

NYSTAR

Annual Report - 2017



**Division of
Science, Technology
& Innovation**

A Division of Empire State Development

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TABLE OF CONTENTS

Table of Contents 3

Introduction 4

New York State’s Innovation Economy..... 5

Overview of NYSTAR Programs 7

Manufacturing Extension Partnership (NY MEP) 10

Centers for Advanced Technology (CAT)..... 14

Centers of Excellence (CoE)..... 32

Innovation Hot Spots & New York State Certified Business Incubators 54

High Performance Computing 55

Science + Technology Law Center..... 56

Game Development Centers 58

Matching Grants Leverage Program 60

Faculty Development & Technology Transfer 61

Other Updates..... 62

Appendix 1: Additional Reporting 63

Appendix 2: Methodology 65

INTRODUCTION

Across the United States and around the world, communities are realizing the power of economic development strategies that build on the synergies of partnerships among universities, industry, entrepreneurs, and start-up ecosystems. Terms like “economic gardening” and “innovation orchards” reflect what New York State already does well: cultivating innovation and growth in companies and early-stage ventures that already call the Empire State home.

To this end, Empire State Development (ESD)'s Division of Science, Technology and Innovation (NYSTAR) is tasked with advancing technology innovation and commercialization in New York State.¹ NYSTAR plays an integral role in ESD's economic development strategy by overseeing funding for university research centers and by providing assistance to businesses through NYSTAR's Centers of Excellence, Centers for Advanced Technology, Manufacturing Extension Partnership centers, Innovation Hot Spots, New York State Certified Business Incubators, and other assets.

NYSTAR offers programs that assist companies from start-up through maturity phases by leveraging the State's unparalleled investments in world-class technology assets and expertise. In total, NYSTAR provides roughly \$55 million in annual funding to support over 70 centers, a network of vital assets for enabling technology advancement that provide direct assistance to New York State companies to foster manufacturing growth and job creation.

NYSTAR's centers and programs touch all points of the state's innovation economy, including but not limited to advanced materials, biotech and life sciences, renewable energy, materials processing, optics and imaging, software and digital media, and electronics technologies. The NYSTAR network is also well integrated with Governor Andrew M. Cuomo's ten Regional Economic Development Councils (REDCs), with many NYSTAR partners serving as valuable REDC members or advisors on matters relating to innovation, entrepreneurship, and technology-led development. In short, NYSTAR and its partners are proud to contribute to New York's leadership in the global innovation economy.

This document serves as the 2017 Annual Report for ESD's NYSTAR programs. It begins by providing context with respect to the State of New York's broader, innovation-based economic strategy, including investments in other ESD and New York State programs in addition to NYSTAR's. Next, it provides an overview of NYSTAR's programs along with updates on important recent activities and accomplishments. Third, the report describes the results of each specific NYSTAR program and individual center, providing the most recent available data for each, which is typically for the 2016 calendar year or the 2015-2016 contract year. Finally, the report concludes with appendices that contain additional information on the methodology used for the reporting and validation of NYSTAR's economic impacts, as well as other notes of interest.

¹ Most of NYSTAR program authority is found in statute including Article 10a of the Public Authority Law, Article 10b of the Executive Law, Section 16-v of the UDC Act, and Article 19 of the Economic Development Law.

NEW YORK STATE'S INNOVATION ECONOMY

Under Governor Andrew M. Cuomo, New York State has made unparalleled investments in world-class technology assets and expertise in order to strengthen its position as a global hub of innovation. Annual State research and development (R&D) investments of \$434.3 million are complemented by over \$15 billion in annual business R&D.² Recent State investments in innovation include:

- NYSTAR – a division of ESD and the focus of this report, NYSTAR promotes the advancement of technology development, innovation, and commercialization in New York State by its oversight of over \$55 million in annual funding for university research centers and business assistance.
- New York State Life Sciences Initiative – a \$520 million investment of capital, operational support, and tax incentives that will be administered by ESD in order to make New York State the leading frontier of commercial life science innovation.
- New York Ventures – meeting the critical capital needs of the state's innovation economy by providing funding to high-growth start-ups as they move from concept to commercialization, through early growth and expansion. As a division of ESD, New York Ventures administers the State's innovation investment funds, providing equity investment capital to early-stage technology-based businesses through direct investments and a fund-of-funds.
- NYSERDA – The New York State Energy Research and Development Authority, a public benefit corporation, provides R&D support, technical expertise, incentives, and other programs that advance innovative energy solutions to improve New York's economy and environment.
- NYSUNY 2020 – the mission of NYSUNY 2020 campus capital investments is to elevate the State University of New York (SUNY)'s public higher education institutions as a catalyst for regional economic development and affordable education.
- REDC Awards – a multi-billion-dollar initiative to support the revitalization of communities via ten Regional Economic Development Councils, a component of which includes various priority projects in strategic technology areas tailored to the strengths of each region. A few such projects include the Alfred State College Biorefinery and Commercialization Center, the Binghamton University Northeast Center for Chemical Energy Storage (NECCES) Battery Dry Room, the Mohawk Valley Community College Advanced Manufacturing Institute, and numerous investments in STEM-related education projects at school districts around the state.

In addition to State initiatives, New York State is also home to three federally-funded Manufacturing USA institutes, more than any other state, and New York State higher education institutions were leading partners in Manufacturing USA Institutes headquartered in other states. New York's institutes include:

- The American Institute for Manufacturing Integrated Photonics (AIM Photonics), headquartered in Rochester as a public-private partnership led by the SUNY Polytechnic Institute;

² NSF National Center for Science & Engineering Statistics, Science and Engineering State Profiles (2016, 2017).

- The Clean Energy Manufacturing Innovation Institute for Reducing Embodied-energy and Decreasing Emissions in Materials Manufacturing (REMADE) Institute, headquartered in Rochester, with Rochester Institute of Technology serving as a lead academic institution; and
- The Rapid Advancement in Process Intensification Deployment (RAPID) Institute, headquartered in New York City and led by the American Institute of Chemical Engineers.

Ultimately, New York State’s investments have strengthened its role as an innovation powerhouse in 2017:

- New York was home to 319 degree-granting institutions of higher education, including nine “R1” research institutions—more than any other state except one.³
- New York had over \$6 billion in higher education R&D expenditures, second-highest among states.⁴
- New York had over \$4.8 billion in federal research and development commitments.⁵
- New York ranked third in the country for its 10,387 patents issued to state residents.⁶
- New York ranked second for State investment in R&D (over \$434 million).⁷
- New York State was home to five federal laboratories.⁸

³ National Center for Education Statistics’ Integrated Postsecondary Education Data System (2017).

⁴ NSF National Center for Science & Engineering Statistics, Science and Engineering State Profiles (2017).

⁵ NSF National Center for Science & Engineering Statistics, Science and Engineering State Profiles (2016, 2017).

⁶ United States Patent and Trademark Office: Performance & Accountability Report (FY 2017)

⁷ NSF National Center for Science & Engineering Statistics, Science and Engineering State Profiles (2017).

⁸ Federal Laboratory Consortium for Technology Transfer.

OVERVIEW OF NYSTAR PROGRAMS

NYSTAR programs represent substantial and critical investments in New York's innovation ecosystem. Highlights of the accomplishments and economic impacts of NYSTAR's programs, as described further in each program section, include:

- During 2016, the 11 centers under the New York Manufacturing Extension Partnership assisted small manufacturers with competitiveness, generating about \$702 million in non-job economic impact and helping to create or retain 3,300 jobs⁹;
- Over the 2015-2016 contract year, the 15 Centers for Advanced Technology collaborated with companies to develop and apply new technologies, generating about \$513 million in non-job economic impact and helping to create or retain about 867 jobs;
- During the 2015-2016 contract year, the 11 Centers of Excellence collaborated with companies to develop and commercialize new products and technologies, generating over \$309 million in non-job economic impact and helping to create or retain 1,405 jobs;
- During the 2015-2016 contract year, the Innovation Hot Spots & New York State Certified Business Incubators provided critical incubation and ship services to start-up companies, generating over \$114 million in non-job economic impact and helping these companies create or retain 854 jobs;
- The High Performance Computing Consortium leveraged New York State's leadership in computational resources and talent in simulation-based engineering to help companies develop and refine best-in-class products;
- The Science & Technology Law Center provided legal research, education, and information to entrepreneurs and companies to help commercialize new technologies from lab to market;
- The Game Development Centers performed groundbreaking digital gaming research and development and assisted companies with gaming concepts, technologies, and trends; and
- The Matching Grants Leverage Program helped attract significant federal research and development funding to New York State institutions.

In support of its programs, NYSTAR held several events designed to enhance collaboration among its network of funded centers and to drive greater utilization of centers' expertise and facilities by New York State businesses. During 2017, these events included:

- NYSTAR Annual Meeting: NYSTAR held its annual meeting in October 2017 at Cornell University. The two-day event was a platform for centers to enhance their knowledge of each other's programs and expertise and learn about innovation-related state and federal initiatives.

⁹ Non-job economic impact refers to the sum of increased or retained company revenue, cost savings realized by the company, non-New York State funds acquired by the company, and capital expenditures by the company, that are attributable to the company's collaboration with the NYSTAR asset. See Appendix 2 for more methodology information.

- NYSTAR Regional Asset Meetings: For the first year ever, NYSTAR and FuzeHub¹⁰ initiated Regional Asset Meetings to enhance regional innovation ecosystems by fostering information sharing, collaboration, and visibility among NYSTAR-funded assets and partners. These meetings were held in the New York City, Central New York, and Finger Lakes regions.
- Solutions Forums: Presented by FuzeHub, these matchmaker-style events connect leaders of manufacturing and product development companies with hand-picked business and technology experts from NYSTAR-funded assets and partners for one-on-one consultations. Solutions Forums were held in the Mohawk Valley, Southern Tier, Capital Region, and Long Island regions.

In 2017, NYSTAR also secured multiple federal awards that allowed the division to disseminate critical technologies into the New York State manufacturing base and secure the competitiveness of important industries:

- \$1.5 million award from the Department of Defense’s (DOD) Office of Economic Adjustment under the Defense Industry Adjustment program: These project funds are being used to help defense supply chain companies diversify to become more resilient to fluctuations in DOD spending. Additional information is available at: <https://esd.ny.gov/manufacturing-and-defense-grants>.
- \$1.2 million grant from the National Institute of Standards and Technology (NIST) to “embed” personnel in the Finger Lakes-based REMADE Institute: This project involves two new NYSTAR/New York Manufacturing Extension Partnership staff members who are responsible for engaging small manufacturers in the institute’s work to help ensure that small manufacturers benefit from the technology developed at the institute.
- \$1.2 million grant from NIST to embed personnel in the Finger Lakes-based AIM Photonics institute: NYSTAR continues work under an earlier NIST “embedding” grant in which the New York Manufacturing Extension Partnership is working closely with AIM Photonics.
- Designation from the federal Department of Commerce/NIST as a Manufacturing Extension Partnership (MEP) center: NYSTAR maintained its federal designation as the MEP for New York State.

Several NYSTAR partners and New York State organizations were also successful in securing additional federal funding during 2017. The following is a small sample:

- The Cornell Center for Materials Research was awarded \$23.2 million for six years from the National Science Foundation (NSF) to support several projects including the Mechanisms, Materials, and Devices for Spin Manipulation project; the Structured Materials for Strong Light-Matter Interactions project; and the 2-D Atomic Membranes for 3-D Systems project.
- Avanti Biosciences, Inc., a preclinical-state biopharmaceutical company in residence at the Center for Biotechnology at Stony Brook University (a CAT) was awarded \$1.9 million over three years in Small Business Innovation Research (SBIR) fast-track grants by the National Institute of Aging (NIA) to support its small molecule treatment for Alzheimer’s disease.

¹⁰ FuzeHub, the ESD-designated statewide New York Manufacturing Extension Partnership center, is charged with promoting NYSTAR assets and connecting manufacturers to innovation assets throughout the state. This non-profit organization is referenced throughout this report as a key NYSTAR economic development partner.

- Syracuse University was an Economic Development Administration i6 Challenge awardee and was granted \$500,000 over three years to promote entrepreneurship in Central New York in innovations that monitor and control energy and environmental quality.
- Hofstra University was also an Economic Development Administration i6 Challenge awardee and was granted \$485,716 over three years to create the Healthcare Entrepreneurship Community Challenge, a program to challenge entrepreneurs to solve healthcare issues facing underserved communities in the New York City metropolitan area.

In its remaining pages, this report next provides details on each specific NYSTAR program.

