



BRIDG

GROWING FLORIDA'S
ADVANCED
MANUFACTURING
SECTOR

MARCH 2020



Senator Pat Neal
Chairman of the Board of Trustees

Dominic M. Calabro
President & Chief Executive Officer

Dear Fellow Taxpayer,

Located in a 500-acre technology district in Osceola County is BRIDG, a state-of-the-art microelectronics manufacturing facility with the capability to build “smart sensors” that are smaller, faster, more affordable, and more capable than what exists today. These are the types of microelectronic chips one would typically find in a smart phone or laptop computer. These smart sensors put real-time information into the hands of individuals and companies and empower them to make better decisions and enjoy a higher quality of life.

BRIDG provides solutions that bridge the gap between technology and capability. The BRIDG facility provides the infrastructure that enables the development of tools and process technology to manufacture microelectronic sensor chips that connect people and their devices to the Internet of Things and that will enable electronic devices of all kinds to communicate with each other.

BRIDG was established as a not-for-profit, public-private partnership with support from state and local governments and leading manufacturing industry companies. For the 2019-20 fiscal year, state funding for BRIDG was withheld. BRIDG has the potential to generate thousands of high-skill, high-wage jobs, with billions of dollars in total earnings and hundreds of millions of dollars in state and local tax revenues. BRIDG has the potential to establish Central Florida as a major hub, if not THE major hub, for information technology research, innovation, and manufacturing in the world.

Florida TaxWatch presents this report in hope that the Governor and Legislature will continue its investment in BRIDG for fiscal year 2020-21 and beyond. TaxWatch is pleased to present this report and its findings and looks forward to engaging policymakers in discussion during the upcoming legislative session and beyond.

Sincerely,

Dominic M. Calabro
President & CEO

Introduction

“The future of Manufacturing is now.”

— LUIS BENAVIDES, PARTNER, MCKINSEY & COMPANY // MAKE MORE MANUFACTURING SUMMIT, MAY 31, 2019

Advanced Manufacturing and the Internet of Things

Manufacturing is a key driver of Florida’s economy. More than 20,000 Manufacturing companies provide more than 381,000 Floridians with high-wage jobs, with average annual wages (2018) of \$61,735.¹ Manufacturers in Florida account for 5.36 percent of the total economic output in the state, employing 4.23 percent of the workforce.² The total economic output from Manufacturing was \$51.86 billion in 2017. Florida manufacturers produce a variety of goods including aerospace products, batteries, food and beverages, communications equipment, pharmaceuticals, medical devices, semiconductors, boats, and more.

Technology is transforming Manufacturing. New digital technologies, increasing connectivity, the drive for innovation, a greater focus on services and changes in customer demands are all factors that are behind a push towards more collaborative models. As a result, the traditional linear contracts individually linking participants in the supply chain are reducing, making way for more flexible multi-party behavioral contracts to account for new cooperative commercial relationships.³

Advanced Manufacturing is the integration of new technology and techniques to optimize product design and the manufacturing process to create highly differentiated, cost effective and competitive products.⁴ Advanced manufacturing products drive significant productivity gains throughout the economies of Florida and the U.S. Although Advanced Manufacturing companies historically have employed only about 45 percent of Manufacturing employees, their output makes up to 53 percent of Manufacturing output.⁵ Advanced Manufacturing accounts for 7 percent of private output and 60 percent of the dollar value of U.S. exports.⁶

Driven by the Internet of Things (IoT)⁷, advanced microelectronics are transforming human interaction with the world. From cars and homes to medical and personal fitness equipment, the growing demand for integrated devices requiring advanced technology is rapidly multiplying, powering a new era known as “Industry 4.0,” the fourth major upheaval on modern Manufacturing. As this trend grows, new cutting-edge manufacturing processes are necessary to keep up with the pace of the microelectronics-driven economy.⁸ The continued growth of Florida’s Manufacturing sector will depend in large part on how well Florida manufacturers adopt technology and how technology shapes the future of Manufacturing.

1 Florida Department of Economic Opportunity, “Florida Manufacturing, June 2019 Labor Statistical Data,” July 19, 2019.

2 Ibid.

3 Nicole Livesey, “How Collaboration is Changing the Manufacturing Sector,” Global Manufacturing, retrieved from www.manufacturingglobal.com/lean-manufacturing/how-collaboration-changing-manufacturing-sector, July 2, 2019.

4 “Advanced Manufacturing,” Autodesk, retrieved from www.autodesk.com/industry/manufacturing/engineering-leadership/advanced-manufacturing, August 16, 2019.

5 Charles S. Gascon and Andrew Spewak, “Advanced Manufacturing is Vital Across Nation, Including Eighth District,” Regional Economist, Federal Reserve Bank of St. Louis, retrieved from www.stlouisfed.org/publications/regional-economist/fourth-quarter-2017/advanced-manufacturing-vital, August 16, 2019.

