1. Vision

The vision for this effort is to empower equitable adoption of productivity enhancing emerging technologies for sustainable, precision manufacturing competitiveness and profitability.

The urgency for smart manufacturing initiatives is irrefutable, something that all members of the industry are feeling. Increased levels of smart manufacturing maturity significantly improve the competitive advantage along multiple performance indicators, such as time to market, cost efficiency, product quality, and customer satisfaction.i

In early 2020, the South Kansas region lost approximately 5,000 aerospace jobs because of the Boeing 737 MAX production suspension. In March 2020, the global COVID-19 pandemic became the second unprecedented event to significantly affect the core industries that drive the regional and state economy. Roughly 20,000 (~60%) aerospace workers were laid off or furloughed.

The COVID-19 pandemic has exposed an ongoing need for supply chain resiliency and domestic crisis preparedness. Simultaneously, trade tensions and near-peer competitors continue to strengthen and emerge while the value of labor arbitrage dwindles, and global logistics costs increase. Without improving the resilience and competitiveness of U.S. manufacturers and supply chains, the future of this country’s economic and national security may be at risk.

The collective convening power of Wichita State University (WSU), South Kansas Coalition partners, and industry leadership, including attractive and centrally located investments made at the WSU Innovation Campus, will make it easier to adopt advanced manufacturing initiatives by drawing manufacturing leaders into an existing ecosystem of technology, industry, and academia. The Driving Adoption initiative will help the regional manufacturing cluster recover from the pandemic and build economic diversity and resiliency to mitigate future impacts.

Aligned with the regional Comprehensive Economic Development Strategy (CEDS), upgrading the long-term manufacturing industrial base with cutting-edge factory floor technologies, such as additive manufacturing, automation with in situ inspection, and semiconductor production, will enhance productivity, aerospace and advanced manufacturing product performance, and quality-control, while accelerating high-skilled job growth (Figure 1). For example, according to Kearney, a global management consulting firm, additive manufacturing (also referred to as 3D printing) is projected to “bring 3–5 million skilled jobs back to U.S. shores in the next decade and yield up to $900 billion in total economic value.”ii

2. Economic Opportunity

2.1. Target Industry(ies)

South Kansas is a global leader in advanced materialsiii and their commercialization in advanced manufacturing. Advanced materials for advanced manufacturing include transportation equipment manufacturing (NAICS 336), machinery manufacturing (333) and petroleum and coal products manufacturing (324).iv

2.2. Quantitative Measures

The region has a diverse economic base, producing a wide variety of products and services. Approximately 21.5 percent of regional employment is in goods-producing industries. According to a Brookings manufacturing report, “Among the 100 largest metropolitan areas, the most
The manufacturing-specialized metropolitan area is Wichita, where manufacturing’s share of jobs was two times its nationwide share. Nearly 94 percent of the area’s business establishments employ fewer than 50 workers. Growth is stimulated by these small firms, as well as local aircraft companies, which combine to produce a significant number of the world’s general aviation, commercial, and defense aircraft parts.

Aircraft and aircraft components have been built with Wichita expertise and craftsmanship for nearly 100 years. Wichita offers one of the largest aerospace labor pools and supplier networks in the world. According to a Milken Institute study, Wichita, the Air Capital of the World (Figure 2), has the highest concentration of aerospace manufacturing employment and skills in the nation. About 50 percent of the Wichita metro area manufacturing employment (44,700, 15.6 percent of all jobs or some 22,200 persons) is in aerospace products and parts manufacturing. The employment location quotient for Aerospace Products and Parts Manufacturing (NAICS 3364) is 23.35; employment concentration is more than 23 times the national average concentration.

Decades of aircraft production have built a comprehensive network of more than 450 precision machine shops, tool and die shops, and subcontract manufacturers. The Kansas and U.S. manufacturing and defense industrial base are able to provide tremendous capabilities to maintain readiness levels in normalcy and surge capacity support in times of crisis.

3. Coalition Members

The South Kansas Coalition’s lead institution is Wichita State University, National Institute for Aviation Research (NIAR), led by senior vice president, John S. Tomblin, PhD, who also is the executive director of NIAR. Review and analysis of regional and state strategic plans are underway to determine the optimum BBB Coalition structure to execute funded BBB projects for the Phase II proposal.

