaps.** Challenges include limited access to secure computing resources, high capital costs for new equipment like robotics, underdeveloped regional production hubs, and a skills gap for technicians trained in traditional manufacturing skills and new skills, such as AI.
- **Cybersecurity and IP Threats.** The expanding cyber-attack surface created by AI systems makes manufacturing OT systems increasingly vulnerable. Ransomware attacks can be devastating for a small manufacturer. In addition, companies are reluctant to share proprietary data that may be disclosed to competitors. Government can help embed IP protections into manufacturing platforms and de-risk deployment for smaller firms.
- **Workforce Development and Training.** Defense manufacturing facilities are often located in economically depressed or rural locations. There needs to be a match in skills and positions for engineers and technicians, including training in advanced technologies such as automation.

2a. Which disruptive manufacturing technologies (e.g., additive, nanotechnology, biotechnology) hold the potential to eliminate reliance on foreign sources for critical minerals and materials, and how will they do that?

Several technologies offer transformative potential to reduce dependency on foreign critical materials:

- **Additive Manufacturing.** Also known as 3D printing, additive manufacturing enables localized production with minimal waste. It can utilize recycled metals like titanium and aluminum, reducing demand for newly mined materials. Additive manufacturing also allows for on-demand, decentralized production, which is vital for defense and aerospace.

- **Synthetic Biology and Biomanufacturing.** Engineered microbes can be designed to biosynthesize high-value chemicals, rare earth element substitutes, and biodegradable polymers at scale, offering a sustainable alternative for material production.
- **Advanced Materials.** New alloy formulations can be designed using integrated computational materials engineering approaches to replace critical materials in alloy formulations, reducing dependence on foreign sources. AI can be used to down select material chemistries based on factors like cost, availability, and performance, which can help identify alternative materials that are more readily available domestically.
- **Nanomanufacturing.** By manipulating matter at the atomic level, technologies like carbon nanotube-reinforced polymers can match or exceed the strength of traditional metal alloys without relying on scarce minerals.
- **Distributed Ledger and Blockchain Technology.** DLT can be used to track and validate new materials, automate compliance for recycled materials, and incentivize domestic sourcing through programmable smart contracts.
- **Other Technologies.** Desktop forging, "urban mining" to reclaim strategic materials from existing stockpiles, and repurposing technologies like the automotive GIGA Press for defense applications (e.g., producing large-caliber shells) could dramatically increase domestic capacity.

2b. What are the technical challenges and barriers associated with implementing these technologies at an industrial scale, and how can they be addressed?

Scaling these technologies faces significant barriers:

- **High Capital Costs.** The "valley of death" between lab-scale innovation and commercial production (TRL 4-7) remains a persistent challenge. Shared pilot lines, such as those operated by Manufacturing USA institutes, can provide critical infrastructure and de-risk scale-up efforts. Financial assistance from programs like the Department of Energy (DOE) Loans Office or DoW Office of Strategic Capital (OSC) can also help.
- **Lack of Standards.** The absence of universally accepted standards for process validation, quality assurance, and material certification hinders widespread adoption, especially in highly regulated sectors like aerospace and defense. In additive manufacturing, the certification of printers, feedstocks, and parts for critical applications has been a long-term barrier.

- **Materials and Supply Chain Limitations.** Challenges include both offshore dependencies and inherent limitations on domestic supply chains, such as the slow throughput of 3D printing compared to traditional casting or the seasonal variability of biomass feedstock for biotechnology. The U.S. needs to incentivize a domestic recycling industry for strategic materials.
- **Talent Gap.** There is a pronounced shortage of workers skilled in both traditional and new manufacturing disciplines, ranging from welding to synthetic biology, process engineering, and nanoscale characterization. Federal, state, and local investments, in partnership with industry, are needed to promote cross-disciplinary training, apprenticeships, and stackable credential pathways.

3a. What should be the near-term and long-term technology R&D priorities for advanced manufacturing, reasons for those priorities, key objectives based on those priorities, the timeframe for achieving objectives, and the metrics for assessing progress toward the objectives?