6 Ibid.

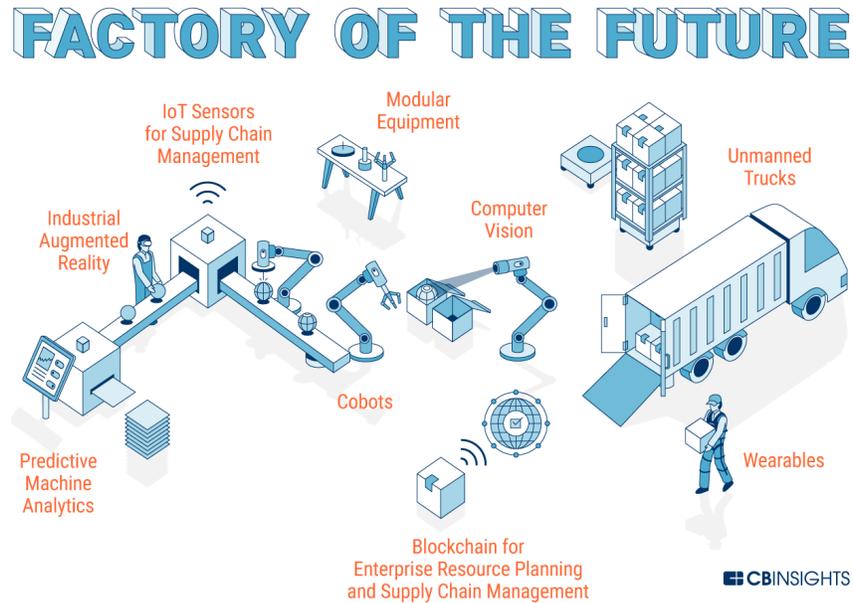
7 The interconnection via the Internet of computing devices embedded in everyday objects, enabling them to send and receive data.

8 BRIDG, retrieved from <https://gobridg.com/solutions/>, August 15, 2019.

The Smart Factory of the Future

New digital technologies, increasing connectivity, the drive for innovation, a greater focus on services and changes in customer demands are all factors that are behind a push towards more automated and digitized factories. “Smart factories” are being built that connect devices, visualize data in real time, collect and analyze critical metrics, and optimize the performance of manufacturing processes (see Figure 1).

FIGURE 1. FACTORY OF THE FUTURE



Source: www.cbinsights.com/research/future-factory-manufacturing-tech-trends/

The Smart City of the Future

More than one-half of the world’s population lives in cities. Smart technologies will play an important role in helping cities meet the growing demands from residents to deliver a better quality of life and to do so at a sustainable cost. Putting real-time information into the hands of individuals and companies empowers them to make better decisions and play a more active role in shaping the city’s overall performance. As cities get smarter, they become more livable and more responsive—and today we are seeing only a glimpse of what technology could eventually do in the urban environment.⁹

McKinsey & Company’s McKinsey Global Institute (MGI) looked at how the application of smart sensor technology has improved the quality of life in cities around the world. MGI found that cities can improve some key quality-of-life indicators by 10–30 percent --- numbers that translate into lives saved, reduced crime, shorter commutes, a lower health burden, and carbon emissions averted.¹⁰

⁹ McKinsey Global Institute, “Smart Cities: Digital Solutions for a More Livable Future,” McKinsey & Company, June 2018.

¹⁰ Ibid.

MGI found that smart technologies can:

- Reduce fatalities by 8–10 percent;
- Accelerate emergency response times by 20–35 percent;
- Shave the average commute time by 15–20 percent;
- Reduce the disease burden by 8–15 percent;
- Lower greenhouse gas emissions by 10–15 percent; and
- Reduce water consumption by 20–30 percent.¹¹

Smartphones are critical components of a smart city. Smartphones provide an interface that anyone can use to tap into a wealth of instant information about transit, vital services, alerts, and community news, and they generate a stream of data themselves. The river of information is continuously fed by a layer of sensors embedded throughout the physical environment. These sensors capture troves of data in real time and feed it into analytics systems that run complex city operations and infrastructure systems, sometimes making instant remote adjustments that require no human intervention at all. As millions of individual actors use data to make better decisions for themselves, the effects add up, causing the city as a whole to become more productive and responsive. Less time is wasted in transit and queues, and health and safety improve. Energy, resources, space, and investment are utilized more efficiently.¹²

Connectivity

The challenge facing manufacturers is “connection.” With the Industrial Internet of Things (IIoT) upon us, technologies such as robotics, 3D printing, advanced analytics and Artificial Intelligence (AI) now offer the potential for connected, additive and autonomous manufacturing processes — which is critical for companies looking to extend the lifespan of machines, reduce device breakdowns and increase throughput. The smart factories of Industry 4.0 will need to deliver better device security, ease of connectivity and common platforms. By bridging the gap between legacy and transformative technologies, manufacturers can gain access to existing data sets and new data streams.¹³

Before a city can become smart, however, it has to be connected. The underlying digital infrastructure has to be in place, including a network of data-collecting sensors and devices, comprehensive broadband and wireless networks, and platforms on which data can be stored and shared.¹⁴ Facilities like Osceola County’s BRIDG facility can play a critical role in establishing this connectivity.

11 McKinsey Global Institute, “Smart Cities: Digital Solutions for a More Livable Future,” McKinsey & Company, June 2018.

12 Ibid.

13 Patrick Murphy, “The Manufacturing Side of Digital Transformation: Smart Factories,” IBM Think Blog, March 4, 2019, retrieved from www.ibm.com/blogs/think/2019/03/the-manufacturing-side-of-digital-transformation-smart-factories/, August 15, 2019.

14 Supra, footnote 11

What is BRIDG?

Located in NeoCity, a 500-acre master-planned technology district in Central Florida (Osceola County), less than 30 minutes from Orlando International Airport and within one mile of the Florida Turnpike, that is becoming a global center for smart sensor, photonics, and nano-technology research and development, BRIDG is a state-of-the-art microelectronics fabrication facility with the capability to fabricate 200 mm (8-inch) wafers.

Formerly known as the International Consortium for Advanced Manufacturing Research (ICAMR), the BRIDG facility provides the infrastructure that enables the development of tools and processes to manufacture microelectronic sensor chips that connect people and their devices to the Internet of Things and that will enable electronic devices of all kinds to communicate. BRIDG officially moved into its 109,000 square foot facility (see Figure 2) in March 2017. The BRIDG facility includes nearly 60,000 square feet of laboratory and manufacturing space that includes two “cleanrooms” --- one operating at Class 100 standards and the other at Class 10,000.¹⁵

FIGURE 2. BRIDG FACILITY



Source: Seamus Payne, courtesy of Skanska

BRIDG capabilities are centered on an advanced system integration platform, which enables the high-density integration of multichip systems. BRIDG provides the following capabilities in support of heterogeneous device integration techniques:

- BRIDG is one of the few 200mm facilities in the world with the ability to implement copper (dual damascene) and gold for electrical signal routing and interconnect.
- Using ultra-high-density silicon interposer capabilities, BRIDG can build and assemble electrical signal interfaces between heterogeneous devices using micro-contact arrays at pitches of 4 microns and smaller.