NIAR’s mission is to conduct research, transfer technology, and enhance education for the purpose of advancing the nation’s aviation industry, and to assist non-aviation industries that may benefit from aviation-related technologies. NIAR runs several centers and participates in initiatives that are strategically aligned with the Driving Adoption’s mission. NIAR’s centers promote the safety, research, manufacturing, and design elements of today’s aviation industry. This happens not only through NIAR’s own research, but through the exchange of knowledge with researchers in other centers. These centers include the following: Advanced Technologies Lab for Aerospace Systems, National Center for Advanced Materials Performance, Composite Materials Handbook-17 (CMH-17), Federal Aviation Administration (FAA) Center of Excellence for Composites and Advanced Materials, FAA ASSURE Center of Excellence for UAS Research, Kansas Aviation Research & Technology Growth Initiative, and FirePoint Innovations Center who partners with the U.S. Army’s Aviation and Missile Center, and National Institute for Research and Digital Transformation.

![Wichita: Air Capital of the World](image-url)
4. Projects

4.1. Small- and Medium-Sized Companies Additive Manufacturing Adoption Strategy

Additive manufacturing provides a highly flexible manufacturing platform capable of providing a diverse mix of manufactured products. It supports both low-volume and high-volume demands as well as providing a high degree of resiliency, allowing rapid product changeover with little to no tooling. The inherent manufacturing flexibility supports a hub-and-spoke model of manufacturing, thereby ensuring maximum supply chain health. Supply chain resilience will occur as long as industry lessens its dependence on a network of suppliers using outdated processes disaggregated across the world and, instead, implements new production tools, including additive manufacturing, advanced materials, robotics, and machine learning.

This project will support the adoption of a variety of additive manufacturing technologies that can print parts with metallics, polymers, reinforced polymers, and robotic additive manufacturing. The South Kansas Coalition will accelerate the adoption and execution of advance manufacturing technologies to increase the domestic additive supply chain within the next four years by doing the following:

- Establishing regulatory and guidance documents with the FAA, Department of Defense, and others for the manufacturing of additive parts for the aviation and non-aviation supply chain.
- Creating a widely accessible material standards and material property database, which the FAA has indicated is necessary for broader adoption of additive manufacturing.
- Providing hybrid technical training to promote equity and establish a base of well-paid experts and life-long learning/professional development opportunities.
- Designing and implementing a comprehensive skills development curriculum to support both production and a maintenance repair and overhaul (MRO) professional workforce across various aviation sectors and advanced manufacturers.

4.2. Expansion of Semiconductor Testing and Evaluation Facilities for U.S.-Based Semiconductor Manufacturing

The South Kansas Coalition is home to the largest U.S. facility for back-end semiconductor services, including die prep, packaging, assembly, testing, and qualification services. This U.S.-based (100 percent U.S. footprint) employee-owned company, or employee stock ownership plan (ESOP), has more than 500 active customers from avionic, military, aerospace, medical, automotive, commercial, and industrial sectors, with a world-wide customer base in more than 25 countries with a 97 percent satisfaction rating.

The BBB project will create and equip a university-based testing and evaluation facility to support the semiconductor industry. The test facility will employ university and technical college students so that they can gain experience in the semiconductor market, establish a body of expertise in running high-volume production, and become well-paid experts in the Midwest semiconductor industry—thereby easing the U.S. semiconductor supply chain challenges.

The regional semiconductor industry is planning a significant expansion and enhancement if its Wichita operations, and the new capacity would serve the Department of Defense semiconductor market, medical-related semiconductor market, and automotive semiconductor market.

4.3. Resiliency of Smart Manufacturing

This project will focus on delivering platforms to underserved and small- and medium-sized manufacturers (SMMs) that will enhance competitiveness. The deployment of advanced manufacturing capabilities requires that equipment be integrated into and across a “Digital Thread” that connects physical infrastructure with the data and computing power it needs to deliver value. A challenge faced by SMMs and the underserved is accessing these platforms in ways that do not...
require huge upfront technical and financial investment. This “technology deficit” can preclude
them from progressing up the capability ladder. This approach will leverage the substantial
previous investments of the federal government in these types of initiatives.\textsuperscript{viii}

The resilience project is a coordinated effort to bring together a broad ecosystem of designers,
manufacturers, regulatory authorities, and community needs to improve crisis response, broadly
defined, while simultaneously leaving behind an enduring platform-based infrastructure that can
promote resiliency and flexibility in response to the minor supply chain disruptions that occur
every day.

4.4. **Industry and Entrepreneurial Cyber Manufacturing Convening**

This project will create an industry and entrepreneurial ecosystem to convene a community of
participants—small, medium, and large—to exchange ideas that will enable adoption of smart
manufacturing technologies and establish industry practices. Semi-annual convenings will help
propel the uptake of advanced manufacturing technologies, while also having a direct connection
to academic programs that are continually refreshed by new technologies, methods, and industrial
operations. Potential convening themes include, but are not limited to, the following:
- Differences between Brownfield and Greenfield Cyber Manufacturing Environments: Opportunities and Challenges.
- Future of the Cyber Manufacturing Technology Landscape: The Criticality of Ecosystems to Support Advanced Technology Absorption.
- Future Manufacturing Processes: Changes Brought about by Cyber Manufacturing.
- Future of Manufacturing Work: Functional and Talent-Centric Shifts Taking Place.