- **Near-Term (1–3 years):** Prioritize optimizing existing infrastructure and embedding intelligence into current systems. Focus on AI for predictive maintenance and dynamic scheduling, AR/VR for workforce training, advanced sensors, strengthening OT cybersecurity, and promoting modular manufacturing platforms.
 - **Objectives:** Fully adopt commercial practices to reduce maintenance costs by incorporating edge-deployed neural networks and AI-enabled predictive maintenance tools to reduce unplanned downtime.
 - **Metrics:** Reductions in lead time and cycle times, lower defect rates, increased mean time between failure (MTBF), and faster times for product changeover or deployment of new production lines.
- **Long-Term (5–10 years):** R&D should emphasize automated manufacturing systems, clean and bio-based production, scalable quantum simulation for materials discovery, and fully closed-loop, AI-driven supply chains.
 - **Objective:** Within 10 years, DoW should be able to fully leverage advanced manufacturing from commercial products, including:
 - Advanced Materials
 - Robust domestic supply chain
 - AI-augmented, autonomous manufacturing
 - End-to-end connectivity
 - In-Situ Measurement (ISM)

- **Metrics:** Percentage of materials sourced from recycled or bio-based inputs, level of manufacturing autonomy, and reduction in supply chain risk scores.

3b. What are the major technical challenges to achieving the priorities identified in response to 3a, and how can they be mitigated to ensure timely progress?

Key challenges include data interoperability, legacy system constraints, insufficient testbeds for high-risk R&D, and the high cost of scale-up for SMMs. Many manufacturing facilities lack the sensor integration needed for AI deployment. Fragmented standards and inconsistent data formats also delay innovation.

These can be mitigated by creating federal open-data platforms, using modular systems to upgrade legacy equipment, expanding access to Manufacturing USA institutes as national testbeds, and providing demonstration funding for SMMs.

4a. What are examples of U.S. manufacturing-related technological, market, or business challenges that may best be addressed by public-private partnerships and are likely to attract both participation and primary funding from industry?

Public Private Partnerships (PPPs) are ideal for addressing complex, capital-intensive challenges that neither sector can solve alone. Key areas include:

- **Bridging the "Valley of Death" (TRLs 4–7).** Manufacturing USA institutes, like America Makes, MxD, and CESMII, provide shared testbeds for validating innovations before full-scale commercialization, attracting industry funding while leveraging federal support.
- **Supply Chain Resilience.** PPPs can develop shared data platforms and risk assessment tools that benefit entire industries.
- **AI Validation and Trust.** Government-facilitated consortia can establish standardized benchmarks and testing environments for manufacturing-specific AI, building trust in its use for mission-critical processes.
- **Workforce Development:** Addressing advanced manufacturing workforce development and recruitment needs.

4b. How can public-private partnerships be structured to overcome potential hurdles and foster successful collaboration?

Effective PPPs require transparent governance, equitable IP and data-sharing agreements, and sustained funding. Key structures include:

- **Flexible IP Frameworks.** Adopting standard commercial licensing terms and allowing for equitable IP and data-sharing agreements encourages participation, especially from SMMs.
- **Shared Digital Infrastructure.** Using secure cloud platforms and common data standards reduces duplication and promotes interoperability.
- **Diverse Funding Models.** Combining SBIR Phase III funding, Other Transaction Authorities (OTAs), and state-level matching grants can scale innovations with speed and agility. In cases where the government is a customer, R&D funding (such as DoW ManTech) and purchase commitments can help attract private sector investment. Connections to other Federal programs (such as the DoW's Office of Strategic Capital, the Defense Production Act (DPA) Title III program, and the DOE Loans Program Office) can also help attract outside capital.
- **Industry-Led Consortia and Embedded Academics.** DoW and other Federal agencies sponsor over 30 OTA consortia, many of which focus on advanced manufacturing. These consortia have been successful in attracting non-traditional suppliers to take an interest in government technology programs. Additionally, academic consortia such as the Systems Engineering Research Center (SERC) and the MIT-Watson collaboration ensure direct industry relevance and access to cutting-edge research.

5a. How can Federal agencies and federally-funded R&D centers supporting advanced manufacturing R&D facilitate the transfer of research results, intellectual property, and technology scale-up into commercialization and manufacturing to benefit all Americans and ensure economic and national security?

Federal agencies can accelerate technology transfer by:

- **Scaling Entrepreneurial Programs.** Replicating programs like DARPA's Embedded Entrepreneurship Initiative, which pairs technical researchers with market experts early on, can improve commercial alignment.