¹⁵ Typically used in manufacturing or scientific research, a *cleanroom* is a controlled environment that has a low level of pollutants such as dust, airborne microbes, aerosol particles, and chemical vapors.

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- Current photolithography capabilities allow for chip features of 0.5 micron vias and 0.35 micron lines and spaces, which enables ultra-dense metal interconnect between chips using silicon interposers and redistribution layers of metal for signal routing. Future plans include acquiring additional photolithography tools with capabilities down to 50 nanometers and smaller.¹⁶

Among the first chip process technologies established at BRIDG is a unique CMOS-Integratable Physically Unclonable Function (CIPUF) process, currently in the qualification phase, that will enable the creation of an array of addressable PUF cells that are extremely low power, radiation tolerant, and anti-tamper risk averse. CIPUF technology provides:

- Very large inter-PUF variations with no internal traceable electrical (non-detectable) or deterministic turn-on characteristics, making it extremely difficult to discover, predict, or hack;
- Root-of-trust for multiple layers of security that is extremely low power and highly integratable into any computer system;
- Anti-tamper protection against cloning, counterfeiting, overbuilding, reverse engineering, and data leakage; and
- Key storage, key management, and crypto functionality.¹⁷

BRIDG develops and integrates microelectronic chips and “smart sensors” technology that are smaller, faster, more affordable, and more capable than what existed yesterday. Smart sensors have a multi-sensing capability that measures the temperature, pressure, humidity and position and processes the data using microprocessors and advanced computation models. Smart sensors offer various advantages such as high reliability, low power consumption, wireless configuration, high performance, easy maintenance, size flexibility and minimal requirement for interconnecting cables.¹⁸

By combining a sensor with an advanced microprocessor, smart sensors can filter out and compensate for anomalies in sensory data before transmission to control networks. This results in greater accuracy and greater information connectivity which, in turn, improves decision making and performs tasks more quickly.

But BRIDG is more than just a facility. Established in Florida as a not-for-profit public-private-partnership through the support of its founding visionaries,¹⁹ BRIDG serves as the “cornerstone” of NeoCity and functions as a global magnet for innovation and investment, and as a catalyst for continued growth in Central Florida. Joining BRIDG at NeoCity is imec’s USA Nanoelectronics Design Center, which focuses on advanced high-speed electronics, photonics, and specialized imaging technologies, and NeoCity Academy, a STEM-oriented high school. Recently opened in 2019 is a 100,000 square-foot office building adjacent to BRIDG that houses the administrative functions for imec and BRIDG as well as support services for startup companies.

16 BRIDG, “Advanced System Integration,” retrieved from https://secureservercdn.net/198.71.233.184/1cb.d2e.myftpupload.com/wp-content/uploads/2019/05/BRIDG_DataSheets_ASI-Final.pdf, October 3, 2019.

17 BRIDG, “CMOS-Integratable PUF Technology,” retrieved from https://secureservercdn.net/198.71.233.184/1cb.d2e=-0myftpupload.com/wp-content/uploads/2019/05/BRIDG_DataSheets_CMOS-Final.pdf, October 3, 2019.

18 Statistics Market Research Consulting Pvt. Ltd., “Smart Sensors – Global Market Outlook (2017-2026),” retrieved from www.researchandmarkets.com/reports/4827671/smart-sensors-global-market-outlook-2017-2026?utm_source=BW&utm_medium=PressRelease&utm_code=98cs9v&utm_campaign=1287998+-+Smart+Sensors%3a+Global+Market+Analysis+%26+Outlook+to+2026&utm_exec=joca220prd, October 4, 2019.

19 Osceola County, University of Central Florida, and the Florida High Tech Corridor Council.

Economic Impacts of BRIDG/NeoCity

Osceola County

The master plan envisions NeoCity becoming the world’s most significant and comprehensive global center for smart sensor, photonics, and nano-technology research and development, big data/predictive analytics, and workforce talent concentration.²⁰ Included in the master plan is an economic impact study conducted by AngelouEconomics that measures NeoCity’s economic contribution to Osceola County through the full build-out (50 years) of the development.

Angelou’s economic impact study expresses the following impacts in terms of jobs, labor income, and total economic output:

- Direct impacts --- include the capital investment, jobs created, and labor incomes paid within NeoCity;
- Indirect impacts --- encompass the impacts for “downstream” companies that support or supply NeoCity; and
- Induced impacts --- measure the spending patterns of those with jobs that have benefited from NeoCity.

The study looks at two different scenarios (see Table I): an industrial-weighted scenario, which offers more industrial space and lower employment density at full build-out; and an office-weighted scenario, which offers more commercial space and a higher employment density at full build-out. The difference in the two scenarios is largely the result of the different product types to be brought on-line over the build-out of the development.