MANUFACTURING EXTENSION PARTNERSHIP (NY MEP)

Program Overview and Purpose

As a program in the NYSTAR portfolio, the New York Manufacturing Extension Partnership (NY MEP) is a network of organizations that provide growth and innovation services to small and mid-sized manufacturers in every corner of the state to help them create and retain jobs, increase profits, and save time and money. NY MEP is part of the National Institute of Standards and Technology (NIST)'s Hollings Manufacturing Extension Partnership and is supported through a combination of federal and state funding.¹¹

NY MEP provides a variety of services including:

- Innovation strategies;
- Process improvements;
- Quality control;
- Manufacturing scale-up;
- Sustainable manufacturing;
- Supply chain assistance;
- Technology acceleration;
- New market strategies;
- Product development and prototyping;
- Entrepreneurial and start-up assistance, including financing and grant information; and
- Other services tailored to regional priority industry clusters.

After a federal competition, ESD was re-designated by NIST as the New York State MEP Center effective January 1, 2016 through December 31, 2020. On behalf of ESD, NYSTAR then competitively selected NY MEP sub-recipient organizations—one in each economic development region and one “statewide” center (FuzeHub)— to implement the program in New York State.

The following section of the report includes information on each individual NY MEP center, or sub-recipient. A description of the definitions and methodology used to collect and validate economic impact information can be found in Appendix 2.

Duties and Obligations of NY MEP Centers

Each MEP center is obligated to work directly with area manufacturers to provide expertise and services tailored to their most critical needs, ranging from process improvement and workforce development, to business practices and technology transfer. Additionally, MEP Centers have a duty to connect manufacturers

¹¹ The New York MEP program is referred to in Article 10a of Public Authorities Law under the program names “Industrial Technology Extension Service” and “Technology Development Organization.” Funding is provided under Department of Economic Development Aid to Localities.

with government and trade associations, universities and research laboratories, and a host of other public and private resources to help them realize individual business goals.

As a statewide MEP, FuzeHub's duties and obligations are different from those of the individual centers and its performance is measured in ways not reflected in the metrics presented later. FuzeHub's duties and obligations are to market the capabilities of NYSTAR-funded entities, host or support events that foster innovation, act as a referrer for centers or companies that need assistance, and administer the Technology Engagement Fund, which is accessible through a competitive application process for technology development and commercialization efforts.

Examples of NY MEP Center Collaborations with Industry

Each of the NY MEP centers focuses on assisting small- and medium-sized manufacturers.

For example, Lumetrics, a 20-person firm and client of the NextCorps MEP center, was founded in 2003. Leveraging technology originally developed by the Eastman Kodak Corporation, Lumetrics develops and manufactures non-contact optical inspection systems for the medical, glass, food packaging, ophthalmic, automotive, and film industries. When Lumetrics was introducing a new, non-contact, metrology instrument to the market and required testing services prior to exporting the devices to Europe, NextCorps supported third-party testing services through its Advanced Manufacturing Jobs and Innovation Accelerator (AMJIAC) grant. Through NextCorps assistance, Lumetrics realized increased sales of \$400,000 within twelve months and retained sales of \$1,000,000.

Another example is Sewing Technology, Inc., a contract manufacturer of cut-and-sew products primarily for aerospace and defense. When Sewing Technology needed to execute on a contract from the U.S. Navy to supply 5,000 helmet covers per month over the next several years, it represented a huge sales opportunity, but the company faced issues in meeting the monthly demand, as seen in an immediate production backlog and the limited availability of trained sewers in the area. Insyte Consulting, an NY MEP center, was engaged to help Sewing Technology address these issues. After working with Insyte Consulting to apply lean manufacturing concepts, Sewing Technology improved its productivity, increased net margin by 45 percent, increased sales by 60 percent, and expanded employment to 30 people within six months.

NY MEP Center Annual Highlights

Most NY MEP centers are organized as not-for-profit organizations, except for the Manufacturing & Technology Resource Consortium at Stony Brook University MEP and the Advanced Institute for Manufacturing at Mohawk Valley Community College, both of which operate as part of a college.

The following tables provide additional details on each MEP Center's composition, economic impacts, activities and accomplishments. In reviewing this data, it is important to note that three sub-recipients—the Manufacturing & Technology Resource Consortium Stony Brook University, the Advanced Institute for Manufacturing at Mohawk Valley Community College, and FuzeHub—were new to the NY MEP initiative as of January 2016 and therefore had limited economic impacts recorded for 2016.

Table 1: 2016 Economic Impacts of NY MEP Centers

Center	Region	Jobs Created	Jobs Retained	Non-Job Economic Impact	Grant Awarded (Federal & State)	Match Provided	Companies Assisted
Center for Economic Growth <i>(CEG)</i>	Capital	20	143	\$34,907,094	\$575,000	\$510,475	810
Central New York Technology Development Organization <i>(CNYTDO)</i>	Central New York	22	174	\$12,775,368	\$575,000	\$845,144	383
NextCorps <i>(formerly High Tech Rochester)</i>	Finger Lakes	87	155	\$58,137,198	\$850,000	\$2,881,208	803
Manufacturing & Technology Resource Consortium at Stony Brook University <i>(new)</i>	Long Island	1	-	\$135,000	\$950,000	\$271,726	3
Manufacturing & Technology Enterprise Center <i>(formerly HVTDC)</i>	Mid-Hudson	14	85	\$14,717,001	\$850,000	\$731,051	498
Advanced Institute for Manufacturing at Mohawk Valley Community College <i>(new)</i>	Mohawk Valley	8	35	\$13,414,908	\$575,000	\$191,700	110
Industrial & Technology Assistance Corporation <i>(ITAC)</i>	New York City	201	377	\$148,002,620	\$950,000	\$1,819,715	1,627
CITEC, Inc.	North Country	50	194	\$21,765,555	\$575,000	\$498,735	145
Alliance for Manufacturing & Technology <i>(AM&T)</i>	Southern Tier	49	649	\$105,099,500	\$575,000	\$522,234	212
Insyte Consulting	Western New York	186	848	\$292,778,185	\$850,000	\$1,538,177	1,415
FuzeHub <i>(new)</i>	Statewide	1	1	\$210,000	\$2,433,194	\$1,200,193	0
NY MEP Total	-	639	2661	\$701,942,429	\$9,758,194	\$11,010,358	6,006

Table 2: Highlighted 2016 Activities and Accomplishments of NY MEP Centers

Center for Economic Growth (CEG)	<ul style="list-style-type: none"> • Performed numerous continuous improvement and efficiency projects for Capital region manufacturers. • Participated in the Tech Valley Global Business Network to drive export-related events and trainings to the manufacturing community.
Central New York Technology Development Organization (CNYTDO)	<ul style="list-style-type: none"> • Engaged in Small Business Innovation Research (SBIR) strategies and proposal submissions for several clients. • Assisted with technology market research and industrial engineering. • Implemented Lean Six Sigma and full Lean projects.
NextCorps (formerly High Tech Rochester)	<ul style="list-style-type: none"> • Participated in the MEP supplier counting program. • Conducted educational seminars on prototype development for manufacturers. • Partnered with the Workforce Development Institute (WDI) on a mechatronics training program for manufacturers.
Manufacturing & Technology Resource Consortium at Stony Brook University (new)	<ul style="list-style-type: none"> • Made supplemental awards to regional manufacturing companies involved in projects from research and development, prototype development, manufacturing expansion and consulting.
Manufacturing & Technology Enterprise Center (formerly HVTDC)	<ul style="list-style-type: none"> • Provided supply chain assistance to a dozen companies. • Provided contract manufacturing for a client. • Provided services such as lean projects, ISO, new product development, prototyping, business development and revenue growth
Advanced Institute for Manufacturing at Mohawk Valley Community College (new)	<ul style="list-style-type: none"> • Developed in-house services in lean process improvement, Occupational Safety and Health Administration (OSHA) safety, Hazard Analysis and Critical Control Point (HACCP)/Safe Quality Foods (SQF) and cybersecurity. • Hosted and participated in technology market research workshop.
Industrial & Technology Assistance Corporation (ITAC)	<ul style="list-style-type: none"> • Hosted numerous events to benefit manufacturers in New York City. • Hosted a SBIR/Small Business Technology Transfer (STTR) workshop. • Partnered with New York Institute of Technology (NYIT) to hold an event with a focus on advanced manufacturing. • Participated in a Global NY ExporTech initiative.
CITEC, Inc.	<ul style="list-style-type: none"> • Performed Lean Green Belt and Lean White Belt certification trainings, as well as business and organizational planning and human resources trainings. • Worked with companies on innovation engineering training and idea creation.
Alliance for Manufacturing & Technology (AM&T)	<ul style="list-style-type: none"> • Performed ISO 9001 workshops for 10 manufacturers. • Taught internal auditor training. • Held numerous workshops and events.
Insyte Consulting	<ul style="list-style-type: none"> • Worked on a series of top- and bottom-line growth services with clients. • Performed work on operational improvement, new product development, process improvement, Lean Six Sigma and quality issues.
FuzeHub (new)	<ul style="list-style-type: none"> • Held numerous events, including Transit Supply Chain and Supply Chain Innovation Showcases and Solutions Forums. • Matched manufacturers across the state with the best resources to assist them. • Held a series of SBIR workshops for NY MEP centers.

CENTERS FOR ADVANCED TECHNOLOGY (CAT)

Program Overview and Purpose

NYSTAR funds 15 Centers for Advanced Technology (CATs) to encourage greater collaboration between private industry and the universities of the state in the development and application of new technologies.¹² The CAT program was created in 1983 and facilitates a continuing program of applied research, development and technology transfer in multiple technology areas in collaboration with and through the support of private industry. It plays a critical role in spurring technology-based applied research and economic development in the state, promoting national and international research collaboration and innovation, and leveraging New York's research expertise and funding with investments from the federal government, foundations, businesses, venture capital firms, and other entities.

NYSTAR periodically identifies technology fields of strategic importance to New York's economic competitiveness and holds competitions to award 10-year CAT designations to New York universities, university-affiliated research institutes or consortia of such institutions.

In the summer of 2017, ESD awarded a new designation for the Center for Advanced Technology in Big Data & Health Sciences (University of Buffalo CAT) at the University of Buffalo. The University at Buffalo had previously administered a CAT in related biomedical fields that evolved into this new center, however, the new center name is used for this report.

The CATs are a place for innovation and provide up-and-coming companies and entrepreneurs with the programs and events necessary for success. These centers are homes to events such as the first-ever Rochester Women's Investors Forum, which was held by the Center for Emerging and Innovative Sciences (CEIS) to increase the number of women investors and provide more funding for women-led tech companies. CATs also host informational seminars, like the biotechnology short course hosted by the Cornell University Center for Life Science Enterprise. The course, which is offered free of charge, helps fortify start-up plans for new businesses and validate their markets. The CAT at Cornell also hosts the Biotechnology to Business Annual Awardees' Showcase. During the showcase, each CAT project faculty investigator shares a brief presentation on the progress they've made with their industry collaborator in terms of advancing the science, commercial aspects, and economic impacts of their biotechnology. It provides investors and businesses valuable opportunities to take their technologies and ideas to the next level through such events and collaborative R&D projects.

¹² The CAT program is cited in Article 10a of Public Authorities Law and 10b of Executive Law. Funding is provided under Department of Economic Development Aid to Localities.

CAT Summaries for the 2015-16 Contract Year

The following section of the report includes information on each CAT. Individual CAT profiles include self-reported information, with verification of each CAT budget performed by NYSTAR. A description of the definitions and methodology used to collect and validate economic impact information can be found in Appendix 2.

Of note, two CATs—the Center for Integrated Electric Energy Systems at Stony Brook University and the Additive Manufacturing and Multifunctional Printing Center at Rochester Institute of Technology—are newly designated as of 2015-2016 and therefore have limited impacts reported for 2015-2016.

