

NSF's Florida Semiconductor Engine

Why It Matters for U.S. Economic Security

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Amid heightened geopolitical tensions, the United States has moved to maintain its historical strength in semiconductor technology via a dual strategy of protection through export and investment controls, and promotion through R&D and funding of U.S.-based technology development. Of particular note is the National Science Foundation's (NSF) Engines regional R&D support program, which established the NSF Florida Semiconductor Engine (FSE), focused on advanced packaging technologies. FSE is gaining attention as a critical new hub for supporting U.S. economic security. Washington CORE spoke with the RTI (Research Triangle Institute) International's Dr. Jeffrey Alexander, whose team evaluated the FSE's first two years of work, about the program background, significance of regional development, and future prospects of the Engine.

NSF Engines program background

The NSF Regional Innovation Engines program, authorized under the "Creating Helpful Incentives to Produce Semiconductors" (CHIPS) and Science Act of 2022, provides long-term, large-scale funding to support the formation of regional technology and industrial ecosystems¹. Ten Engine projects have been selected to date from nearly 700 concept outlines, with each Engine slated to receive as much as \$160 million in total funding over up to 10 years^{2, 3}. The Florida Engine focuses on advanced packaging.

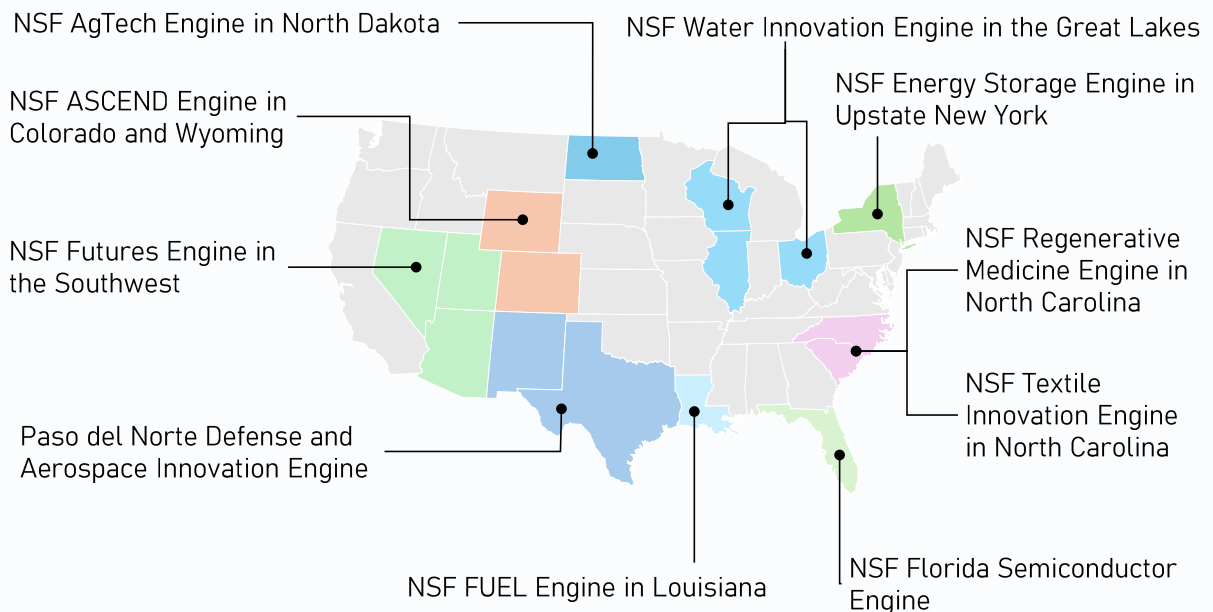


Source : Washington CORE

"Advanced Packaging" as the Foundation for the AI Era

Semiconductors have previously centered on the "front-end process"—how to form nanoscale circuit patterns on wafers. However, in recent years, driven by expanding demand for generative AI, high-performance computing, and next-generation high-speed communication systems, the "back-end process"—integrating multiple chips at high density to function as a single larger chip—has become crucial for performance, cost, and power efficiency. The Florida Engine focuses on technological development including high-density packaging utilizing Through Silicon Vias (TSV) and interposer technology, optimization of design and manufacturing processes through digital twins (digital replica models), and ensuring the security of the package itself. This research directly contributes to achieving both performance improvement and packaging reliability.