TABLE I. BRIDG/NEOCITY DEVELOPMENT SCENARIOS

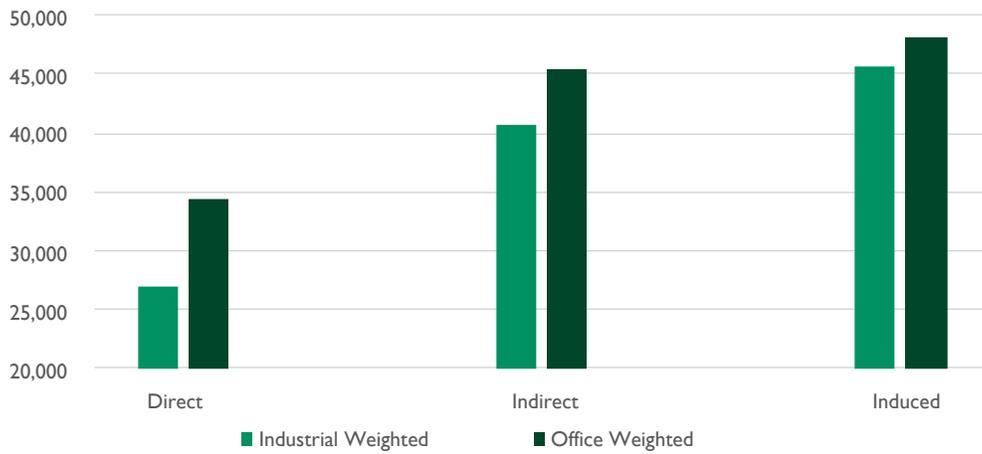
Industrial-Weighted Scenario		Office-Weighted Scenario	
Building Type	Square Feet	Building Type	Square Feet
Commercial	7.1M	Commercial	8.5M
Industrial	2.2M	Industrial	691K
Residential	545K	Residential	1.7M
Total	9.9M	Total	10.9M

Source: NeoCity Master Plan

Angelou’s analysis projects the build-out of NeoCity will generate from 113,300 (Industrial-weighted) to 127,700 (Office-weighted) direct, indirect, and induced jobs, as shown in Figure 3.

²⁰ Perkins + Will, “NeoCity Master Plan,” August 2017.

FIGURE 3. JOBS BY SCENARIO



Source: AngelouEconomics, 2017

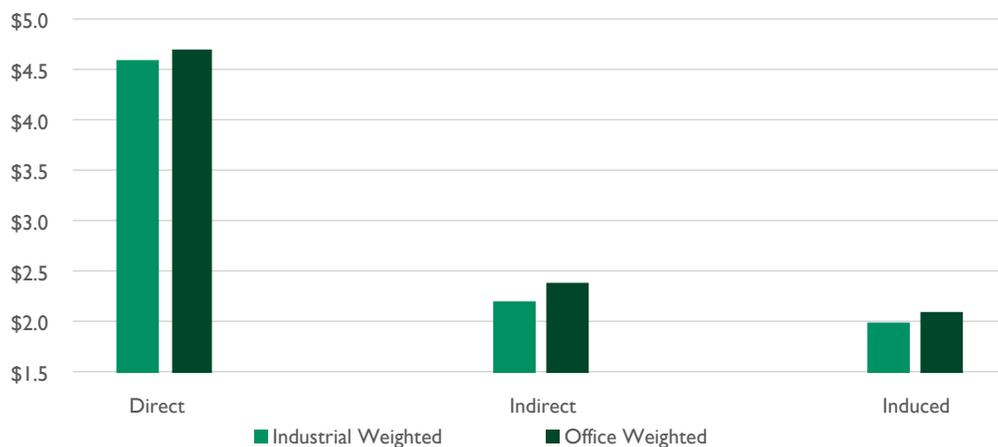
For each scenario, AngelouEconomics projected the following top jobs to Osceola County:

TABLE 2. PROJECTED TOP JOBS: OSCEOLA COUNTY

	Office Weighted	Industrial Weighted
Construction	9,800	5,300
Research & Development	9,400	7,300
Product Design	9,100	6,500
Semiconductor Manufacturing	700	NA
Printed Circuit Manufacturing	NA	1,500
Electrical Testing & Quality Assurance	400	800

Angelou’s analysis projects the build-out of NeoCity will generate from \$8.8 billion (Industrial-weighted) to \$9.2 billion (Office-weighted) in labor income, as shown in Figure 4.

FIGURE 4. LABOR INCOME BY SCENARIO (\$ IN BILLIONS)



Source: AngelouEconomics, 2017

All told, the total economic output of NeoCity at build-out is projected to range from \$25.3 billion (Industrial-weighted scenario) to \$28.8 billion (Office-weighted scenario).²¹

Tax Revenues

The taxable value of property in NeoCity at build-out is estimated to range from \$1.5 billion to \$2.1 billion.²² The tax revenue model:

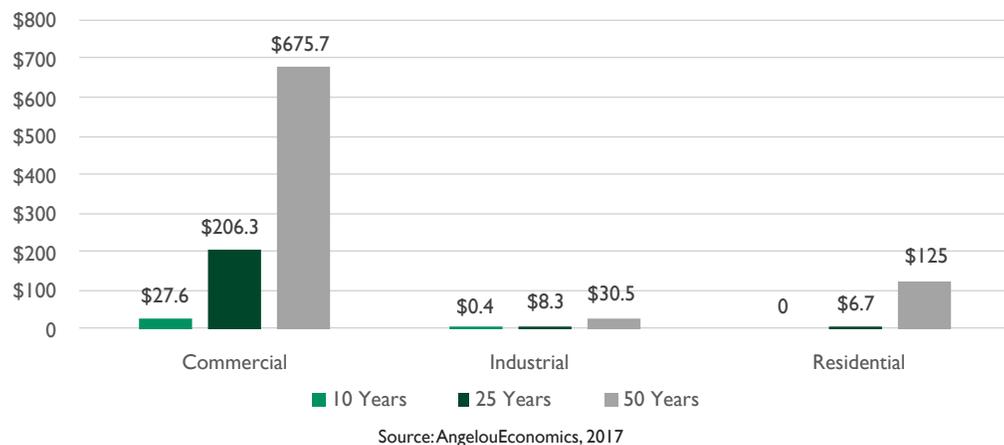
- Details revenues for commercial, industrial, and residential uses;
- Uses the Industrial-weighted and Office-weighted scenarios; and
- Considers cumulative revenues after 10, 25, and 50 years.