Table 3: 2015-2016 Evaluation and Economic Impacts of Centers for Advanced Technology

CAT Name	NYSTAR Evaluation ¹³	Jobs Created	Jobs Retained	Non-Job Economic Impact
SUNY Polytechnic Institute Center for Advanced Technology in Nanomaterials and Nanoelectronics (CATN2)	Satisfactory	224	-	\$88,023,001
Alfred University Center for Advanced Ceramic Technology (CACT)	Satisfactory	11	6	\$3,483,246
University at Binghamton Integrated Electronics Engineering Center (IEEC)	Satisfactory	33	36	\$28,553,824
University at Buffalo Center for Advanced Technology in Big Data & Health Sciences (UB CAT)	Satisfactory	40	13	\$75,520,628
Clarkson University Center for Advanced Materials Processing (CAMP)	Satisfactory	-	-	\$7,028,282
Cornell University's Center for Life Science Enterprise (CLSE)	Satisfactory	18	17	\$4,057,510
New York University Polytechnic School of Engineering (Tandon) Center for Advanced Technology in Telecommunications and Distributed Information Systems (CATT)	Satisfactory	134	-	\$75,007,260
Rensselaer Polytechnic Institute Center for Automation Technologies and Systems (RPI CATS)	Satisfactory	45	4	\$7,675,394
Rensselaer Polytechnic Institute Center for Future Energy Systems (CFES)	Satisfactory	24	-	\$13,051,500
University of Rochester Center for Emerging and Innovative Sciences (CEIS)	Satisfactory	61	28	\$104,036,358
Stony Brook University Center for Biotechnology (CFB)	Satisfactory	80	10	\$77,080,129
Stony Brook University Sensor Center for Advanced Technology (Sensor CAT)	Satisfactory	31	5	\$13,984,000
Syracuse University Center for Advanced Systems and Engineering (CASE)	Satisfactory	28	14	\$15,469,351
Rochester Institute of Technology Additive Manufacturing and Multifunctional Printing (AMPrint) Center (<i>new</i>)	Satisfactory	6	-	\$190,000
Stony Brook University Center for Integrated Electric Energy Systems (CIEES) (<i>new</i>)	Satisfactory	-	-	\$0
CATs Total		734	133	\$513,160,483

¹³ During the reporting period, no deficiencies were identified, and, as such, no remedial actions were recommended or taken to address such deficiencies.

SUNY Polytechnic Institute Center for Advanced Technology in Nanomaterials and Nanoelectronics (CATN2)

Description of Achievements

CATN2 continued to concentrate its efforts on formation of start-ups, the establishment of tight supply chain linkages with end-use customers, and the expansion of an R&D-manufacturing ecosystem through strategic business attraction by enabling technology, business and market development projects, workforce preparation, small business assistance programs, and statewide economic development initiatives. Specifically, CATN2 targeted the demonstration of proof-of-concept, pilot-prototype, and manufacturing scale-up of devices, processes, and systems all with an eye toward enabling high-technology economic growth across the state. The Center reported \$116 million in extramural grant awards (including a \$110 million AIM Photonics award).

CATN2 also reported \$88 million in non-job economic impact and 224 jobs created.

Description of Small Business Assistance Provided by Each CAT

The CATN2 team directly supported: 1) dozens of start-up companies; 2) over a dozen faculty and student spin-offs; and 3) applied research with hundreds of industry partners spread among each of CATN2's Strategic Industry Groups (SIGs), and worked with local Small Business Development Centers.

Table 4: CATN2 2015-2016 Operating Budget

SUNY Polytechnic Institute Center for Advanced Technology in Nanomaterials and Nanoelectronics (CATN2)				
Operating Expenses Description	NYSTAR Funding	Matching Funds		Total
		Company Cost Share	Other Sources	
Salaries & Fringe	\$1,177,697	\$88,673	\$356,711	\$1,623,081
Indirect Costs	\$176,655	\$12,060	\$40,618	\$229,333
Equipment	\$18,648	\$0	\$29,234	\$47,882
Materials & Supplies	\$125,922	\$7,781	\$79,552	\$213,256
Tuition	\$85,979	\$0	\$27,861	\$113,840
Travel	\$9,886	\$5,947	\$47,285	\$63,119
Subcontractors	\$16,793	\$44,950	\$0	\$61,743
Other	\$96,099	\$1,017,585	\$154,893	\$1,268,577
Total	\$1,707,680	\$1,176,996	\$736,155	\$3,620,831

Alfred University Center for Advanced Ceramic Technology (CACT)

Description of Achievements

CACT continued with industrial projects and analytical services. The clients ran the gamut, from large Fortune 500 corporations to small start-ups. The Center for High Temperature Characterization (CHTC) continued to be better established while Alfred University established itself as the go-to place for high temperature analytical services. The director and deputy director conducted company visits and attended conferences. In addition to ACerS and NYBEST meetings, Alfred University was again prime sponsor for the Ceramics Expo in Cleveland in the spring; specifically, the deputy director was the conference chair. In fall 2016, CACT launched a webinar series to support companies. CACT reported ~\$180,000 in extramural grant awards.

CACT also reported \$3.5 million in non-job economic impact, 11 jobs created and 6 jobs retained.

Table 5: CACT 2015-2016 Operating Budget

Alfred University Center for Advanced Ceramic Technology (CACT)				
Operating Expenses Description	NYSTAR Funding	Matching Funds		Total
		Company Cost Share	Other Sources	
Salaries & Fringe	\$362,222	\$236,175	\$349,814	\$948,211
Indirect Costs	\$54,314	\$59,044	\$87,454	\$200,811
Equipment	\$154,242	\$4,922	\$12,054	\$171,218
Materials & Supplies	\$32,201	\$36,639	\$29,217	\$98,056
Tuition	\$46,980	\$0	\$128,608	\$175,588
Travel	\$18,971	\$3,685	\$33,460	\$56,116
Subcontractors	\$0	\$0	\$0	\$0
Other	\$150,027	\$21,828	\$89,876	\$261,731
Total	\$818,957	\$362,292	\$730,483	\$1,911,732

Description of Achievements

IEEC continued its efforts to help and strengthen its working relationships with mid- and small-sized New York State-based companies. IEEC concentrated on increasing the number of participating member companies and, in particular, full members. With equipment support valued at over \$250,000 and adjunct funding expected to be coming in future years, the IEEC will take a large step into the sector of ‘Industry 4.0’; i.e., Internet of Things (IoT), whereby interoperability between the tools that perform the assembly process and automated inspection tools will greatly improve manufacturing by reducing defects and improving yields. The laboratory will provide Industry 4.0 researchers a test bed for new methods and techniques to define a communication pathway for feedback and feedforward among assembly tools from different suppliers and to develop optimal manufacturing schemes using artificial intelligence. IEEC reported one invention disclosure. Lastly, the ‘2016 Call for Proposals’ for pooled research was sent to faculty members and researchers on campus. As a result, seven projects were approved/funded for 2016-17.

IEEC also reported \$28.6 million in non-job economic impact, 33 jobs created and 36 jobs retained.

Table 6: IEEC 2015-2016 Operating Budget

University at Binghamton Integrated Electronics Engineering Center (IEEC)				
Operating Expenses Description	NYSTAR Funding	Matching Funds		Total
		Company Cost Share	Other Sources	
Salaries & Fringe	\$723,057	\$556,390	\$595,091	\$1,874,538
Indirect Costs	\$119,267	\$129,931	\$145,300	\$394,498
Equipment	\$0	\$0	\$0	\$0
Materials & Supplies	\$113,532	\$42,768	\$35,242	\$191,542
Tuition	\$30,537	\$102,071	\$86,116	\$218,724
Travel	\$0	\$18,980	\$48,491	\$67,471
Subcontractors	\$63,235	\$0	\$0	\$63,235
Other	\$65,326	\$77,622	\$51,710	\$194,658
Total	\$1,114,954	\$950,306	\$961,950	\$3,027,210

University at Buffalo Center for Advanced Technology in Big Data & Health Sciences (UB CAT)

Description of Achievements

UB CAT continued to engage with new and established UB CAT portfolio companies to realize economic impact. UB CAT also continued to grow its leadership role in technology-based economic development efforts at the national, state and regional levels. Most notably, UB CAT worked with the New York State Center of Excellence in Bioinformatics and Life Sciences (CBLS) to administer the Buffalo Institute for Genomics & Big Data Analytics (BIG), part of the \$105 million genomic medicine initiative. The UB CAT was assisting by both funding and administering a small-scale pilot study with key industry partners and the New York Genome Center (NYGC) to cultivate R&D opportunities. UB CAT continued to leverage its substantial customer engagement expertise and infrastructure in its administration of UB's STARTUP NY campus plan. Lastly, UB CAT reported two patent awards, nine licensing agreements/royalty payments, one invention disclosure, one institutional hire and one start-up company formation.

UB CAT also reported \$75.5 million in non-job economic impact, 40 jobs created and 13 jobs retained.

Table 7: UB CAT 2015-2016 Operating Budget

University at Buffalo Center for Advanced Technology in Big Data & Health Sciences (UB CAT)				
Operating Expenses Description	NYSTAR Funding	Matching Funds		Total
		Company Cost Share	Other Sources	
Salaries & Fringe	\$442,546	\$161,542	\$24,665	\$628,753
Indirect Costs	\$66,382	\$24,231	\$3,700	\$94,313
Equipment	\$63,134	\$0	\$0	\$63,134
Materials & Supplies	\$69,882	\$99,166	\$99,166	\$268,214
Tuition	\$15,611	\$11,100	\$11,100	\$37,811
Travel	\$0	\$5,602	\$5,602	\$11,204
Subcontractors	\$0	\$0	\$0	\$0
Other	\$318,354	\$322,325	\$322,325	\$963,004
Total	\$975,908	\$1,269,131	\$466,559	\$2,711,597

Description of Small Business Assistance

UB CAT supports Buffalo's entrepreneurial ecosystem. Specific engagements include Pre-Seed Workshop, which supported eight life sciences and seven advanced manufacturing companies, and the Bright Buffalo Niagara Entrepreneur Expo, which featured 13 life sciences companies and five advanced manufacturing companies; and, culminated in awarding \$25,000 in cash prizes to the most promising startups. The Center continues to leverage substantial customer engagement expertise and infrastructure in its administration of UB's Start-Up NY campus plan. UB's Start-Up NY program provides a comprehensive entry point for companies to engage university assets and resources, including new UB CAT project opportunities. Of the companies in the UB CAT's 2015-16 portfolio, 53% are also part of Start-Up NY.

Clarkson University Center for Advanced Materials Processing (CAMP)

Description of Achievements

During the past year CAMP seated a new Director, business development staff, and several new faculty members with knowledge, expertise and research interests in several materials-related technical areas. With new CAMP leadership in place, CAMP placed increased emphasis on finding research sponsors and collaborators in new areas such as biomaterials, biotechnology, bioscience and biocompatible materials. CAMP also began exploring opportunities for conducting research on, and technology transition of, materials for rail transportation system safety. CAMP reports one patent award (and four patent applications), ~\$200,000 in extramural grant awards, ~\$20,000 in licensing applications/fees/royalty payments, and 5.5 full-time equivalent institutional hires.

CAMP also reported \$7 million in non-job economic impact.

Table 8: CAMP 2015-2016 Operating Budget

Clarkson University Center for Advanced Materials Processing (CAMP)				
Operating Expenses Description	NYSTAR Funding	Matching Funds		Total
		Company Cost Share	Other Sources	
Salaries & Fringe	\$675,466	\$327,798	\$323,157	\$1,326,421
Indirect Costs	\$101,320	\$49,169	\$26,798	\$177,287
Equipment	\$31,499	\$32,252	\$0	\$63,751
Materials & Supplies	\$34,247	\$91,128	\$35,138	\$160,512
Tuition	\$4,914	\$53,373	\$13,113	\$71,400
Travel	\$41,861	\$67,812	\$13,204	\$122,876
Subcontractors	\$0	\$0	\$0	\$0
Other	\$31,894	\$37,531	\$8,612	\$78,038
Total	\$921,200	\$912,049	\$420,021	\$2,253,270

Cornell University's Center for Life Science Enterprise (CLSE)

Description of Achievements

CLSE continued to build on NYSTAR’s ongoing investment, and remained focused on its economic impact to the state. CLSE increased its impact on the innovation economy through funding of industry-matched research projects, industry-oriented education and training, outreach, networking, and referrals. An integrated approach between the directors and staff of the CAT, the Kevin M. McGovern Family Center for Venture Development in the Life Sciences, and the Biotechnology Resource Center’s core facilities promoted more robust cross-pollination for biotechnology projects with engagement from Cornell’s entrepreneurial life science research community. The Center reported one invention disclosure, five patent awards, \$12 million in extramural grant awards, \$1 million in licensing applications/fees/royalty payments, nine institutional hires and 14 new start-up company formations.

CLSE also reported \$4 million in non-job economic impact, 18 jobs created and 17 jobs retained.

Description of Small Business Assistance

CLSE engaged in the student Internship and Industry Partnership, which was coordinated by Entrepreneurship at Cornell and partially supported by CLSE. The program matched 15-20 student interns with the opportunity to work in small entrepreneurial companies in the state by offering subsidies, thereby allowing companies to participate. Since its inception, this program has placed more than 70 interns at small high-tech and scientific companies in New York State.