NSF Engine Programs Selected in the First Round



Source: Created by Washington Core based on NSF Engine's individual engine overview pages, etc.

"Use-Inspired Innovation" R&D Working Backwards from End Use

Dr. Alexander emphasizes that the Florida Engine's R&D is driven by the concept of "Use-Inspired Innovation", meaning the Engine consciously develops designs with end-use applications in mind. The Engine is targeting applications in domains where high performance and reliability are essential, such as autonomous vehicles, AI, 5G communications, medical devices, and aerospace/defense. The Engine is focusing on R&D for application-specific semiconductors, not mass-produced commodity chips, with the aim of becoming a technology supply hub for the U.S. The Engine's program is housed in the new Technology, Innovation, and Partnerships (TIP) Directorate at NSF, focused on accelerating commercialization through business support rather than the NSF's primary mission of funding academic basic research.

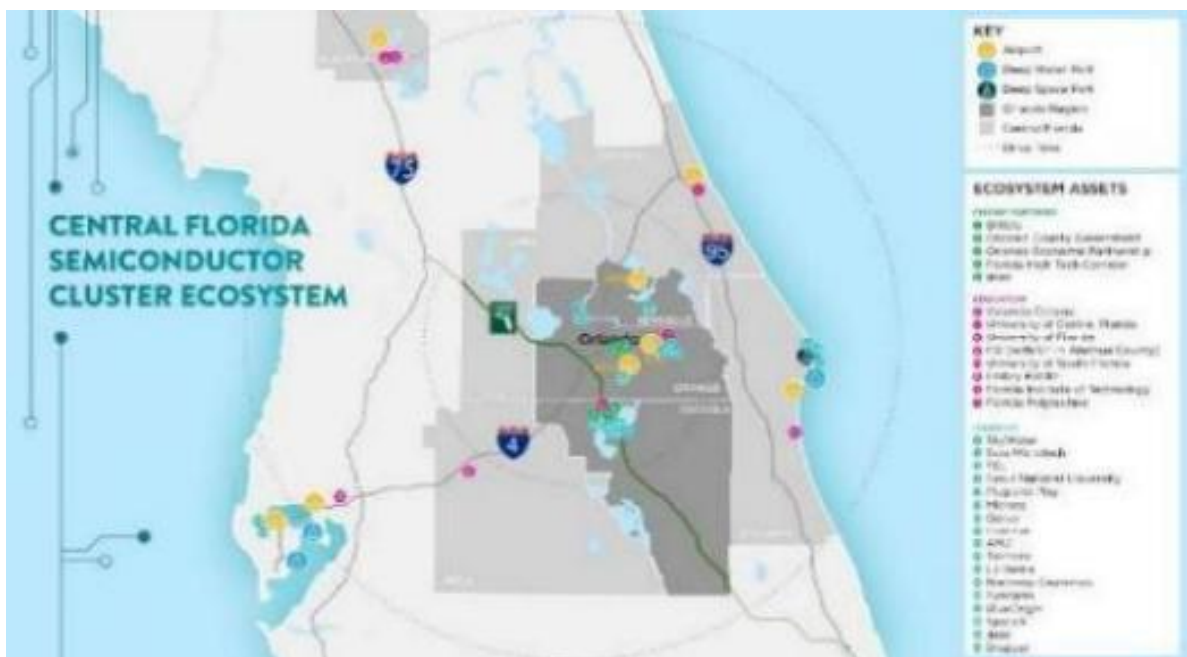
Regional Policy: From Tourism to Advanced Manufacturing - The Challenge of NeoCity

Osceola County, Florida, home to the Florida Engine, also hosts robust tourism and hospitality industries – most notably Disney World – that are subject to economic "boom and bust" cycles. Around 2016, Osceola County began to make strategic economic development investments, including establishing a semiconductor research and manufacturing park called "NeoCity". This effort leverages Osceola County's location near research universities (such as the University of Central Florida), military facilities, and NASA's space launch center at Cape Canaveral. Subsequently, the County secured funding through programs like the U.S. Department of Commerce's Economic Development Administration (EDA) Build Back Better Regional Challenge and the Department of Defense's Cornerstone Program. These programs attracted and bolstered domestic and international companies in the county, such as imec (Belgium's semiconductor manufacturing technology research institute), Tokyo Electron, and Siemens.

