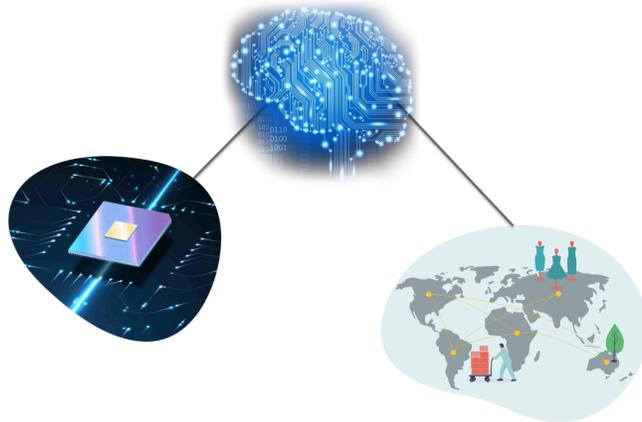


NSF Regional Innovation Engines – Concept Outline ✓

NSF Engines: Type 2 - Reinforcing the Future with Inclusive AI: Optimizing the Domestic Production of Next Generation Technologies to Strengthen U.S. Supply Chain Resilience

Key Terms: supply chains, artificial intelligence, customs, manufacturing, interconnectivity

Topic Area: Supply chains are essential to ensuring that the US remains ahead of global innovation and competitiveness. The diversity of sectors and organizations involved in this system all require the implementation of new ideas and improvement of the products and services that satisfy the optimization of the manufacturing



processes, which in turn are the backbone of both social and economic development. Due to increasing interconnectivity and smart automation, the organizations, people, activities, information, and resources involved in supplying, are currently experiencing disruptive transformations. These transformations are impacting productivity, manufacturing, distribution, and economic stability, among other key performance

indicators. The Association for Supply Chain Management (2022) says, “Advanced analytics and automation will continue to accelerate, helping organizations mitigate disruption via digital, agile supply chain management.”⁽⁷⁾ At the same time, it is critical to train and develop the talent required to support the ongoing industry solutions and frameworks that are relevant to future supply chain needs. Likewise, “Supply chain resilience will continue to require data expertise, novel solutions and strong collaboration among global networks that are highly complex and interconnected.” (J. Adam, 2022)⁽⁷⁾.

‘Reinforcing the Future with Inclusive AI: Optimizing the Domestic Production of Next Generation Technologies to strengthen U.S. Supply Chain Resilience’, significantly empowers the national and societal resources that ensure that next generation supply chains are resilient in times of exponential change, through sustained innovation. After the COVID-19 crisis, production delays have become central to public discourse and the cause of market uncertainty. The limited supply of key commodities and logistical capacity is negatively impacting purchasing power. According to KPMG (2022)⁽⁸⁾, “Industry is evaluating and investing in their long-term supply chain strategies, paving the way for a new post pandemic normal.” Supply chain evaluation and evolution has intensified with the global economic crisis.

Region: Via the application of artificial intelligence capabilities to the first “intermestic” customs facility in the world, already operating in the State of Arizona (Mesa), the region enables the transnational and international trade hub of the coming century. This allows Arizonians to participate in the economy and the workforce of the future. The NSF Regional Innovation Engines program is the opportunity to benefit beyond the temporary fixes, serving as the perfect scenario for a circular process of positive feedback loops. This Concept Outline connects essential human resources, exponential technologies, and engenders coalitions that attract investment, inspire developmental inclusion and consolidate solutions to unforeseen challenges.



Purpose and Vision: The overall purpose and vision of this Engine is to reinforce the region's critical infrastructure and develop socioeconomic resilience through cultural diversity:

- Establishing cross-disciplinary AI Labs to research, develop, and commercialize scalable systems that solve supply, logistics, distribution, and encompass the entire value chain.
- Growing the capacity and accessibility of all the partners in the region through the expansion of their business networks, by consolidating the technologies that drive the regional and national supply chains toward the new industrial revolution.
- Expediting the distribution of goods, raw materials, and resources needed to fuel innovation.
- Becoming the leading minority-driven digital transformation hub and producing multiple avenues of development and profitability.
- Leveraging the value, resources, creativity, and ingenuity of Arizona communities, including invisible populations and their close ties with the Hemisphere, as a winning edge to connect the Nation with continental markets.

By reinforcing the regional capacity to advance in the research and development (R&D) of emerging technologies and industries, including machine learning, semiconductors technology for Internet of Things (IoT) infrastructure, blockchain solutions, quantum, cybersecurity, and other emerging exponential technologies, this proposal sets the stage for a regional economic growth that strengthens the foundation of optimized global supply chains and enhanced customs management in the coming decade. A recent Deloitte report states, “It may be no surprise that supply chains are becoming ever more complex systems to manage.” This is potentially a challenge for any given business, but a potentially source of advantage as well. The returns to managing something well are heightened as it becomes harder to manage. The report adds, “In the midst of this treacherous landscape, some businesses are



identified as supply chain followers, while others are distinguishing themselves as supply chain leaders.” (Deloitte, 2022) ⁽⁹⁾