Table 9: CLSE 2015-2016 Operating Budget

Cornell University's Center for Life Science Enterprise (CLSE)				
Operating Expenses Description	NYSTAR Funding	Matching Funds		Total
		Company Cost Share	Other Sources	
Salaries & Fringe	\$546,882	\$10,959	\$191,114	\$748,955
Indirect Costs	\$82,032	\$1,644	\$28,667	\$112,343
Equipment	\$0	\$0	\$0	\$0
Materials & Supplies	\$152,179	\$5,337	\$39,704	\$197,220
Tuition	\$27,245	\$0	\$0	\$27,245
Travel	\$2,750	\$1,171	\$2,919	\$6,839
Subcontractors	\$0	\$0	\$0	\$0
Other	\$110,112	\$651,879	\$37,973	\$799,964
Total	\$921,200	\$670,990	\$300,377	\$1,892,566

New York University Polytechnic School of Engineering (Tandon) Center for Advanced Technology in Telecommunications and Distributed Information Systems (CATT)

Description of Achievements

The New York University Polytechnic School of Engineering (NYU Tandon) Center for Advanced Technology in Telecommunications and Distributed Information Systems (CATT) remained committed to the continued growth of New York's advanced technology sectors and recently underwent several operational innovations. As part of the increased investment resulting from the merger of Brooklyn Poly with NYU to create NYU Tandon, there has been significant new hiring of faculty in the areas of interest to CATT, as well as other benefits:

- CATT researchers are now pursuing inter-disciplinary research with the medical school, business school and the Courant Institute, among others.
- CATT now has access to NYU units that fund and train entrepreneurs, and the combined efforts in creating incubators.
- CATT has the ability to exploit economies of scale through shared lab facilities, research libraries, and meeting spaces.

Adjunctly, the NYC Media Lab, under the leadership of Executive Director Justin Hendrix and Faculty Director Shiv Panwar, is performing extremely well, and was playing a key role in bringing New York's media industry and universities together in a variety of projects. The Center reports 69 patent awards and \$3 million in extramural grant awards.

CATT also reported \$75 million in non-job economic impact and 134 jobs created.

Description of Small Business Assistance

A significant new investment is the creation of the Tandon MakerSpace in Tandon's Brooklyn campus. This facility will be open not only to students and faculty, but also to local companies. NYU also invested in another major facility this past year: a clean room located on the NYU Tandon campus. This clean room, which fills a major gap in capabilities, will be shared by NYU Tandon and NYU Physics researchers.

Table 10: CATT 2015-2016 Operating Budget

New York University Polytechnic School of Engineering (Tandon) Center for Advanced Technology in Telecommunications and Distributed Information Systems (CATT)				
Operating Expenses Description	NYSTAR Funding	Matching Funds		Total
		Company Cost Share	Other Sources	
Salaries & Fringe	\$631,858	\$1,152,274	\$243,259	\$2,027,391
Indirect Costs	\$94,779	\$170,581	\$24,574	\$289,934
Equipment	\$11,261	\$13,426	\$2,078	\$26,765
Materials & Supplies	\$38,523	\$1,225,673	\$390,490	\$1,654,686
Tuition	\$66,473	\$16,175	\$40,747	\$123,396
Travel	\$1,539	\$149,008	\$28,962	\$179,510
Subcontractors	\$60,046	\$0	\$0	\$60,046
Other	\$25,000	\$0	\$0	\$25,000
Total	\$929,479	\$2,727,138	\$730,111	\$4,386,727

Rensselaer Polytechnic Institute (RPI) Center for Automation Technologies and Systems (CATS)

Description of Achievements

Rensselaer Polytechnic Institute (RPI) Center for Automation Technologies and Systems (CATS) had over 30 active research projects, including, but not limited to: 11 with New York companies, three government-sponsored projects with industry collaborators, four projects with non-profits and 12 government-sponsored projects with no collaborator. Seven of these projects were new—four with New York manufacturers and three with the NSF. Adjunctly, CATS successfully competed to serve as the Northeast Regional Manufacturing Center of the DOE-sponsored Clean Energy Smart Manufacturing Innovation Institute (CESMII).

CATS also actively engaged in industry-oriented education and training (e.g., co-sponsoring the annual one-day Advanced Manufacturing Conference with the Center for Economic Growth in October 2015). CATS staff and faculty also actively mentored 45 graduate student and 29 undergraduate student researchers, many of whom either intended to or were already working in manufacturing. CATS staff continued to stay active in the manufacturing, robotics and automation communities by attending numerous workshops, conferences and webinars along with participating in industry trade organizations. Finally, CATS continued to engage K-12 STEM students through National Manufacturing Day, U.S First and sponsorship of high school interns.

During the 2015-16 reporting year, the CATS reported one invention disclosure, two patent awards, ~\$860,000 in extramural grant awards, two institutional hires and two start-up company formations.

CATS also reported \$7.7 million in non-job economic impact, 45 jobs created and 4 jobs retained.

Description of Small Business Assistance

CATS staff continued to engage New York businesses, including many small and medium-sized enterprises (SMEs) and start-ups. During the year, they met with 45 different manufacturers to provide energy audits, discuss technical issues and pursue joint funding proposals.

Table 11: RPI CATS 2015-2016 Operating Budget

Rensselaer Polytechnic Institute Center for Automation Technologies and Systems (RPI CATS)				
Operating Expenses Description	NYSTAR Funding	Matching Funds		Total
		Company Cost Share	Other Sources	
Salaries & Fringe	\$601,396	\$301,126	\$893,629	\$1,796,151
Indirect Costs	\$96,016	\$0	\$0	\$96,016
Equipment	\$3,894	\$9,275	\$62,102	\$75,270
Materials & Supplies	\$19,696	\$19,606	\$284,125	\$323,427
Tuition	\$0	\$109,426	\$418,954	\$528,380
Travel	\$32,058	\$3,193	\$53,742	\$88,993
Subcontractors	\$0	\$0	\$0	\$0
Other	\$3,983	\$15,512	\$3,892	\$23,387
Total	\$757,043	\$458,138	\$1,716,444	\$2,931,625

Description of Achievements

CFES started a number of new projects with several New York State partners and assisted five startup companies in its first year of re-designation. The Center also developed sponsored research agreements with several large companies.

CFES was also expanding its international reach through partnerships and research collaboration with global leaders in the development and application of renewable energy and distributed energy resources technology. New research exchange and sponsored research agreements were being developed with several international institutes of higher education/research institutions. These collaborations intend to enhance CFES' core research agenda and bring invaluable experiences from the rest of the world for the benefit of New York State industry and residents.

CFES reported five invention disclosures, ~\$375,000 in extramural grant awards and one new start-up company formation.

CFES also reported \$13 million in non-job economic impact and 24 jobs created.

Description of Small Business Assistance

CFES assisted in support of the Lally School of Management Masters Scholars Research Program (MSRP) for the task of business plan development and commercial pathways on faculty/student innovations. Three projects were suggested—active flow control on wind turbine blades (Amitay), energy vibration harvesting (Borca-Tasciuc) and agricultural by-product waste composites (Draper). The students presented their findings related to market segmentation, supply chain, intellectual property rights and/or competitive advantages for the adoption of these technologies to the companies.

Table 12: CFES 2015-2016 Operating Budget

Rensselaer Polytechnic Institute Center for Future Energy Systems (CFES)				
Operating Expenses Description	NYSTAR Funding	Matching Funds		Total
		Company Cost Share	Other Sources	
Salaries & Fringe	\$280,437	\$543,992	\$295,718	\$1,120,147
Indirect Costs	\$42,066	\$77,663	\$46,572	\$166,301
Equipment	\$23,114	\$214,163	\$4,778	\$242,055
Materials & Supplies	\$14,417	\$92,506	\$24,755	\$131,678
Tuition	\$62,530	\$0	\$0	\$62,530
Travel	\$16,883	\$37,767	\$20,052	\$74,701
Subcontractors	\$0	\$0	\$357,594	\$357,594
Other	\$7,938	\$18,456	\$0	\$26,394
Total	\$447,385	\$984,547	\$749,469	\$2,181,400

Description of Achievements

The University of Rochester (UR) Center for Emerging and Innovative Sciences (CEIS) continued 37 projects funded through CEIS Collaborative Integrated Research (CIR) programs with faculty and New York State companies. The research undertaken by Principal Investigators (PIs) and their industry partners allowed 23 students the opportunity to participate in the research and gave some of them internship opportunities in partner companies. CEIS continued to focus on strengthening and expanding existing optics, photonics & imaging (OPI) cluster-based partnerships to foster advanced manufacturing-related company growth and accelerate high-quality job creation. CEIS hosted its 16th annual University Technology Showcase, where 30 posters were on display to highlight the research endeavors of numerous UR and RIT faculty and 19 sponsors manning their tables. Lastly, CEIS received 31 responses to its 2016-17 CIR RFP solicitation from 27 faculty researchers and 16 companies.

CEIS reported two invention disclosures, two patent awards, ~\$450,000 in extramural grant awards and six new institutional new hires as a direct result of activities undertaken with State funds.

CEIS also reported \$104 million in non-job economic impact, 61 jobs created and 28 jobs retained.

Description of Small Business Assistance

CEIS continued to commit time and resources to support entrepreneurial and outreach activities. In October 2015, CEIS was a patron level sponsor for the Rochester Regional Veterans Business Council annual Job Expo. In June 2016, CEIS led the Rochester-China Business Exchange, an effort to attract Chinese investment into the Rochester region, with a focus on optics, photonics, and imaging. CEIS organized a spin-off of the U.S. Department of Commerce’s SelectUSA program (part of the International Trade Administration, or ITA). The event drew 23 delegates from China representing nine industrial companies, two banks, and two economic development organizations. CEIS recruited 71 local companies to apply for an opportunity to meet with members of the delegation, and 51 were chosen.

Table 13: CEIS 2015-2016 Operating Budget

University of Rochester Center for Emerging and Innovative Sciences (CEIS)				
Operating Expenses Description	NYSTAR Funding	Matching Funds		Total
		Company Cost Share	Other Sources	
Salaries & Fringe	\$697,741	\$784,528	\$21,855	\$1,504,124
Indirect Costs	\$98,477	\$95,638	\$0	\$194,115
Equipment	\$152,489	\$152,299	\$9,037	\$313,826
Materials & Supplies	\$39,926	\$118,894	\$10,632	\$169,451
Tuition	\$0	\$0	\$0	\$0
Travel	\$6,211	\$26,609	\$0	\$32,820
Subcontractors	\$224,429	\$277,291	\$0	\$501,720
Other	\$81,909	\$87,533	\$3,662	\$173,104
Total	\$1,301,181	\$1,542,793	\$45,185	\$2,889,159

Description of Achievements

Stony Brook University Center for Biotechnology (CFB) continued to fulfill its mission to foster economic growth by serving as an important catalyst in the development of new technologies and emerging companies in New York State. Significant effort was devoted to implementation of the \$8.7 million, three-year NIH REACH initiative, which the CFB continued to lead in partnership between Stony Brook University, Cold Spring Harbor Laboratory, Brookhaven National Laboratory, and the Feinstein Institute. The BioEntrepreneur-in-Residence Initiative (BEIR) recruited three new entrepreneurs to review the intellectual property portfolios of the CFB's institutional partners with the goal of company formation. All three BEIRs had established companies and/or were in the process of executing options agreements, bringing the total number of BEIRs to eight, all of which have resulted in company formation. Interaction with pre-seed and emerging New York State companies continued to be a primary focus of the CFB. More than 25 emerging companies received advisory services under the CFB's BioStrategy and Technology Commercialization Clinic programs, five companies received matching funds under the Applied Research and Development initiative and the 2015 Life Sciences Summit took place on Dec 1-2, 2015, attracting 300 industry executives and academic innovators. The CFB reported 11 invention disclosures, 16 license agreements (equating to \$8.6 million in licensing fees/royalty payments) and ~\$715,000 in extramural grant awards.

CFB also reported \$77 million in non-job economic impact, 80 jobs created and 10 jobs retained.

Description of Small Business Assistance

Through the CFB's role as co-host of the Life Sciences Summit, a global partnering event focused on bridging academic innovators and emerging companies to potential strategic partners and investors, relationships continued to be developed with the global pharmaceutical industry (Merck, Pfizer, AstraZeneca, J&J, Sanofi, GSK, etc.) medical research foundations (MJF Foundation, Damon Runyon Cancer Foundation, Alzheimer's Drug Discovery Foundation, etc.), and the investment community (Topspin Partners, Ascent BioVentures, MABA, etc.). The Emerging Company Showcase at the Summit brought the CFB in touch with dozens of emerging companies from New York.