4.5. **Workforce Expansion: Construction Project for National Center for Aviation Training (NCAT) Advanced Manufacturing Training and Research Building**

One of the primary goals of the South Kansas Coalition is to help meet our region’s workforce
needs. Over the last ten years, the National Center for Aviation Training has become the nation’s
leading institution for aerospace manufacturing and aviation maintenance education and training.

Leveraging this strength, the proposed 80,000-square-foot workforce construction project will be
home to advanced manufacturing training, education, and research programs. It will provide
instruction and professional development in robotics, mechatronics, and automation, plus other
modern manufacturing methods such as 3D printing (see endnotes). The facility will also feature
space for companies to conduct research and develop new processes and equipment.

The new construction will also be home to the newly implemented professional pilot program,
aimed to prepare individuals for a professional pilot career in a multitude of industries including
commercial airlines, flight training, private or business aviation, cargo, and government
organizations. Boeing’s Pilot and Technician Outlook 2020–2039 executive summary cites that
while the current industry downturn, driven by COVID-19, has resulted in a temporary oversupply
of qualified personnel, the long-term need remains robust. The report states that in the next 20
years, 763,000 pilots will be needed nationwide, 208,000 of them in North America. The outlook
report goes on to reiterate that “meeting the projected long-term demand” for aviation
positions “will require a collective effort across the global aviation industry.” The company
says educational outreach and career pathway programs “will be essential to inspiring and
recruiting the next generation.”

5. **Metrics**

<table>
<thead>
<tr>
<th>South Kansas Coalition Project</th>
<th>Additive</th>
<th>Semi-Conductor</th>
<th>Resiliency</th>
<th>Convening</th>
<th>Construction</th>
</tr>
</thead>
<tbody>
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<td>Job Creation</td>
<td>600–1000</td>
<td>90–110</td>
<td>3–10%</td>
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<td>Wage Growth</td>
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<td>Labor Force Participation Rate</td>
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<td>Workers Completing Training</td>
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<td>300–500</td>
<td>9K–12K</td>
<td>3K/year</td>
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<td>Population Demographic Breakdown</td>
<td>Yes</td>
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</table>
6. **Matching Funds Identification and Other Complementary Investments**

<table>
<thead>
<tr>
<th>BBB Federal Funding Request</th>
<th>BBB Cost Share Available*</th>
<th>Other Federal Funding to be Requested</th>
<th>Private Investment**</th>
<th>Philanthropic Investment</th>
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<tbody>
<tr>
<td>~$67,000,000</td>
<td>~$14,000,000</td>
<td>Developing Significant CHIPS Project, 700 jobs</td>
<td>~$9,000,000</td>
<td>None secured at this time</td>
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</table>

* Cost share will (i) be committed to the project for the period of performance, (ii) be available as needed, and (iii) not be conditioned or encumbered in any way that may preclude its use consistent with the requirements of EDA investment assistance.

** Third-party cost share provided to WSU cost-share commitment from GE Additive and Integra Technologies, through some combination of material, equipment, and/or tailored consulting and training to enable BBB projects.

7. **Barriers and Mitigation Strategies**

Several potential program risks have been identified, along with potential mitigation approaches for each:

- **Continuity and momentum.** It may be necessary for different people to become involved over time. To mitigate this risk, the South Kansas Coalition will create a documented succession plan that includes clear hand-off procedures to ensure project continuity. Additionally, manufacturing focus and attention shifts may evolve. To mitigate this, the Coalition will use its annual “Vision Check” to realign any activities.

- **Community membership.** There could be risks related to engaging competitive industry participants. Some companies may be reluctant to join due to confidentiality or competitive reasons. To mitigate this risk, the Coalition will build trust among members and encourage shared goals for improving U.S. manufacturing competitiveness. It will also establish “Rules of the Road” for membership and pay particular attention to diversity (gender, race, industry, company size, rural/urban, etc.).

- **Disruptions like the current COVID-19 pandemic.** The current pandemic could limit in-person and physical activities, including symposiums. To mitigate this risk, the Coalition will develop alternate plans that build on the experience of moving activities to virtual platforms.

8. **Timeline**

The South Kansas Coalition will prioritize best practices in attracting and expanding manufacturing by bringing together diverse and inclusive regional stakeholders and using long-term planning that integrates targeted public investments in support of the manufacturing ecosystem and leads to a broad-based increase in manufacturing resilience and regional prosperity across the sector, the region, and the nation.

**Proposed Project Period of Performance = 12 Months**

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<th>Task/Deliverable</th>
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<td>5. Development of training strategy/</td>
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