- **Establishing Tech Hubs.** Creating shared Technology Integration and Demonstration Hubs near industry clusters can provide neutral ground for validating scale-up and de-risking private investment.
- **Modernizing Licensing Frameworks.** Standardizing tiered licensing agreements, streamlining Cooperative Research and Development Agreements (CRADAs), and increasing the use of non-exclusive licenses can reduce friction and expand innovation.
- **Creating "Tech-to-Market" Fellowships.** Programs like Cyclotron Road support innovators in translating research into viable products.
- **Implementing Acquisition Reforms.** Reduce non-commercial practices and compliance requirements that make government contractors less commercially efficient and competitive.

5b. What are the key challenges in translating research findings into commercially viable manufacturing processes and products, and how can they be overcome?

Persistent challenges include regulatory inertia, insufficient scale-up infrastructure, and a disconnect between technology readiness and market readiness. Long timelines for securing an Authority to Operate (ATO) for new software can stifle agile iteration.

Overcoming these requires translational funding mechanisms that span the "middle corridor" between basic research and product launch, such as expanding NSF's Partnerships for Innovation (PFI) program. Development contracts should deliver immediate manufacturability. Using models like NSF's I-Corps nationally can help bridge the gap between university R&D and manufacturer needs.

6a. What are the main challenges in attracting, training, and retaining a skilled workforce for advanced manufacturing, and how can they be addressed?

The primary challenges are aligning educational pipelines with the rapid pace of technological change and overcoming an outdated perception of the industry. The defense industrial base (DIB) struggles to compete with the commercial tech sector for STEM talent due to compensation gaps and lengthy security clearance processes. There is also a national shortage of skilled tradespeople like welders and machinists.

A robust national campaign is needed to rebrand manufacturing as a dynamic, high-tech career destination. The Navy's advertising campaign to expand the submarine

manufacturing workforce is a good example, as is the Danville, VA, center for Accelerated Training in Advanced Manufacturing.

6b. How can Federal agencies and federally-funded R&D centers develop, align, and strengthen all levels of advanced manufacturing training, certification, registered apprenticeships, and credentialing programs?

Federal agencies should partner with industry to lead the creation of a unified, interoperable credentialing framework. This system should support lifelong learning and skill portability, managed through AI-based skill assessment tools and blockchain-secured digital credentials.

The Departments of Labor, War, and the NSF should co-develop a standardized curriculum that integrates emerging technologies. R&D centers should host immersive training residencies, and apprenticeship models should be modernized to include hybrid learning and VR simulations, with an emphasis on reaching underrepresented communities.

7a. In what ways can the Federal government assist in the development of advanced manufacturing clusters and technology hubs nationwide, beyond funding needs?

Beyond funding, the government can:

- **Act as a Convener.** Bring together industry, academia, and local government.
- **Leverage Procurement Power.** Serve as a predictable "anchor customer" to support a cluster's focus area.
- **Provide Access to Resources.** Offer access to federal labs and high-performance computing.
- **Offer Regulatory Flexibility.** Streamline permitting and compliance to cut approval times for new facilities and technologies.
- **Strengthen Supply Chains.** Promote portable, national digital credentials for workers to ease talent mobility between regions.
- **Increase accessibility:** Expand training availability with grants and scholarships.

7b. Is there a need for new or expanded advanced manufacturing clusters or technology hubs for the competitiveness of U.S. manufacturers, and if so, in what sectors or technologies?

Yes, the U.S. urgently needs to expand clusters in emerging sectors to maintain strategic autonomy. Key areas include:

- **Semiconductor Packaging and Heterogeneous Integration:** While recent CHIPS Act funding supports fabrication, a parallel investment in advanced packaging and testing capabilities—particularly in midwestern and southern states—can close a critical gap in the semiconductor supply chain.
- **AI-Enabled Materials Science:** Clusters dedicated to autonomous experimentation and machine learning-driven discovery of polymers, alloys, and nanomaterials could accelerate innovation in energy, defense, and aerospace.
- **Quantum Manufacturing Ecosystems:** Establishing hubs focused on cryogenic systems, photonics, and superconducting materials will be essential as quantum computing transitions from lab to deployment.
- **Circular and Sustainable Manufacturing:** Clusters that integrate industrial symbiosis principles—where waste streams from one industry serve as inputs for another—can support decarbonization and resilience.
- **Regional Needs:** Target underserved regions with tech hubs to connect talent and reinforce domestic supply chains.