Table 14: CFB 2015-2016 Operating Budget

Stony Brook University Center for Biotechnology (CFB)				
Operating Expenses Description	NYSTAR Funding	Matching Funds		Total
		Company Cost Share	Other Sources	
Salaries & Fringe	\$624,799	\$694,058	\$2,302,696	\$3,621,553
Indirect Costs	\$92,854	\$173,514	\$575,674	\$842,042
Equipment	\$0	\$0	\$148,591	\$148,591
Materials & Supplies	\$37,682	\$76,457	\$228,159	\$342,298
Tuition	\$0	\$710	\$79,878	\$80,589
Travel	\$5,231	\$396	\$94,122	\$99,750
Subcontractors	\$0	\$0	\$599,570	\$599,570
Other	\$49,310	\$21,551	\$212,202	\$283,064
Total	\$809,876	\$966,687	\$4,240,893	\$6,017,457

Stony Brook University Sensor Center for Advanced Technology (Sensor CAT)

Description of Achievements

Professor Serge Luryi, the Stony Brook University Sensor Center for Advanced Technology (Sensor CAT)'s founding Director, stepped down from his position as Chair of Electrical and Computer Engineering Department, thereby allowing him to fully concentrate on leading the Sensor CAT's activities, with resulting adjustments in the responsibilities of the rest of the team. At the same time, Sensor CAT reconciled CEWIT's co-sponsorship of Dr. Larry Weber, thus formalizing his position as Business Development Manager for two CATs as part of its continuing efforts in developing an ecosystem of support for research-based manufacturing on Long Island and in New York State. Lastly, the Sensor CAT's public-private partnership, Research-Development-Manufacturing Consortia (RDMC), remained stable.

Adjunctly, Sensor CAT continued: recruiting new faculty affiliates and encouraging them to work with industry; supporting and expanding the Entrepreneur in Residence (EIR) activities; and expanding cooperation with CEWIT through the Center's in-house EIR and Business Development Manager and with the BioTech CAT through the Deputy Directors. Lastly, Sensor CAT also began a working collaboration with the new NY MEP Center on campus. Sensor CAT reported one licensing agreement/fees/royalty payment, \$2.6 million in extramural grant awards and one new invention disclosure.

Sensor CAT also reported \$14 million in non-job economic impact, 31 jobs created and five jobs retained.

Examples of Small Business Assistance

One client of Sensor CAT's is Graphene Laboratories, a small, profitable manufacturing company that was focusing on the revolutionary properties of graphene when they first came into contact with the center. Graphene Laboratories was developing, manufacturing and selling several varieties of graphene while actively looking for an entrance point into the worldwide race to find practical applications for this exciting material, whose discoverers had just been awarded a Nobel Prize. R&D cooperation with the Sensor CAT was instrumental in the rapid growth and diversification of the company. As the result of assistance from experts at Sensor CAT, Graphene Laboratories offers over 100 graphene and related products to over 14,000 customers including almost every Fortune 500 technology company and major research university.

Table 15: Sensor CAT 2015-2016 Operating Budget

Stony Brook University Sensor Center for Advanced Technology (Sensor CAT)				
Operating Expenses Description	NYSTAR Funding	Matching Funds		Total
		Company Cost Share	Other Sources	
Salaries & Fringe	\$686,816	\$842,672	\$24,673	\$1,554,161
Indirect Costs	\$102,999	\$210,668	\$6,168	\$319,835
Equipment	\$24,596	\$6,278	\$17,991	\$48,865
Materials & Supplies	\$40,388	\$48,148	\$0	\$88,536
Tuition	\$2,094	\$12,087	\$0	\$14,181
Travel	\$2,215	\$15,334	\$0	\$17,550
Subcontractors	\$0	\$0	\$0	\$0
Other	\$15,083	\$21,016	\$0	\$36,099
Total	\$874,191	\$1,790,075	\$48,832	\$2,713,098

Description of Achievements

CASE continued to focus on activities to increase measurable economic impact and position CASE for continued success. CASE leadership and staff continue to engage the Industry Advisory Board, faculty researchers, industry partners, and key university and community constituents in serving the New York State industry and scientific communities. After CASE was designated for the next 10 years, it planned to add UAV expertise and innovation consulting to the Board and consider other possible additions.

CASE continued to play a role in important regional initiatives during the program year. CASE is an active member of NUAIR, the coalition of industry, academic institutions and government engaged in the FAA-designated Unmanned Aircraft System (UAS) Test Bed, and played a key role in the Central New York Region’s award of \$500 million in New York State funding under the Upstate Revitalization Initiative (URI), providing technical support for both unmanned aerial vehicle (UAV) and data security activities. CASE also continued to play a key role in Cyber NY Alliance and the Cyber Research Institute, with which CASE also collaborates.

CASE also reported \$15.5 million in non-job economic impact, 28 jobs created and 14 jobs retained.

Description of Small Business Assistance

CASE, in partnership with the Department of Electrical Engineering and Computer Science, presented their annual twelve-part colloquium series on technical topics, from distributed sensor networks, information fusion and machine intelligence, to entrepreneurs’ personal stories. The CASE Industry Co-op program continues to be successful, placing students in a variety of short- and long-term positions within local companies to gain direct work experience and provide opportunities and encouragement to remain in the region after graduation.

Table 16: CASE 2015-2016 Operating Budget

Syracuse University Center for Advanced Systems and Engineering (CASE)				
Operating Expenses Description	NYSTAR Funding	Matching Funds		Total
		Company Cost Share	Other Sources	
Salaries & Fringe	\$433,356	\$1,095,696	\$169,862	\$1,698,914
Indirect Costs	\$47,453	\$74,389	\$32,121	\$153,963
Equipment	\$0	\$24,529	\$0	\$24,529
Materials & Supplies	\$5,799	\$8,986	\$0	\$14,785
Tuition	\$0	\$26,719	\$156,795	\$183,514
Travel	\$4,166	\$21,895	\$5,184	\$31,245
Subcontractors	\$0	\$0	\$0	\$0
Other	\$54,896	\$41,412	\$1,320	\$97,629
Total	\$545,670	\$1,293,627	\$365,282	\$2,204,579

Rochester Institute of Technology Additive Manufacturing and Multifunctional Printing Center (AMPrint)

Description of Achievements

AMPrint was a newly established CAT and was only under contract for the final three months of the reporting period. However, progress was made getting the new center up and running, with construction of the AMPrint's new 3,200 square foot lab facility nearing completion. Several state-of-the-art pieces of 3D printing equipment were purchased and made ready for installation, and AMPrint's Director of Business Development was hired. Given the short amount of time AMPrint has been in existence, the amount of financial support received from industry and government was a testament to the importance of 3D printing/additive manufacturing to New York State's economy. Looking ahead to the first full year of operation, AMPrint had an impressive list of industry projects in the pipeline.

AMPrint reported one invention disclosure, five patent awards, \$12 million in extramural grant awards, \$1 million in licensing applications/fees/royalty payments, nine institutional hires and one new start-up company formation.

AMPrint also reported \$190,000 in non-job economic impact and 6 jobs created.

Table 17: AMPrint 2015-2016 Operating Budget

Rochester Institute of Technology Additive Manufacturing and Multifunctional Printing (AMPrint) Center				
Operating Expenses Description	NYSTAR Funding	Matching Funds		Total
		Company Cost Share	Other Sources	
Salaries & Fringe	\$25,456	\$1,165	\$27,152	\$53,773
Indirect Costs	\$2,513	\$0	\$6,109	\$8,622
Equipment	\$145,158	\$195,158	\$0	\$340,316
Materials & Supplies	\$3,775	\$1,026	\$0	\$4,801
Tuition	\$0	\$0	\$92,015	\$92,015
Travel	\$793	\$0	\$0	\$793
Subcontractors	\$0	\$0	\$0	\$0
Other	\$358	\$3,006	\$60,294	\$63,658
Total	\$178,052	\$200,355	\$185,571	\$563,978

Description of Achievements

CIEES ramped up its operations, compiled a list of potential customers and conducted interviews with the PIs of the projects outlined in their original proposal. CEIS also finalized employment contracts with the Deputy Director and Administrative Assistant and updated the CIEES website, which now includes a list of CIEES facilities and links to CIEES partners. In September 2016, CIEES held its first executive board meeting at which the CIEES board outlined a strategy for the development of CIEES. CIEES established partnerships with Sensor CAT at Stony Brook University and CFES at Rensselaer Polytechnic Institute, with two projects co-funded between CIEES and Sensor CAT.

CENTERS OF EXCELLENCE (COE)

Program Overview and Purpose

As of 2016, NYSTAR provided funding to 11 Centers of Excellence (CoEs) to foster collaboration between the academic research community and the business sector to develop and commercialize new products and technologies, promote critical private sector investment in emerging high-technology fields in New York State, and to create and expand technology-related businesses and employment.¹⁴ This program was created to enhance and accelerate the operations of recipient COEs in the facilitation of joint university-industry research and development, product commercialization, and workforce training.

The most notable difference between NYSTAR's CoE and Center for Advanced Technology (CAT) programs is the stage of the technology or company leveraging each program. CoEs provide a resource for early-stage ideas, and entrepreneurs benefit from the proximity to academic experts who can provide insight into how the technology works scientifically and how the technology can be commercialized. Comparatively, CATs are organized to include experts with the capacity to build and expand a technology, including those that may have been first conceptualized in a CoE. CATs have access to industry equipment to help with the small-scale manufacture of technologies and to expert partners who assist companies through development, with manufacturing concepts as the focus.

In 2017, a new CoE was designated in Precision Medicine and Responses to Bioterrorism and Disasters at New York Medical College.

CoE Summaries for the 2015-16 Contract Year

Individual CoE profiles include self-reported information, with verification of CoE budgets performed by NYSTAR.¹⁵ A description of the definitions and methodology used to collect and validate economic impact information can be found in Appendix 2.

It is important to note that NYSTAR funds under these contracts are to be used to assist with operational expenditures. No money under this contract was spent on capital expenditures, unless in the case of matching funds.

¹⁴ The CoE program is cited in Article 19 of Economic Development Law. Funding is provided under Department of Economic Development Aid to Localities.

¹⁵ The information included within individual CoE budgets covers the 2016 contract year, which is defined as 7/1/15 – 6/30/16.

Table 18: 2015-2016 Economic Impacts of Centers of Excellence

Center	Jobs Created	Jobs Retained	Non-Job Economic Impact
Binghamton University Small Scale Systems integration and Packaging Center (S3IP)	1	30	\$21,022,359
Rochester Institute of Technology Center of Excellence in Advanced & Sustainable Manufacturing (CoE-ASM)	13	28	\$2,652,665
Stony Brook University Advanced Energy Research and Technology Center (AERTC)	21	4	\$2,733,062
Stony Brook University Center of Excellence in Wireless and Information Technology (CEWIT)	30	74	\$13,751,402
SUNY Polytechnic Institute Center of Excellence in Nanoelectronics and Nanotechnology (CENN)	54	561	\$144,333,883
SUNY Polytechnic Institute Smart System Technology & Commercialization Center (STC) ¹⁶	-	48	\$0
Syracuse University Center of Excellence in Environmental and Energy Systems (SyracuseCoE)	23	41	\$6,058,833
University of Rochester Center of Excellence in Data Science (UR CoEDS) ¹⁷	-	-	\$0
University at Albany Center of Excellence in Atmospheric and Environmental Prediction and Innovation (U Albany CoE) ¹⁸	2	1	\$1,583,000
University at Buffalo Center of Excellence in Bioinformatics and Life Sciences (CBLS)	169	125	\$74,218,376
University at Buffalo Center of Excellence in Materials Informatics (CMI)	104	76	\$42,985,995
CoEs Total	417	988	\$309,339,575

¹⁶In June 2017, the STC's facility was sold to a private company, Akoustis Technologies, Inc., which was expected to invest \$20 million in the facility and create or retain 220 jobs, resulting in the end of its CoE designation.

¹⁷UR CoEDS was still in the process of hiring and ramping up services during this period.

¹⁸U Albany CoE was a relatively newly designated CoE, receiving a much smaller funding amount than a typical CoE.

Overall Strategic Plan

S3IP conducts research and development activities to develop new applications and systems which improve people's lives and lead to new product development and commercialization. Successfully building next generation integrated systems requires development of the necessary infrastructure in such leading areas as electronics packaging, flexible electronics, energy efficiencies, solar energy, and new materials and sensors; as well as development of the required analytical and physical models and characterization tools that make a fundamental understanding of these systems possible.