Regional Importance and impact: Arizona is one of the top 10 culturally diverse states in the U.S. “Diversity in tech is important because it’s crucial in every facet of life – it allows for inclusivity and strengthens the environment as a whole. It is limiting to formulate a team almost entirely made up of people from one gender and one racial or ethnic background. It limits the perspectives on the team, and in turn, hurts the tech industry’s progress as a whole.” (U.S. Equal Employment Opportunity Commission, 2021) ⁽⁴⁾. As a result, cultural diversity is key to establishing a sustainable Engine. From this perspective, Arizona is an ideal location to build a vibrant tech ecosystem. In a large-scale effort to support the upgrading and sustainability of regional supply chains, GENIA Latinoamérica, a U.S. Public Benefit Corporation, and INTERMESTIC Partners, an Arizona-based international business and investment advisory group, signed an agreement to create a consortium of AI R&D Labs that enhance inclusive workforce development, leverage cultural diversity, and scale regional and global solutions for market commercialization.

Partnerships: Organizations such as Skybridge Arizona, a multi-use gateway development facility to expedite joint border customs in Mesa Airport, AZ, and semiconductor manufacturer Intel (in ongoing discussion), are partners with this Engine. A network of deep-tech startups has already shown interest in joining the development of the ecosystem that will fuel this Engine. Researchers from academic institutions such as the University of Arizona, Arizona State University, and Northern Arizona University, and their venture capital arms, are already collaborating with the leading members of the Coalition, sharing ideas and talent and we expect to be signing agreements within the coming weeks. Additionally, the Coalition is connected with local Communities and Non-Profits in the region. Their joint participation is essential to addressing the training, upskilling, manufacturing, productivity, innovation, R&D, investment and supply chain challenges that fit the purpose, vision, and needs of the core ecosystem. Gartner (2022) says, “Ecosystems will become the predominant competitive entity. In 2026, more than 50% of large organizations will compete as collaborative digital ecosystems rather than discrete firms — sharing inputs, assets and innovations.” Arizona’s industries are set to meet this demand. ⁽⁵⁾

According to the Observatory of Economic Complexity (2021), Arizona exported \$24.1B, making it the 21st largest exporter out of the 53 exporters in the United States. In 2021, the top exports of Arizona were 1) Aircraft parts (\$3.25B), 2) Electronic integrated circuits: processors and controllers, whether or not combined with memories, converters, logic circuits, amplifiers, clock and timing circuits, or other circuits (\$1.69B), 3) Copper ores and concentrates (\$1.69B), 4) instruments, appliances for medical, etc. for science (\$465M), making it an ideal hub for cutting-edge hardware production and semiconductor innovation to enhance the development of next-generation technologies. ⁽²⁾

Workforce Development: Ultimately, this Engine addresses the need for an improved labor market where people can access a convergence of future-proof



training methodologies. The future regional workforce needs foundational skills in data analytics, creativity, upskilling and retraining talent, because traditional approaches may not be relevant to the future of the region's economy. A Training Program to create scholarships, internships, pairings and exchange stays between industry, students, officials, researchers, scientists, civil society and the public and private sector. Similarly, it seeks to promote the development of products and services that support scientific advancements, linked to the evolution of the Fourth Industrial Revolution,

Related Initiatives: Other initiatives are tackling supply chain challenges. For example, technology giant Microsoft is using blockchain for end-to-end traceability and accountability in their cloud supply chain. ⁽¹⁵⁾ Advanced Micro Devices Inc. is working on supply initiatives that mitigate the fluctuating regional retail availability of their raw materials, through corporate partnerships. ⁽¹³⁾ Moreover, IBM's 'AI is reshaping the supply chain' report concludes, "95 percent of the highest-performing organizations see AI as central to their innovation success." ⁽³⁾ Through their initiatives, the surveyed companies are targeting three distinct and complex supply chain areas: Product development, Procurement, Manufacturing. Although these actions are important, the Arizona Engine and its partnerships focus on deeper challenges. Rather than end-to-end and beyond the output, the coalition is building an AI-first alliance to transition from an output-driven system to an input-driven ecosystem that considers all the components of a robust pipeline - from people to product.

Based on cycles of iteration, not just in supply, accountability and provenance, but also in materials, manufacturing components, final product, usage, and optimization, the Engine aims to protect domestic production of next generation technologies and ensure that American industries remain ahead of global innovation in this decade and going forward. By building a consortium of AI developers, researchers, academic institutions, communities, private investors, distributors and manufacturers in Arizona, this Engine sparks innovation in the Region that has not historically benefited from much innovation and technological development. And any developments that did take place previously were not driven by cultural diversity. Therefore: 1) by leveraging inclusive R&D, 2) harnessing workforce development open to diverse ideas, norms and criteria, and 3) scaling market commercialization for regional economic growth, national industrial efficiency, and global competitiveness, *'Reinforcing the Future with Inclusive AI: Optimizing the Domestic Production of Next Generation Technologies to strengthen U.S. Supply Chain Resilience'* generates a vibrant, healthy, and agile innovation ecosystem, **by all and for all.**

I, Felipe Castro Quiles, hereby consent to the disclosure of a summary of my Concept Outline, if approved, as described in the BAA.

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