The projected cumulative tax revenues for 10, 25, and 50 years for the Industrial-weighted and Office-weighted scenarios are shown in Figures 5 and 6, respectively.

FIGURE 5. INDUSTRIAL WEIGHTED SCENARIO — PROJECTED TAX REVENUES (\$ IN MILLIONS)



FIGURE 6. OFFICE WEIGHTED SCENARIO — PROJECTED TAX REVENUES (\$ IN MILLIONS)



21 Perkins + Will, "NeoCity Master Plan," August 2017.

22 Ibid.

Surrounding Counties

The economic analysis conducted by AngelouEconomics focused only on the impacts of BRIDG and NeoCity on the economy of Osceola County. Given limited data on BRIDG's economic impact on surrounding counties, one can look at the 2014 economic impact analysis of the 20-year economic impact of SEMATECH on Austin and its surrounding counties conducted by AngelouEconomics for the Florida High Tech Corridor Council to better gauge the impacts of BRIDG on surrounding counties.

AngelouEconomics credits SEMATECH as being the driving force behind Austin's explosive economic expansion. High-tech supply chain development and the clustering of related industries after SEMATECH helped double Austin's population (from 800,000 to 1.6 million) from 1987 to 2008.²³ As shown in Table 3, AngelouEconomics found that the location of SEMATECH in Austin (Travis County) has:

- Created more than 36,000 jobs in the regional economy;
- Created more than \$2.2 billion in regional labor income paid to workers;
- Generated more than \$25.7 billion in total regional economic activity; and
- Generated more than \$912 million in state and local, and federal tax revenues.²⁴

TABLE 3. SEMATECH ECONOMIC IMPACT: 1987 - 2007

	Travis County	Bastrop County	Caldwell County	Hays County	Williamson County	TOTAL
Jobs	29,443	349	153	910	5,274	36,129
Labor Income	\$1,930,568,052	\$2,661,916	\$953,621	\$11,199,578	\$264,700,291	\$2,210,083,458
Economic Activity	\$24,915,148,384	\$43,079,750	\$11,711,578	\$81,559,510	\$703,402,209	\$25,754,901,431
<i>Tax Revenues</i>						
State & Local	\$273,251,502	\$4,990,010	\$1,017,546	\$7,662,907	\$51,003,123	\$337,925,088
Federal	\$492,923,379	\$4,360,211	\$1,395,220	\$8,375,600	\$78,790,410	\$585,844,820
<i>Retail Benefit</i>						
Output	\$112,382,059	\$3,276,517	\$1,368,180	\$8,321,460	\$40,231,027	\$165,579,243
Jobs	1,577	58	22	151	608	2,416

Source: AngelouEconomics, "20-Year Economic Impact of SEMATECH on Austin and its Surrounding Counties," October 10, 2014.

Public and Private Investment in BRIDG

BRIDG is modeled after a successful public-private partnership of semiconductor companies (SEMATECH) established in Austin, Texas in 1987 to restore the U.S. industry's competitiveness in the global semiconductor manufacturing market. In 2003, the state of New York partnered with the SEMATECH consortium to research and develop advanced nanotechnology production and manufacturing at state-built facilities in Albany.

Originally envisioned as a public-private partnership with corporate and other external memberships and \$125 million in long-term state support, the BRIDG project included a research and advanced manufacturing facility to be constructed and financed by Osceola County through the issuance of bonds backed by sales tax receipts. Upon completion, Osceola County leased the completed facility to the

²³ AngelouEconomics, "20-Year Economic Impact of SEMATECH on Austin and its Surrounding Counties," October 10, 2014.

²⁴ Ibid.

University of Central Florida (UCF) for 40 years at a base rent of \$1 per year. UCF is responsible for paying all operational costs and assumes ownership of the facility when the lease term ends. In October 2017, UCF signed a management agreement for BRIDG to operate the facility.²⁵

Local Government Investment

Since FY 2016, UCF has invested nearly \$25.7 million of university funds into BRIDG. Osceola County has committed in excess of \$100 million over 40 years to the project.²⁶

“BRIDG is an important catalyst to boosting our state’s economic landscape and strength in technology innovation... BRIDG provides industry with broad business development initiatives which are focused on revenue generation, long-term sustainability, and cost-effective access to new technologies.”

— DR. BOB PORTER, FMR EXECUTIVE DIRECTOR OF ECONOMIC DEVELOPMENT AND STRATEGIC INITIATIVES, OSCEOLA COUNTY

State Government Investment

Since 2016, BRIDG has received a total of \$36 million in state funding. The state budget for fiscal year 2016-17 included a \$15 million state appropriation for BRIDG. A non-recurring \$10 million appropriation permitted BRIDG to purchase tools and equipment for manufacturing. The remaining \$5 million in continuation funds permitted BRIDG pursue federal contracts, attract industry partners, and proceed with plans for its continued operation and growth.

For fiscal year 2017-18, the Legislature appropriated \$9.5 million. A non-recurring \$2.0 million appropriation permitted BRIDG to purchase sophisticated tools and equipment to be used in BRIDG’s manufacturing development and research activities for cutting edge smart sensor technology. The remaining \$7.5 million in continuation funds permitted BRIDG pursue federal contracts, attract industry partners, and proceed with plans for its continued operation and growth.

For fiscal year 2018-19, the Legislature appropriated \$5 million in recurring funds for BRIDG to continue ramping up and to support its ongoing base operations, including critical personnel hiring, purchase of critical research materials, R&D operations, back office operations, and leasing of highly specialized manufacturing tools. A non-recurring appropriation of \$500,000 permitted BRIDG to purchase tools and equipment. An additional \$1.0 million was appropriated to help advance fire detection/safety device sensor technology.