The Center focuses in six key interdisciplinary areas:

- Systems integration and packaging
- Energy storage and PV solar harvesting
- Flexible electronics
- Energy-efficient electronic systems
- Sensors and new materials for electronic systems
- Advanced analytical and diagnostic expertise

Description of CoE Facility Activities

The Binghamton University Small Scale Systems Integration and Packaging Center:

- Performs cutting-edge research in energy storage (up to and including grid scale applications), energy harvesting, alternative and renewable energy sources, transmission and distribution systems, energy efficiency and conservation; and, Smart Grid infrastructure, systems and devices;
- Builds infrastructure onsite and offsite to advance energy research and technology development, commercialization and deployment;
- Provides workforce development programming and multidisciplinary educational opportunities including K-12, undergraduate, graduate, and professional offerings;
- Accelerates commercialization of new energy technologies through start-up ventures and established industry partners;
- Promotes the success of existing energy providers, utilities and technology companies in the region and the growth of the energy industry regionally and around the state; and
- Establishes and maintains long-term collaborative relationships with federal, state, industrial, and academic partners.

Table 19: S3IP 2015-2017 Operating Budget¹⁹

BINGHAMPTON UNIVERSITY SMALL SCALE SYSTEMS INTEGRATION AND PACKAGING CENTER			
CATEGORY OF EXPENSE	GRANT FUNDS	MATCH FUNDS	TOTAL
Personal services			
Salary	\$1,368,103	\$0	\$1,368,103
Fringe	\$694,795	\$0	\$694,795
Subtotal	\$0	\$0	\$0
Non Personal services			
Contractual Services	\$0	\$0	\$0
Travel	\$0	\$0	\$0
Equipment	\$0	\$0	\$0
Space/Property & Utilities	\$0	\$0	\$0
Operating Expenses	\$309,435	\$0	\$309,435
Other (Undefined)	\$0	\$0	\$0
Subtotal	\$0	\$0	\$0
Total	\$2,372,333	\$0	\$2,372,333

Patents, Research Partnerships and Intellectual Property (IP) Agreements

No patents, other research partnerships, or IP agreements were reported for the contract year.

¹⁹ This is a two year operating budget, due to the CoE being late to enter into contract. The first year of the contracts was not executed until 2/17, and therefore the first reported period covers two years.

Rochester Institute of Technology Center of Excellence in Advanced & Sustainable Manufacturing (CoE-ASM)

Overall Strategic Plan

CoE-ASM aims to develop technologies in collaboration with New York State manufacturing companies to help make their products and processes more sustainable and competitive, and to increase the number of value-added manufacturing jobs statewide. Activities include applied research to address common technology problems, supply chains integration, comprehensive metrics for sustainable manufacturing, technology proof of concept demonstration and evaluation, and technology deployment and commercialization support. The Center seeks to license technology that results from research, perform technical and economic assessments for candidate technologies, provide support for sustainability score-cards and supply chains, and provide technical training (e.g., training in sustainable design).

Description of CoE Facility Activities

CoE-ASM focuses on activities that promote increased federal funding for sustainable manufacturing in New York State, and that directly enhance the competitiveness of New York companies resulting in economic growth statewide. Specific strategies include:

- Support/advance growth of existing clusters, including energy storage and food processing;
- Identify opportunities for new company creation, or existing company job creation, to support smart products and systems, or provide value added sustainability services to industry; and
- Develop a relationship with the Smart System Technology and Commercialization Center to leverage smart sensors and embedded systems technologies.

Table 20: CoE-ASM 2015-2016 Operating Budget

ROCHESTER INSTITUTE OF TECHNOLOGY CENTER OF EXCELLENCE IN ADVANCED & SUSTAINABLE MANUFACTURING			
CATEGORY OF EXPENSE	GRANT FUNDS	MATCH FUNDS	TOTAL
Personal services			
Salary	\$595,799	\$332,887	\$928,686
Fringe	\$215,004	\$115,097	\$330,101
Subtotal	\$810,803	\$447,984	\$1,258,787
Non Personal services			
Contractual Services	\$5,000	\$12,000	\$17,000
Travel	\$15,000	\$5,000	\$20,000
Equipment	\$12,000	\$15,000	\$27,000
Space/Property & Utilities	\$0	\$0	\$0
Operating Expenses	\$157,197	\$520,016	\$677,213
Other (Undefined)	\$0	\$0	\$0
Subtotal	\$189,197	\$552,016	\$741,213
Total	\$1,000,000	\$1,000,000	\$2,000,000

Patents, Research Partnerships and Intellectual Property (IP) Agreements

No patents, other research partnerships, or IP agreements were reported for the contract year.

Overall Strategic Plan

AERTC is a partnership of academic and research institutions, energy providers, industry, and government. The mission of AERTC is to increase the efficiency of current energy systems, while promoting the adoption of alternative and renewable sources to reduce New York's carbon footprint. AERTC conducts cutting-edge research and development of new technologies to generate, transmit and distribute, store and manage energy; including but not limited to alternative and renewable sources, by accelerating deployment of these new technologies, and providing education and training to disseminate the skills necessary to implement, maintain and capitalize on their enhanced functionalities.

AERTC's programs will involve nanotechnology applications for energy efficiency and conservation as well as new "green" energy sources and smart grid, combining basic energy sciences research together with wireless information and sensor technology, modeling and simulation, testing, and evaluation. The fundamental goal of AERTC is to lead research, development, deployment, and work force development efforts to facilitate reliable, economical, and plentiful sources of clean energy for a sustainable economy.

Description of CoE Facility Activities

AERTC aims to:

- Establish a broad based interdisciplinary research program which integrates fundamental science, nanotechnology, and engineering to design the next generation of advanced energy systems. This involves exploring renewable energy sources, enhancing the performance of traditional fuels through molecular engineering, and employing cutting-edge solid state and polymeric polyelectrolyte fuel cell technology.
- Build a state-of-the-art laboratory to model power generation that can test new technologies, such as biomass, hydrogen fuels, fuel cells, carbon sequestration, and power cogeneration. This facility will be able to quantitatively evaluate the economic factors of zero emissions power generation and will enable AERTC to be a national leader in establishing universal standards for safety and environmental impact for the energy industry.
- Engineer full scale demonstration and testing facilities to accurately simulate the power generation grid and which will optimize the distribution network, provide alternatives in case of local failures, and provide early warning of sabotage, leaks, or terrorist infringements.
- Design a program of public outreach to the community in order to explain energy policy and emerging technologies. This includes:
 - Sponsorship of national and international conferences for leaders in energy research;
 - Organizing workshops to inform the public of energy policies; and
 - Outreach to schools through special programs designed for K-12 teachers and their students.

Table 21: AERTC 2015-2016 Operating Budget

STONY BROOK UNIVERSITY ADVANCED ENERGY RESEARCH AND TECHNOLOGY CENTER			
CATEGORY OF EXPENSE	GRANT FUNDS	MATCH FUNDS	TOTAL
Personal services			
Salary	\$1,368,103	\$0	\$1,368,103
Fringe	\$694,795	\$0	\$694,795
Subtotal	\$2,062,898	\$0	\$2,062,898
Non Personal services			
Contractual Services	\$0	\$0	\$0
Travel	\$0	\$0	\$0
Equipment	\$0	\$0	\$0
Space/Property & Utilities	\$0	\$0	\$0
Operating Expenses	\$309,435	\$0	\$309,435
Other (Undefined)	\$0	\$0	\$0
Subtotal	\$309,435	\$0	\$309,435
Total	\$2,372,333	\$0	\$2,372,333

Patents, Research Partnerships and Intellectual Property (IP) Agreements

Table 22: AERTC Patents

Status	Title	File Date	Issue Date	Patent No.	Inventor
Issued	Automated Meter Reading System and Energy Conservation Method Using Same	9/27/2011	3/15/2016	9,285,243	Jon P. Longtin
Issued	Carbon Nanotube Dewpoint and Ice Condition Sensor	3/7/2011	7/21/2015	9,086,363	Vladimir Samuilov
Issued	High Flux High Efficiency Nanofiber Membranes and Methods of Production Thereof	10/7/2009	4/1/2015	200980146276.8	Benjamin Chu, Benjamin S. Hsiao, Hongyang Ma

Stony Brook University Center of Excellence in Wireless and Information Technology (CEWIT)

Overall Strategic Plan

The mission of Stony Brook University Center of Excellence in Wireless and Information Technology (CEWIT) is to lead, initiate, foster, and manage the transfer of technologies from the research laboratory to the marketplace, and to facilitate interaction between companies and university faculty and students. CEWIT's competencies include:

- Attracting industry partners to further develop university discoveries and inventions;
- Maximizing the commercial potential of university technologies;
- Initiating and supporting the growth of start-ups based on promising technologies;
- Generating industrial and financial support for applied projects;
- Facilitating collaborative industry research and development programs;
- Becoming a know-how center of wireless and information technologies for New York State companies;
- Directing commercialization and marketing efforts; and
- Generating new jobs within the state.

Description of CoE Facility Activities

CEWIT is designed to implement an efficient process of moving good ideas/discoveries/inventions from conceptualization (lab) to the marketplace.

Specifically, CEWIT is organized to address each stage of development:

- Discovery/Invention/Creation of Idea
- Scoping: Evaluation of An Idea
- Development: Build and Test Prototype
- Testing, Validation, Detailed Design, Product Planning
- Launch (and Post-Launch Review)

Table 23: CEWIT 2015-2016 Operating Budget

STONY BROOK UNIVERSITY CENTER OF EXCELLENCE IN WIRELESS AND INFORMATION TECHNOLOGY			
CATEGORY OF EXPENSE	GRANT FUNDS	MATCH FUNDS	TOTAL
Personal services			
Salary	\$2,495,248	\$0	\$2,495,248
Fringe	\$1,297,504	\$0	\$1,297,504
Subtotal	\$3,792,752	\$0	\$3,792,752
Non Personal services			
Contractual Services	\$0	\$0	\$0
Travel	\$0	\$0	\$0
Equipment	\$0	\$0	\$0
Space/Property & Utilities	\$0	\$0	\$0
Operating Expenses	\$568,913	\$0	\$568,913
Other (Undefined)	\$0	\$0	\$0
Subtotal	\$568,913	\$0	\$568,913
Total	\$4,361,665	\$0	\$4,361,665

Patents, Research Partnerships and Intellectual Property (IP) Agreements

Table 24: CEWIT Patents

Status	Title	Patent No.	Inventor
Issued	Optical Control Sensor System	9,222,830	Mikhail Gouzman, Dmitri Gavrilov, Vladislav Kuzminskiy, Anatoliy Borodin, Vladimir Smagin, William Cheng
Issued	Attenuated Viruses Useful for Vaccines	1621100	Bruce Futcher, Eckard Wimmer, Steven Skiena, Steffen Mueller, Dimitris Papamichail, John Coleman
Issued	Multi-tier Caching	9,355,109	Erez Zadok, Richard Spillane, Sagar Dixit, Shrikar Archak
Issued	Illumination Information Icon for Enriching Navigable Panoramic Street View	9,367,954	Klaus Mueller
Issued	Realitydeck Apparatus and Conformal Visualization Method	9,401,044	Arie Kaufman
Issued	Method for Conformal Visualization	9,401,044	Arie Kaufman, Klaus Mueller, Dimitrios Samaras, Hong Qin, Kaloian Stanislavov Petkov, Charilaos Papadopoulos

AERTC Sponsorships²⁰:

- Licensing Partner: BAH Holding, LLC
- Licensing Partner: EMD Millipore Corporation
- Licensing Partner: Patient Code Software, Inc.
- Licensing Partner: FUJIFILM Corporation

²⁰ CEWIT was informed by the University technology licensing office that the titles, descriptions, and inventor information are confidential.

SUNY Polytechnic Institute Center of Excellence in Nanoelectronics and Nanotechnology (CENN)

Overall Strategic Plan

The SUNY College of Nanoscale Science and Engineering Center of Excellence in Nanoelectronics & Nanotechnology (CENN) leverages the combined resources of pre-competitive, private-public, consortia for R&D and workforce training to establish New York as the most effective and attractive location for nanotechnology-enabled industries—including, but not limited to, defense and civilian nanoelectronics, ultrafast ultra-secure communications, renewable environmentally-friendly energy sources, nanobiotechnology, nanoeconomics and nanomedicine. The envisioned research is expected to assemble and deploy the critical mass of vertically and horizontally integrated industry-university consortia and public-private partnerships to convert prospective nanotechnology innovations into real business opportunities and revenue-generating ventures within a technically aggressive and economically competitive technology development and deployment environment. In addition, CENN’s mission includes serving as a platform for implementation of innovative real-time educational programs to train a critical pool of highly qualified scientists, engineers, and technicians to support the continually developing needs of the nanoelectronics industry.