7c. Should Federal incentives prioritize industry-specific advanced manufacturing clusters or instead focus on technology hubs centered on advanced technologies, critical components, and materials? If so, why?

Federal incentives should prioritize **technology-centric hubs** (e.g., focused on AI, additive manufacturing, quantum sensing) over industry-specific clusters. This approach maximizes cross-sector innovation and economic spillover, as foundational technologies can be applied across defense, energy, healthcare, and transportation. Technology hubs enable faster knowledge transfer and build more resilient ecosystems that are not tied to the fate of a single industry.

8a. What are the primary vulnerabilities and weaknesses within the current domestic supply chains?

- **Foreign Overreliance.** The U.S. depends heavily on foreign sources for critical minerals, pharmaceuticals, and semiconductor components, creating systemic risk from geopolitical instability.
- **Supply Chain Opacity.** Many SMMs lack visibility into their upstream and downstream suppliers, inhibiting proactive risk mitigation. Just-in-time logistics models eliminate critical inventory buffers.
- **Erosion of Domestic Capacity.** Decades of offshoring have eroded domestic production capacity for foundational inputs like electronics and precision tools.
- **Fragility of OT Software.** A primary vulnerability is the vast amount of undocumented, unsecured control system logic (e.g., PLC code) running manufacturing operations. A single ransomware attack or hardware failure can halt production for weeks if this critical IP cannot be immediately restored.

8b. What programs and policies need to be implemented to develop and re-shore a resilient domestic advanced manufacturing supply chain and industrial base?

A multi-pronged national strategy is needed:

- **Target Leap-ahead Technologies.** Beyond reshoring capabilities for existing products (necessary for some items), look for new opportunities where “developed in the U.S.” can lead to “produced in the U.S.”
- **Enhance Visibility.** Continue supporting a National Supply Chain Data Platform to provide real-time, AI-powered analytics and critical node mapping.
- **Deploy Targeted Incentives.** Use tax credits, loan guarantees, and grants to encourage the reshoring of critical material processing and component manufacturing.
- **Create Resilience Innovation Zones.** Establish regional hubs where manufacturers can collaborate on testing digital twin-based supply chain scenarios, cyber-hardening, and sustainability.
- **Invest in Workforce Training.** Integrate logistics, customs compliance, and digital supply chain management into national manufacturing education strategies.
- **Secure supply of critical materials:** Establishing a domestic source for critical materials or negotiating international trade agreements to ensure a stable and competitively priced supply.

9a. What are the biggest obstacles faced by small and medium-sized manufacturing companies in adopting advanced technologies to increase efficiency and productivity?

The primary obstacles for SMMs are the prohibitive cost of new equipment, a lack of in-house expertise, and the inability to absorb the risk and downtime associated with transitioning production processes. Many operate with undocumented and unmanaged control system code, making any new investment inherently risky. The crippling financial risk of a single day of unplanned downtime often outweighs the cost of new technology itself.

Additional obstacles include:

- **Perceived Complexity and Lack of "IT-like" Tools for the Factory Floor:** SMMs are often deterred by the perceived complexity and specialized skillset required to manage industrial automation systems. The lack of intuitive, IT-like tools for managing, backing up, and securing PLC and robot code creates a major barrier to improving operational efficiency and cybersecurity posture.
- **Financial constraints:** Including high upfront costs, uncertain returns on investment (ROIs), uncertainty in federal planning, and the year-to-year nature of most defense contracts, and significant capital investments.
- **Intellectual Property Concerns:** SMMs consider their IP and their manufacturing trade secrets to be their lifeblood. They are reluctant to share IP with customers. This is a big issue when the government attempts to acquire IP rights that threaten to disclose SMM IP to competitors.
- **Cybersecurity Compliance:** SMMs lack the expertise to implement cybersecurity controls, especially for their OT systems. They find compliance with Federal cybersecurity requirements too expensive, and many are choosing to exit the Federal market in favor of commercial markets.

9b. How can Federal agencies assist these companies in adopting advanced technologies and participating in the establishment of robust and resilient domestic manufacturing supply chains?

- **Provide Targeted Financial Support.** Offer grants and low-interest loans specifically for technology adoption.
- **Expand Technical Assistance.** Increase funding for regional outreach centers like the Manufacturing Extension Partnership (MEP) to provide hands-on guidance.