For fiscal year 2019-20, the Legislature appropriated \$6 million in general revenue funds for the purchase or lease and installation of sophisticated tools and equipment to be used in BRIDG’s microelectronics manufacturing development and research activities.

An additional \$250,000 was appropriated to support BRIDG’s efforts to help advance sensor technology integrated with fire detection devices to save lives and lower insurance costs via earlier detection. Both of these appropriations were vetoed by the Governor. A remaining \$5 million in continuation funds for BRIDG was approved to support continued base operations and growth.

²⁵ University of Central Florida, “Board of Trustees Special Teleconference Meeting,” December 16, 2019.

²⁶ Ibid.

Federal Government Investment

The U.S. Department of Defense's Industrial Base Analysis and Sustainment (IBAS) office has awarded BRIDG its first major federal defense contract valued at up to more than \$20 million to provide a new technology for next generation microelectronic multi-chip systems that will strengthen national security and cyber resiliency for the United States defense industrial base.²⁷

“BRIDG is very well positioned to provide the Defense Department with this critical, next-generation technology that will strengthen national security and cyber resiliency for the United States defense industrial base. I am proud to have worked with Congressman Soto to help ensure Florida companies receive full and fair consideration for federal contracts.”

— SENATOR MARCO RUBIO, UNITED STATES SENATE

“I’m proud to have worked in a bi-partisan manner with Senator Rubio to support BRIDG and their efforts to achieve federal recognition for their advanced microelectronics work. This contract will strengthen our national security and continue to bring high tech jobs home to Central Florida.”

— REPRESENTATIVE DARREN SOTO, U.S. HOUSE OF REPRESENTATIVES

The microelectronics that are used in large defense projects are frequently outsourced or made by foreign-owned companies. Securing the microelectronics supply chain is a priority of the Department of Defense and this award is the first step in a larger effort that the federal government is beginning to undertake.²⁸ Securing the microelectronics supply chain also positions BRIDG to become a leader in 5G, the Internet of Things, and the creation of countless smart sensors.

“The capabilities enabled by this contract will allow us to assist the defense industrial base to achieve performance levels that consume 80 percent less power and are five times faster than conventional electronics. This positions BRIDG to be at the forefront of protecting our nation’s technical leadership and global competitiveness.”

— CHESTER KENNEDY, FORMER CEO, BRIDG

“The award announcement is recognition that Osceola County is an emerging leader in securing our nation’s microelectronics supply chain. The work we do here will not only help our service members by providing them with advanced technology that was completely and securely built in the United States but will also create new high-tech jobs right here in Kissimmee and Central Florida.”

— CHERYL GRIEB, COMMISSIONER, OSCEOLA COUNTY COMMISSION

²⁷ BRIDG, “Department of Defense Awards Over \$20 Million to BRIDG,” Press Release, October 29, 2019.

²⁸ *Ibid.*

The U.S. Air Force Research Laboratory (AFRL), which plays an integral role in the discovery, development, and integration of cost-effective war-fighting technologies, has awarded BRIDG a major federal defense contract valued at \$7.5 million to develop a secure digital twin for semiconductor (SDTS) capability that will enable end-users to validate the integrity of a chip or assembly of multiple chips.²⁹

Private Investment

BRIDG has proven to be successful in establishing partnerships with private companies that will create new solutions and further transform the smart sensor industry. Working with its partners, BRIDG is energizing the Central Florida region and creating an established cluster of high-tech companies intensely focused on the future and industry solutions for next-generation nanoscale production.³⁰ Some of BRIDG’s most prominent private partnerships are identified in Table 4.

TABLE 4. BRIDG PRIVATE BUSINESS PARTNERSHIPS

Partner	Scope of Engagement
SUSS MicroTec	SUSS MicroTec equipment, located on-site at BRIDG, will help to fill vital needs in BRIDG’s infrastructure for manufacturing and research and development. The unique tools manufactured by SUSS MicroTec will add capabilities that will enable BRIDG customers to design systems faster, smaller, lighter, and using lower power, which will allow BRIDG customers to stay ahead of their competition while having key systems components manufactured in the U.S.
Tokyo Electron	BRIDG will develop tool and process technology needed to further enable collaborative approaches for development-to-commercialization of technologies and applications that accelerate commercialization of emerging technologies.
L3Harris Technologies	L3Harris has been a long-standing partner of BRIDG, partnering on several efforts that require its technical and domestic microelectronics fabrication infrastructure-related capabilities for projects focused on developing critical emerging technologies to retain the leading edge for the nation’s warfighters. Through its long-term partnership with BRIDG, L3Harris seeks to enhance the reduction of systems through advanced interconnections that use traditional semiconductor manufacturing processes. The impact to the future of electrical interconnection will be at the heart of next-generation devices that drive computing ability.
Massey Services	BRIDG will continue to provide Massey Services the opportunity to leverage cutting edge sensor technology that will benefit its customers and businesses. For example, the partnership helps drive innovation that can be applied in real-world situations, such as detecting pests inside the home due to sensor recognition and therefore contacting Massey Services. In return, Massey Services can contact and communicate to the customer exactly where the pest was located and schedule a time to service the home.

29 BRIDG, “Air Force Research Laboratory Awards BRIDG \$7.5 Million,” Press Release, November 19, 2019.

30 BRIDG, “A Catalyst for Growth,” retrieved from <https://secureservercdn.net/198.71.233.184/1cb.d2e.myftpupload.com/wp-content/uploads/2019/01/BRIDG-Insert-December-2018-Final.pdf>, October 29, 2019.