CENN facilities are expected to house a comprehensive set of programs that advance the full spectrum of activities required for international leadership in the fields of nanoelectronics and nanotechnology, ranging from academic research and development to the introduction and commercialization of new products and services, to business acceleration services and workforce development education.

Description of CoE Facility Activities

The concentration of CENN is to support business development efforts which result in driving revenue into CENN and support regional economic development. This includes driving growth in (1) commercial revenue from both large and small commercial customers; (2) increasing competitively awarded research and development grants; and, (3) increasing facility utilization and new campus developments. The Center will pursue an economic development strategy including but not limited to:

- Clean energy (e.g. smart grid, photovoltaics, power electronics, & energy storage);
- Biomedicine/healthcare (e.g. environmental health and safety, medical devices, pharmaceuticals, etc.);
- Smart cities technology (e.g. software and cloud computing infrastructure);
- Creating opportunities for varied business/economic development organizations and individuals to collaborate;
- Developing workforce and technical training programs, and workforce improvement opportunities; and
- Identifying and assisting with incubation and technology transfer opportunities.

Table 25: CENN 2015-2016 Operating Budget

SUNY POLYTECHNIC INSTITUTE CENTER OF EXCELLENCE IN NANOELECTRONICS AND NANOTECHNOLOGY			
CATEGORY OF EXPENSE	GRANT FUNDS	MATCH FUNDS	TOTAL
Personal services			
Salary	\$679,324	\$672,782	\$1,352,106
Fringe	\$165,742	\$197,020	\$362,762
Subtotal	\$845,066	\$869,802	\$1,714,868
Non Personal services			
Contractual Services	\$0	\$0	\$0
Travel	\$2,500	\$0	\$2,500
Equipment	\$0	\$0	\$0
Space/Property & Utilities	\$0	\$0	\$0
Operating Expenses	\$117,000	\$130,470	\$247,470
Other (Undefined)	\$35,434	\$0	\$35,434
Subtotal	\$154,934	\$130,470	\$285,404
Total	\$1,000,000	\$1,000,272	\$2,000,272

Patents, Research Partnerships and Intellectual Property (IP) Agreements

No patents, other research partnerships, or IP agreements were reported for the contract year.

Overall Strategic Plan

Smart Systems Technology Commercialization Center (STC) was the New York State Center of Excellence in microsystems and photonics technologies.²¹ STC’s mission was to assist the small photonics and optoelectronics companies in New York State, as well as the large companies, bridge the gap between research and development (R&D) and commercialization and help expand these industries in New York State, creating high paying, high skills jobs.

Description of CoE Facility Activities

STC supported business development efforts which resulted in driving revenue into STC and support regional economic development; including but not limited to driving growth in (1) commercial revenue from both large and small commercial customers; (2) increasing competitively awarded research and development grants; and, (3) increasing facility utilization and new campus developments. STC offered an array of micro-electromechanical system (MEMS)-related services in the industry; including its 140,000 square foot, state-of-the-art facility which includes over 20,000 square feet of certified clean room space, complemented by a dedicated 8,000 square foot MEMS and optoelectronic packaging facility. The STC team featured industry leaders, guiding programs through the difficult stages of product commercialization with proven skill in developing innovative MEMS fabrication and packaging processes that ensure product success.

Table 26: STC 2015-2016 Operating Budget

SUNY POLYTECHNIC INSTITUTE SMART SYSTEM TECHNOLOGY AND COMMERCIALIZATION CENTER			
CATEGORY OF EXPENSE	GRANT FUNDS	MATCH FUNDS	TOTAL
Personal services			
Salary	\$566,307	\$0	\$566,307
Fringe	\$249,175	\$0	\$249,175
Subtotal	\$815,482	\$0	\$815,482
Non Personal services			
Contractual Services	\$0	\$0	\$0
Travel	\$5,000	\$0	\$5,000
Equipment	\$35,000	\$0	\$35,000
Space/Property & Utilities	\$0	\$0	\$0
Operating Expenses	\$122,322	\$0	\$122,322
Other (Undefined)	\$22,196	\$0	\$22,196
Subtotal	\$184,518	\$0	\$184,518
Total	\$1,000,000	\$0	\$1,000,000

Patents, Research Partnerships and Intellectual Property (IP) Agreements

No patents, other research partnerships, or IP agreements were reported for the contract year.

²¹ In June 2017, the STC was sold to a private company, Akoustis Technologies, Inc., which was expected to invest \$20 million in the facility and create or retain 220 jobs, resulting in the end of its CoE designation.

Syracuse University Center of Excellence in Environmental and Energy Systems (SyracuseCoE)

Overall Strategic Plan

Syracuse University Center of Excellence in Environmental and Energy Systems (SyracuseCoE) targets research in the built environment and urban ecosystems at Syracuse University. SyracuseCoE and its academic partners will work in cooperation with the commercialization and business development expertise of the New York Indoor Environmental Quality Center, Inc. (d/b/a SyracuseCoE Office for Industry Collaboration). Research in built environmental systems will include indoor air quality, comfort, lighting, acoustics, energy efficiency, renewable energy, and intelligent control systems. Research in the area of urban ecosystems will include activities relating to renewable resources, ambient air quality, water resource management, waste management, and sustainable development. The envisioned research is expected to include the development of new products, technologies, and services that will enhance New York State's ability to respond quickly and appropriately to environmental threats or attacks, ameliorate disease, boost worker productivity, develop new strategies to conserve energy, and create jobs. Educational activities will also be occurring at SyracuseCoE through graduate and undergraduate teaching, seminars and lectures on environmental and energy issues and technologies, cooperative learning/teaching, and activities aimed at placing students in local environmental and energy companies.

SyracuseCoE facilities are expected to house a comprehensive set of programs that advance the full spectrum of activities required for international leadership in the fields of environmental and energy systems, ranging from academic research and development to the introduction and commercialization of new products and services, to business acceleration services and workforce development education.

Description of CoE Facility Activities

SyracuseCoE catalyzes research, development, and demonstrations to accelerate innovations for cleaner energy, healthier buildings, and more resilient communities. Led by Syracuse University, SyracuseCoE engages faculty, students, and industry partners to enable a thriving culture of collaboration for innovative research and product development.

- SyracuseCoE conducts projects that take ideas from the lab to the market and bring market needs to the lab for solutions. The result is advanced technologies that conserve natural resources and promote healthy buildings and cleaner, greener communities.
- The purpose of the SyracuseCoE is to create jobs and wealth in New York State through collaborations in research, development, and education.

Table 27: SyracuseCoE 2015-2016 Operating Budget

SYRACUSE UNIVERSITY CENTER OF EXCELLENCE IN ENVIRONMENTAL AND ENERGY SYSTEMS			
CATEGORY OF EXPENSE	GRANT FUNDS	MATCH FUNDS	TOTAL
Personal services			
Salary	\$543,340	\$310,299	\$853,639
Fringe	\$155,237	\$101,708	\$256,945
Subtotal	\$698,577	\$412,007	\$1,110,584
Non Personal services			
Contractual Services	\$30,000	\$50,000	\$80,000
Travel	\$25,000	\$10,001	\$35,001
Equipment	\$25,000	\$0	\$25,000
Space/Property & Utilities	\$0	\$0	\$0
Operating Expenses	\$104,786	\$414,985	\$519,771
Other (Undefined)	\$116,637	\$113,007	\$229,644
Subtotal	\$301,423	\$587,993	\$889,416
Total	\$1,000,000	\$1,000,000	\$2,000,000

Patents, Research Partnerships and Intellectual Property (IP) Agreements

No patents, other research partnerships, or IP agreements were reported for the contract year.

Overall Strategic Plan

The Rochester Center of Excellence in Data Science (UR CoEDS) works in a unified strategy with the UR Institute for Data Sciences (IDS) to establish the region and the state as a hub for new talent and a leader in analyzing and commercializing the limitless uses of data, to improve quality of life and to fuel economic growth. Data science is defined as the concepts, methods, and applications for extracting meaning from large-scale data. UR CoEDS will build upon UR infrastructure and expertise in data science and high performance computing, while leveraging collaborations with other academic partners, industry, and government agencies. UR CoEDS will help bring leading, highly talented researchers, engineers, and computer scientists together with the necessary resources to empower collaborations in data science across diverse fields, initially focusing on predictive health analytics, cognitive systems, and analytics on demand.

UR CoEDS builds upon existing UR collaborations with companies such as Xerox and IBM to create the nation's most advanced high performance computing health research center. Additionally, UR CoEDS will stimulate regional economic activity by generating innovative new technologies that can be spun off into commercial ventures and make the region attractive for relocation of existing companies. Educational initiatives will also be a priority for UR CoEDS through graduate and undergraduate programs, experiential learning opportunities and initiatives to place students in leading companies and government.

With a growing national need for technical specialists, managers, clinicians and others versed in the field of data science, UR CoEDS is well positioned to help meet the growing demand for training in this field. UR CoEDS will work with a range of partners to provide consultations and a portal to a suite of programs required for leadership in data science, ranging from academic research and development to the introduction and commercialization of new products and services, to business acceleration services and workforce development education.

Description of CoE Facility Activities

The focus of UR CoEDS is to support research, education and business development partnerships, which ultimately enhance regional economic development. This includes: (1) increasing competitively awarded research grants and generating innovative technologies/methods; (2) driving growth of large and small commercial partners; (3) increasing the pool of well-trained, highly skilled data scientists to meet national demands; and, (4) increasing access to advanced computing facilities and expertise. UR CoEDS will:

- Provide programs to support new research and technology development (funding for research, technology innovation, consultations and support services);
- Create educational and workforce training programs and opportunities;
- Identify and analyze policies that address data science requirements and related issues; and
- Establish a process/portal to facilitate partnerships and provide access to:
 - Existing and new resources and facilities;
 - Business development opportunities; and
 - Commercialization expertise, including incubation and technology transfer.

Table 28: UR CoEDS 2015-2016 Operating Budget

UNIVERSITY OF ROCHESTER CENTER OF EXCELLENCE IN DATA SCIENCE			
CATEGORY OF EXPENSE	GRANT FUNDS	MATCH FUNDS	TOTAL
Personal services			
Salary	\$41,388	\$310,324	\$351,712
Fringe	\$11,589	\$46,549	\$58,138
Subtotal	\$52,977	\$356,873	\$409,850
Non Personal services			
Contractual Services	\$0	\$0	\$0
Travel	\$3,077	\$0	\$3,077
Equipment	\$820,000	\$135,127	\$955,127
Space/Property & Utilities	\$0	\$0	\$0
Operating Expenses	\$7,946	\$0	\$7,946
Other (Undefined)	\$116,637	\$508,000	\$624,637
Subtotal	\$947,660	\$643,127	\$1,590,787
Total	\$1,000,637	\$1,000,000	\$2,000,637

Patents, Research Partnerships and Intellectual Property (IP) Agreements

No patents, other research partnerships, or IP agreements were reported for the contract year. This was the first year of the contract and the focus was on obtaining necessary equipment for UR CoEDS.

University at Albany Center of Excellence in Atmospheric and Environmental Prediction and Innovation (U Albany CoE)

Overall Strategic Plan

The Center of Excellence in Atmospheric Research and the Weather Enterprise (U Albany CoE) involves both the Atmospheric Science Research Center (ASRC)—which performs research on the physical and chemical nature of the atmosphere and applies that knowledge to study the interaction of chemical, physical, geological and biological processes impacting the environment—and the Department of Atmospheric and Environmental Science (DAES), which carries out a wide range of research, organized under three main topics: synoptic and mesoscale meteorology, climate and environmental systems and atmospheric chemistry and physics.

U Albany CoE will be focused on high-impact weather monitoring and prediction research as well as product and services development and commercialization aimed at better understanding of the causes of high impact weather in New York State, as well as the kinds of changes expected in the future as a result of climate change. In collaboration with strategic partners, U Albany CoE will improve New York State’s resilience in the face of high impact weather events through new technologies and better decision-making.

Description of CoE Facility Activities

The focus of U Albany CoE is to support business development efforts that develop and expand the weather enterprise and regional economic development. This includes: (1) driving growth in commercial revenue from both large and small commercial customers; (2) increasing competitively awarded research and development grants; and, (3) increasing collaborations with faculty and leveraging new campus developments. U Albany CoE will pursue a multidisciplinary economic development strategy that reaches the sectors of energy, agriculture, transportation, forensics (insurance), health, tourism, and finance/commerce.