Performance Evaluation Seeing the Effects Beyond Employment

Building on these previous endeavors, in 2023, the county was selected for one of the NSF Engines. The Florida Engine received an initial investment of \$15 million over its first two

Florida's NeoCity = Semiconductor Technology Center



Source : Florida Semiconductor Engine⁷

Florida's Semiconductor Engine in Osceola County



Source: Florida Semiconductor Engine⁸

years, with a third-party evaluation conducted at the two-year mark. Dr. Alexander noted that the evaluation criteria included: university research outcomes; technology transfer to local firms; workforce development; and ecosystem promotion.

According to Dr. Alexander, FSE is not designed to create large numbers of new jobs in the short term, in contrast with other U.S. regions which focus on attracting massive semiconductor fabrication facilities. Since semiconductors are platform technologies, personnel trained through the Engine may go on to find employment in industries

beyond the semiconductor industry itself. For example, graduates from Valencia College, a participating member of the Florida Engine, may find employment in the defense industry, which would not necessarily be counted as semiconductor-related employment.

Therefore, Dr. Alexander's team designed their review to measure broader regional economic impacts. For instance, the review assesses trends, such as employment shifts from tourism to manufacturing and increased facility construction. It also considers spillover effects into other fields like optics and photonics as part of the evaluation.

Dr. Alexander stated that there is uncertainty about whether NSF's investments in programs emphasizing applied research will increase going forward, but he sees a reduction as unlikely. Furthermore, BRIDG (BRIdging the Innovation to Development Gap), the organization supporting the Florida Engine's operations, has secured semiconductor procurement commitments related to the Department of Defense's Re-shore Ecosystem for Secure Heterogeneous Advanced Packaged Electronics (RESHAPE) initiative. Given that semiconductors are a critical dual-use technology for the United States, public support for the Florida Semiconductor Engine is widely expected to continue or even expand, regardless of which political party is in power.

Outlook

Expectations for the Florida Semiconductor Engine (FSE) are high. Competition in AI chips is likely to intensify further, and a growing view is that the main battleground is shifting toward establishing standards. In December 2025, President Donald Trump said the United States would allow Nvidia to ship its H200 chips to approved customers in China under certain conditions.⁹ Yet China's reaction has not been uniformly welcoming: reports indicate that authorities asked some Chinese firms to halt orders for the H200 and that China may require domestic AI chip purchases in certain contexts.¹⁰ Separate reporting has also pointed to guidance restricting the use of foreign-made AI chips in data center projects funded even partly by the state.¹¹ Taken together, these developments reinforce an interpretation that the contest is no longer only about acquiring the fastest hardware, but increasingly about shaping standards and the surrounding ecosystem.¹²

Against U.S. trade measures and broader policy pressure—including export controls—China has continued to strengthen investment aimed at semiconductor self-reliance, and frictions around the flow of talent and technology have also been highlighted. Industry observers, watching these moves up close, have remarked that “China's technological catch-up is faster than expected.”

Semiconductors—once the most fiercely contested arena in U.S.–Japan trade friction—remain at the heart of geopolitics today, with rivalry now centered on U.S.–China competition for supremacy in development, manufacturing, and standards. In this landscape, the fate of the FSE, which seeks to advance foundational advanced packaging technology, will significantly influence U.S. economic security. The pressure to succeed will undoubtedly intensify.

Endnote

1. Refer to the white paper on the NSF engine at Washington Core (link: <https://www.wcore.com/strengthening-national-security-through-advanced-technology-hubs/>).
2. <https://www.nsf.gov/funding/initiatives/regional-innovation-engines/about-nsf-engines>
3. <https://www.nsf.gov/funding/initiatives/regional-innovation-engines/find-potential-nsf-engines>
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12. <https://eastasiaforum.org/2026/02/03/standards-are-the-new-frontier-in-us-china-ai-competition/>
13. <https://www.rti.org/expert/jeffrey-m-alexander>



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Dr. Alexander has over 30 years of experience in science and technology policy analysis, strategic consulting, and innovation management research. He specializes in evaluating public research and development (R&D) programs, assessing regional innovation clusters, and conducting science and technology foresight studies. He served as Chapter President of the Technology Transfer Society in Washington, D.C., and Director of the Innovation Strategy and Policy Center at SRI International. He earned a Ph.D. in Management and Technology from the George Washington University Business School¹³.

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