Siemens	BRIDG will drive the development of Digital Twin technologies for the semiconductor industry by utilizing Siemens' PLM software portfolio to enable BRIDG's research and development activities. The combination of expertise will help establish the first Digital Enterprise Solution for semiconductor manufacturing at the BRIDG wafer fabrication facility. With an in-kind software grant valued at more than \$30M, this partnership creates an important milestone—the first ever digital enterprise implementation in the semiconductor industry. Siemens' Digital Enterprise solutions enable manufacturing companies to streamline and digitalize their entire business process, seamlessly integrating suppliers into the mix. Designed as one of the world's most flexible and adaptable fabrication facilities, BRIDG is focused on the manufacturing development of advanced technologies in smart sensors, imagers, advanced devices and 2.5D/3D chip integration.
State University of New York Polytechnic Institute (SUNY Poly)	The Memorandum of Understanding between BRIDG and The Research Foundation for The State University of New York on behalf of SUNY Poly will further help connect researchers with industry to accelerate the development of emerging technologies.
i3 Microsystems	BRIDG will support the technology development and manufacturing deployment of i3's 4D Heterogenous System in Package (4DHSiPTM) technology. The unique capability of i3's 4DHSiPTM technology enables the placement of over 100 components in a single package the size of a thumb nail, with the thickness of a credit card. This package can be stacked up to 5 high, containing 500 components and 70 interconnect layers on a heterogenous basis. This is an astonishing reduction in size, weight and power consumption, creating tremendous potential for 4DHSiPTM in markets such as aerospace, interconnect systems, medical, servers, internet of things, smart machines and automotive. No other company in the world has this capability.
Arizona State University	BRIDG acquired licensing access to Conductive Bridging Random Access Memory (CBRAM) technology. Now being commercialized and offered by BRIDG, this ultra-low-energy data storage technology for computers achieves substantially lower energy consumption, enhanced performance, and reduced cost compared to current technologies.

Global Market for Smart Sensors

The global market for smart sensors accounted for \$24.26 billion in 2017 and is expected to reach \$123.32 billion by 2026, growing at a compound annual growth rate of 19.8 percent from 2017 to 2026. Some of the key factors driving the market growth for smart sensors are growing demand for consumer electronics products, higher demand in the healthcare and automotive industries and the growing trend of miniaturization in electronics.³¹

The global smart sensors market has been segmented on the basis of:

- End users --- automotive, consumer electronics, industrial, infrastructure/construction, medical, and others.
- Technology --- complementary metal-oxide-semiconductor (CMOS), and micro-electro-mechanical systems (MEMS) among others. During the forecast period, CMOS based smart sensors are dominating the market. It is expected to generate \$40 billion in market revenue while growing at a compound annual growth rate of 25.01 percent.
- Type --- image sensors, motion sensors, position sensors, pressure sensors, temperature sensors, touch sensors, and others. Smart image sensors segment is dominating the market. During the forecast period, the smart touch sensor is expected to grow with the fastest rate at a compound annual growth rate of 27.51 percent.
- Region --- North America, Europe, Asia Pacific, and the Middle East & Africa (MEA). North America is the biggest regional market due to technological advancement, the presence of many key market players, and many established industries being present in this region.³²

Economic Benefits to the State

Florida ranks number 49 out of 50 states nationwide for Advanced Manufacturing job salaries,³³ as advanced Manufacturing programs like BRIDG provide high-wage, high-skill jobs for Floridians. As a catalyst for creating high-wage, high-skill job opportunities, not only in Florida but across the Southeast U.S., BRIDG is expected to create a more financially sound and diverse economy in Central Florida. As of September 30, 2019, the average annual pay for the Advanced Manufacturing jobs category in Florida is \$63,703 a year. While ZipRecruiter reports seeing annual salaries as high as \$110,410 and as low as \$18,052, the majority of salaries within the Advanced Manufacturing jobs category currently range between \$38,622 (25th percentile) to \$77,665 (75th percentile) in Florida (see Table 5).

31 Business Wire, "Smart Sensors: Global Market Analysis & Outlook to 2026 - ResearchAndMarkets.com," retrieved from www.businesswire.com/news/home/20190820005552/en/Smart-Sensors-Global-Market-Analysis-Outlook-2026, October 4, 2019.

32 Market Watch, "Smart Sensor Market 2019: Global Size, Share, Industry Growth, Key Players Analysis, Statistics, Future Trends, Opportunity Assessment, Segmentation and Regional Forecast to 2022," February 21, 2019, retrieved from www.marketwatch.com/press-release/smart-sensor-market-2019-global-size-share-industry-growth-key-players-analysis-statistics-future-trends-opportunity-assessment-segmentation-and-regional-forecast-to-2022-2019-02-21, October 7, 2019.

33 ZipRecruiter, "Advanced Manufacturing Salary in Florida," retrieved from www.ziprecruiter.com/Salaries/How-Much-Does-an-Advanced-Manufacturing-Make-a-Year-in-Florida, October 7, 2019.

TABLE 5. AVERAGE ADVANCED MANUFACTURING SALARY IN FLORIDA

	Salary Range (Percentile)		
	25 th	Average	75 th
Annual Salary	\$38,622	\$63,703	\$77,665
Monthly Salary	\$3,218	\$5,309	\$6,472
Weekly Salary	\$743	\$1,225	\$1,494
Hourly Salary	\$19	\$31	\$37

Source: ZipRecruiter

The SEMATECH consortium, the model upon which BRIDG is based, created more than 36,000 jobs and generated more than \$25 billion in economic activity within 20 years. More than 50 companies were operating just outside Austin, Texas, making Austin America’s hub for information technology innovation and manufacturing.³⁴

According to a 2015 study by Arduin Associates, if BRIDG were able to replicate the technology cluster in Albany, New York, within 10 years Florida would experience 19,800 new jobs, \$1.1 billion in total earnings, and \$106 million in state and local taxes. If BRIDG were able to replicate the technology cluster in Austin, Texas, within 10 years Florida would experience 83,180 new jobs, \$5.2 billion in total earnings, and \$482 million in state and local taxes.³⁵

“BRIDG is poised to emerge as Florida’s technical and economic engine for fostering innovation in microelectronics, increasing high-tech employment and regional wage growth, and developing a skilled microelectronics workforce to ensure global competitiveness.”