- **Streamline Acquisition.** Make it easier for SMMs to compete for federal contracts that would justify technology investments.
- **Create "Tech Sandbox" Grants.** Fund pilot projects to help SMMs de-risk the adoption of new technologies.
- **Fund Digital Transformation.** Provide SBIR-style funding for SMMs to digitize legacy technical data packages and implement data as a Service.
- **Simplify regulations.** Reduce the complexity of the Federal Acquisition Regulation (FAR) and rules/regulations to facilitate participation.
- **Demand Signal.** Provide more than year-to-year contracts so that defense contractors can clearly define an ROI for Capital Expenditures on advanced manufacturing technologies.

10. What are examples of public-private partnership models (at the international, national, state, and/or local level) that could be expanded to facilitate manufacturing technology development, technology transition to market, and workforce development?

The following models should be emulated, expanded, or receive increased support:

- **National PPPs:** The Manufacturing USA institutes, such as America Makes (3D printing), MxD (digital manufacturing and cybersecurity), LIFT (lightweight materials), CESMII (smart manufacturing), and BioMADE (biomanufacturing).
- **Applied R&D Centers:** Fraunhofer USA (adapting the German model for localized R&D) and the Connecticut Center for Advanced Technology (CCAT).
- **Regional Hubs:** New York's NY CREATES (semiconductor hub) and DoW's Manufacturing Innovation Institutes (MIIs).
- **Federal Programs:** Manufacturing USA network, MEP centers, and the SBIR program.
- **National Labs:** e.g., Oak Ridge National Laboratory.

11. The current 2022-2026 National Strategy for Advanced Manufacturing has three top-level goals, each with objectives and priorities: (1) Develop and implement advanced manufacturing technologies; (2) Grow the advanced manufacturing workforce; and (3) Build resilience into manufacturing supply chains and ecosystems.

a. Are these goals appropriate for the next 4-5 years? Why or why not?

Yes, these three goals remain fundamentally appropriate and accurately capture the core challenges facing the U.S. industrial base.

b. What emerging needs or opportunities might require the addition of new top-level goals, and why?

Potential new goals could include:

- **Achieve Dual-Use Technology Superiority.**
- **Ensure Ethical and Sustainable Manufacturing.**
- **Cybersecurity Readiness for Operational Technology.**
- **Digitize and Unlock Legacy Data for Rapid Manufacturing Transition.** Without access to this data, advanced manufacturing remains out of reach for most sustainment needs. Data-as-a-Service technologies offer new ways to deal with IP protection issues.

12. Is there any additional information related to advanced manufacturing in the United States, not requested above, that you believe should be considered? If so, describe.

Policy leaders must recognize that **nothing can be manufactured without proper data**. The primary bottleneck in manufacturing for sustainment is not production capacity; it is the reverse engineering and engineering substantiation required when legacy data is unavailable. This is an area where small businesses provide enormous value.

Furthermore, technology alone will not solve the challenge. Modernizing is risky and costly, and building a new production line is often unaffordable for many companies without support. Federal grants, cost-sharing programs, or long-term procurement contracts could reduce this risk and bolster domestic manufacturing resilience. Many of the constraints in the U.S. defense industrial base are at small and medium-sized manufacturers specializing in defense-specific sub-components. These companies often cannot justify an ROI for modernization and the adoption of advanced manufacturing.

To address demand fluctuations and lifecycle needs, rapid part qualification has become a critical defense sector challenge. Current qualification processes are time-consuming and costly, hindering the ability to quickly adapt to changing production demands. We recommend prioritizing the development of efficient part qualification methods for all manufacturing processes, including additive, subtractive, and casting. By leveraging simulation-based verification and validation and other innovative approaches, we can enable contractors to swiftly transition between manufacturing processes, facilitating agile production and reduced lead times. This initiative will enhance manufacturing flexibility, responsiveness, and competitiveness, ultimately benefiting national security and economic growth.

Conclusion

NDIA appreciates the government's commitment to fostering a strong and dynamic defense industrial base. NDIA members also welcome the opportunity to organize a meeting with OSTP to discuss further or answer follow-up questions. If you have any questions or are seeking any additional information, please contact Michael Seeds at mseeds@ndia.org.

Sincerely,

National Defense Industrial Association