— BRIAN SAPP, INTERIM CEO, BRIDG

BRIDG has the potential to establish Florida and NeoCity as a major hub, if not THE major hub, for information technology research, innovation, and manufacturing. This is critical to an area that is eager to attract high-wage, high-skill, jobs. The Orlando-Kissimmee-Sanford metropolitan statistical area ranked last among America’s top cities for median income levels among America’s top cities. Data from the U.S. Bureau of Labor Statistics show median wages of \$33,150 a year, or \$15.94 per hour, with one in every four jobs paying less than \$23,050 annually.³⁶

BRIDG has the potential to establish Florida and NeoCity as a major player in the Defense industry. With more than \$25 million in major U.S. defense contracts, BRIDG is well-positioned to provide the U.S. Department of Defense with critical, “next-generation” technology that will strengthen national security and cyber resiliency for the U.S. defense industrial base.

34 FAMRC, “Florida Becoming a Global Leader,” retrieved from <http://www.orlandoedc.com/MetroOrlando/media/Metro-Orlando/Industries/Advanced-Technologies/ICAMR-FAMRCInfographic.pdf?ext=.pdf>, October 7, 2019.

35 Arduin Associates, “Economic Impact from a Potential Advanced Technology Manufacturing Cluster in Florida,” January 2015.

36 Rachel Christian, “Osceola Struggles to Fix for Low-Income Economy,” Osceola News-Gazette, April 19, 2019.

Conclusions and Recommendations

BRIDG is a major infrastructure investment that will improve the competitive positioning of the State of Florida for advanced manufacturing. It will provide an open-innovation infrastructure platform for a global center of excellence in advanced materials that will enable the commercialization of future smart sensors and the manufacturing development of other next-generation emerging technology. BRIDG provides Florida with a platform for advanced manufacturing development that will bridge the gap between advanced research at Florida's research universities and cost-competitive manufacturing that will get these discoveries in the marketplace.

BRIDG will apply smart manufacturing and Industry 4.0 strategies, including secure digital twin manufacturing concepts, to develop data-driven, quantifiable security standards and methodologies for the fabrication of microelectronics that are well aligned with the needs of both the federal government and commercial customers in the automotive, aerospace, defense, medical, and industrial markets.

By leveraging technology capabilities, processes, and background intellectual property, BRIDG provides open-innovation platforms at economies of scale needed for cost-effective manufacturing, allowing BRIDG's partners to compete globally. With capabilities that enable advances in many industries (e.g., medical, agricultural, aerospace, defense, cybersecurity, food and environmental safety, autonomous vehicles, and critical infrastructure), BRIDG serves as a catalyst for economic growth and diversification. BRIDG also has partnerships in place with educational institutions to strengthen our nation's STEM (Science, Technology, Engineering, and Mathematics) pipeline.³⁷

Modeled after a successful public-private semiconductor consortium in New York and Texas (SEMATECH), BRIDG will be able to attract a wide set of advanced manufacturing and technological supply chain corporations to the State of Florida. By creating this open innovation infrastructure and working with the first industry-led smart sensor technology not-for-profit public-private partnership to attract advanced global manufacturing leaders, BRIDG will position Florida as the dominant global manufacturing hub for smart sensor technology.

At build-out (50 years), NeoCity will include 8.5 million square feet of Commercial development, 691,000 square feet of Industrial development, and 1.7 million square feet of Residential development. At full build-out, NeoCity has the potential to become Osceola County's largest tax payer (based on the total taxable value of property). The long-term total economic output in Osceola County is expected to range from \$25.3 billion to \$28.8 billion, with 113,300 to 127,700 new jobs and labor income ranging from \$8.8 billion to \$9.2 billion. Total cumulative tax revenues generated by the build-out of NeoCity are estimated at \$781 million to \$831 million.

“NeoCity is generating incredible momentum, positioning Central Florida as an innovation epicenter in smart sensors, photonics, and optics... We expect this development to be a gamechanger for these industries and high-wage job creation in Osceola County.”

— DON FISHER, OSCEOLA COUNTY MANAGER

³⁷ BRIDG, “What is BRIDG?,” retrieved from <https://gobridg.com/what-is-bridg/>, October 3, 2019.

BRIDG’s importance to the U.S. defense industry cannot be overstated. By providing a trusted and assured fabrication facility for the production of microelectronic devices in Central Florida, BRIDG protects the defense industry from intellectual property theft by hostile foreign governments. BRIDG’s digital fingerprinting technology protects microelectronic devices against cloning, counterfeiting, overbuilding, reverse engineering, and data leakage.

“Here, in our nation’s fast-growing, third-largest state, our alliance stands to reinvent the future of nano-electronics research and development in this country and beyond... We will position Central Florida to be a high-tech magnet for 21st-century international industry.”

— JOHN C. HITT, FORMER PRESIDENT, UNIVERSITY OF CENTRAL FLORIDA

Florida TaxWatch supports continued public investment in BRIDG.

ABOUT FLORIDA TAXWATCH

As an independent, nonpartisan, nonprofit taxpayer research institute and government watchdog, it is the mission of Florida TaxWatch to provide the citizens of Florida and public officials with high quality, independent research and analysis of issues related to state and local government taxation, expenditures, policies, and programs. Florida TaxWatch works to improve the productivity and accountability of Florida government. Its research recommends productivity enhancements and explains the statewide impact of fiscal and economic policies and practices on citizens and businesses.

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