U Albany CoE will:

- Establish and maintain a robust leadership team;
- Establish and maintain a team of scientific researchers;
- Identify and develop collaborations with industry sectors to develop projects addressing high impact weather related risks;
- Leverage Federal and State funding in support of applied research;
- Advance workforce development in support of the weather enterprise; and
- Establish partnerships with other Empire State Development and NYSTAR programs (Regional Technology Development Centers (RTDC), Centers for Advanced Technology (CAT), Regional Economic Development Councils (REDC), etc.).

Table 29: U Albany CoE 2015-2016 Operating Budget

UNIVERSITY AT ALBANY CENTER OF EXCELLENCE IN ATMOSPHERIC AND ENVIRONMENTAL PREDICTION AND INNOVATION			
CATEGORY OF EXPENSE	GRANT FUNDS	MATCH FUNDS	TOTAL
Personal services			
Salary	\$116,000	\$175,000	\$291,000
Fringe	\$37,240	\$77,000	\$114,240
Subtotal	\$153,240	\$252,000	\$405,240
Non Personal services			
Contractual Services	\$35,600	\$0	\$35,600
Travel	\$22,000	\$0	\$22,000
Equipment	\$5,000	\$0	\$5,000
Space/Property & Utilities	\$0	\$0	\$0
Operating Expenses	\$22,986	\$0	\$22,986
Other (Undefined)	\$11,174	\$0	\$11,174
Subtotal	\$96,760	\$0	\$96,760
Total	\$250,000	\$252,000	\$502,000

Patents, Research Partnerships and Intellectual Property (IP) Agreements

No patents, other research partnerships, or IP agreements were reported for the contract year.

Overall Strategic Plan

The University at Buffalo's New York State Center of Excellence in Bioinformatics and Life Sciences (CBLS) is home to internationally recognized faculty and industry partners with assets/resources to drive both scientific innovation and economic growth. Researchers study the mechanistic processes involved in human disease, and the envisioned research is expected to include development of new diagnostic tools and therapeutic interventions, preventive treatments and other devices and processes which improve the population's health. Educational activities will also continue to occur at CBLS. These include the monthly Innovation Lecture Series geared toward professional and entrepreneurial ecosystem partners, the iSciWNY program guiding interested students to potential life sciences career pathways, the Career Experience Program that pays students to work at local companies, and other programs and events designed to connect students and professionals with opportunities in life sciences industries.

Working with its technology commercialization and business development resources, CBLS leverages its research capabilities to generate new technological advantages for the health care and life sciences industry sectors, including biomedical informatics, diagnostics, medical devices, pharmaceuticals, and research and development products and services. The business development resources of CBLS are fully aligned with UB's Center for Advanced Biomedical & Bioengineering Technology (UB CAT), which is co-located at the CBLS.

CBLS houses a comprehensive set of programs that advance the full spectrum of activities required for international leadership in the fields of health care and life sciences, ranging from academic research and development to the introduction and commercialization of new products and services, to business acceleration services and workforce development education.

Description of CoE Facility Activities

CBLS is focused on supporting business development efforts that result in driving revenue to the Center and support regional economic development. This includes facilitating growth in (1) commercial revenue from both large and small commercial customers; (2) increasing competitively awarded research and development grants; and, (3) increasing facility utilization and new campus developments. The Center will pursue an economic development strategy including but not limited to:

- Advancing the state-of-the-art through interdisciplinary, collaborative, life sciences translational research;
- Driving economic development through innovation and commercialization;
- Increasing and enhancing collaborative relationships with state, federal, industry and academic partners;
- Increasing corporate and public funding for research and commercialization efforts; and
- Providing workforce development, business development & commercialization programming and services.

Table 30: CBLs 2015-2016 Operating Budget

UNIVERSITY OF BUFFALO CENTER OF EXCELLENCE IN BIOINFORMATICS AND LIFE SCIENCES			
CATEGORY OF EXPENSE	GRANT FUNDS	MATCH FUNDS	TOTAL
Personal Services			
Salary	\$926,732	\$0	\$926,732
Fringe	\$398,858	\$0	\$398,858
Subtotal	\$1,325,590	\$0	\$1,325,590
Non Personal Services			
Contractual Services	\$250,000	\$0	\$250,000
Travel	\$33,000	\$0	\$33,000
Equipment	\$46,000	\$0	\$46,000
Space/Property & Utilities	\$0	\$1,140,000	\$1,140,000
Operating Expenses	\$198,839	\$0	\$198,839
Other (Undefined)	\$146,571	\$860,000	\$1,006,571
Subtotal	\$674,410	\$2,000,000	\$2,674,410
Total	\$2,000,000	\$2,000,000	\$4,000,000

Patents, Research Partnerships and Intellectual Property (IP) Agreements

Nine patents have been filed. CBLs does not have any other research partnerships or IP agreements that were reported for the contract year.

Overall Strategic Plan

The University at Buffalo (UB) Center of Excellence in Materials Informatics (CMI) leverages UB's cutting-edge materials science and informatics expertise to drive innovation and critical R&D activities that directly impact private sector growth in several industries, including, in particular, advanced manufacturing, life sciences and energy. The objective is to establish UB as the partner of choice related to materials informatics and advanced manufacturing, both regionally and statewide. UB and CMI will partner with the Buffalo Niagara Institute for Manufacturing Competitiveness (BNIAMC) and its founding member companies to develop manufacturing methods, innovative materials and testing technologies to spur growth of high-tech manufacturing in Western New York. The CMI leadership and governance model remains that Co-Directors lead the scientific strategy and industry collaboration efforts in close consultation with CMI's Business Development Executive and Director of Management and Strategic Implementation.

Description of CoE Facility Activities

The vision of CMI remains to:

- Serve the industry by convening public-private consortia that compete effectively for large, federally funded initiatives across a range of segments, including advanced manufacturing, critical materials, alternative energy, national security, healthcare, or other areas of national, strategic importance;
- Advance developing breakthrough technologies and IP, and streamline the innovation cycle;
- Create high-technology jobs in Western New York, and attract investment and manufacturing to Western New York; and
- Engage in workforce development through internships, fellowships and capstone projects.

Table 31: CMI 2015-2016 Operating Budget

UNIVERSITY OF BUFFALO CENTER OF EXCELLENCE IN MATERIALS INFORMATICS			
CATEGORY OF EXPENSE	GRANT FUNDS	MATCH FUNDS	TOTAL
Personal services			
Salary	\$1,281,217	\$899,905	\$2,181,122
Fringe	\$433,330	\$473,369	\$906,699
Subtotal	\$1,714,547	\$1,373,274	\$3,087,821
Non Personal services			
Contractual Services	\$5,906	\$0	\$5,906
Travel	\$45,839	\$0	\$45,839
Equipment	\$170,237	\$189,067	\$359,304
Space/Property & Utilities	\$0	\$1,140,000	\$0
Operating Expenses	\$0	\$0	\$0
Other (Undefined)	\$435,804	\$809,992	\$1,245,796
Subtotal	\$657,786	\$2,139,059	\$1,656,845
Total	\$2,372,333	\$3,512,333	\$4,744,666

Patents, Research Partnerships and Intellectual Property (IP) Agreements

CMI reports that three patents have been awarded.

Table 32: CMI Licensing Agreements and Income

CMI LICENSING AGREEMENTS AND INCOME		
Project Name	Inventor	Licensing Partner
Optoelectronic Nanodevices, LLC Patent License Agreement	Vladimir Mitin	Optoelectronic Nanodevices, LLC
Technology License Agreement - Exclusive Field of use for marine coatings all other uses (and non- exclusive excluding medical devices)	Michael Detty	SiliCycle
Technology License Agreement for Microfabricated Calorimeter for Research Foundation	Albert Titus	Bird Technologies Group, Inc.
Technology License Agreement for Electrochemical Eradication of Biofilm Related Infections of Passive Orthopedic Implants	Mark Ehresberger	Garwood Medical Devices, LLC
Technology Licensing Agreement for measurement of pH or other ionic concentrations in fluids	Cartwright and Prasad	Garwood Medical Devices, LLC
Software License Agreement for SIMIT: A multi-physics computational framework for conducting multiphase turbulent reacting flows and fluid-structure interactions	Paul Desjardin	Reaction Engineering International
University of Michigan License Agreement with eGravitas Ltd for Energy Harvesting from Constrained Buckling of Piezoelectric Beams (co-owned)	M. Amin Karami	eGravitas Ltd

INNOVATION HOT SPOTS & NEW YORK STATE CERTIFIED BUSINESS INCUBATORS

Program Overview and Purpose

The Innovation Hot Spot and New York State Certified Business Incubator Program provides financial support to incubators in the state to expand their services and reach a greater number of early stage companies.²² Support available at individual centers varies but generally includes: physical space; shared administrative staff; access to capital; coaching; mentoring; networking connections; prototype development; and access to other technical services. In addition, Innovation Hot Spots are charged with coordinating regional entrepreneurial ecosystems and can offer certain tax benefits to client businesses.

Table 33: Economic Impacts of Hot Spots and Incubators for the 2015-16 Contract Year

Region	Center	Jobs Created	Jobs Retained	Non-Job Economic Impact
Capital	Innovate 518 at University at Albany (Hot Spot)	4	7	\$267,800
Capital	Rensselaer Polytechnic Institute (RPI) Incubator	7	3	\$4,513,700
Capital	Tech Valley Center of Gravity Certified Incubator	5	7	\$1,200,155
Central	Syracuse Tech Garden (Hot Spot)	32	90	\$5,588,016
Finger Lakes	NextCorps / High Tech Rochester (Hot Spot)	5	2	\$2,478,500
Finger Lakes	Cornell Food Innovation Incubator The Technology Farm	9	-	\$7,357,614
Long Island	Stony Brook U. Long Island High Technology Incubator	37	39	\$19,629,046
Mid-Hudson	BioInc@NYMC (Hot Spot)	20	-	\$4,749,787
Mid-Hudson	NYS Clean Tech Certified Business Incubator iCANny	11	3	\$2,780,000
Mid-Hudson	The Accelerator Powered by Orange County IDA	7	12	\$1,950,260
Mohawk Valley	thINCubator (Hot Spot)	8	-	\$107,850
Mohawk Valley	The Griffiss Institute	6	6	\$1,077,227
New York City	Brooklyn Biotech	59	118	\$30,067,606
New York City	NYU Tandon School of Engineering	107	131	\$18,736,269
North Country	Clarkson University Shipley Center (Hot Spot)	36	6	\$2,054,010
Southern Tier	Southern Tier Startup Alliance (Hot Spot)	35	15	\$3,280,277
Western NY	WIN: WNY Incubator Network (Hot Spot)	28	-	\$8,237,933
Totals		415	439	\$114,076,050

²² This program is program is cited in Article 16-v of the Urban Development Corporation Act. Funding is provided under Department of Economic Development Aid to Localities.

HIGH PERFORMANCE COMPUTING

Program Overview and Purpose

New York State is a global leader in computational resources and talent in the areas of simulation-based engineering and high-performance computing. NYSTAR supported the High Performance Computing Consortium (HPC^{NY}) in order to leverage these resources, helping New York State companies gain competitive advantage through cost-effective access to advanced computing assets and expertise.²³ HPC^{NY} consortium members included: Rensselaer Polytechnic Institute, University at Buffalo, Stony Brook University, NYSERNet, Marist College, and the Icahn School of Medicine at Mount Sinai. HPC^{NY} offered several forms of support to the industry to solve business, technology, and R&D needs, including:

- Access to its high-speed networks and high-performance platforms, enabling industrial entities and research groups to make scientific breakthroughs and to accelerate the engineering and development path of complex, ground-breaking designs for reliable, accurate, innovative product and process performance that can provide competitive advantage;
- Education, outreach and training in simulation-based engineering science; and
- Web-based tutorial and training sessions and user support.

HPC^{NY} Summary for the 2015-16 Contract Year

During this reporting period, HPC^{NY} assisted 17 companies, helping them to create 39 jobs, retain six jobs, and generate nearly \$13.2 million in non-job economic impact. That economic impact consisted of approximately \$2.6 million in increased revenues, \$1.6 million in cost savings, \$1.7 million in federal funds acquired, \$7.2 million in non-government funds acquired, and \$0.2 million in capital improvements.

²³ This program is not cited in New York State statute and was funded through the Matching Grants Leverage Program.

Program Overview and Purpose

NYSTAR is the primary funding source for the New York State Science & Technology Law Center²⁴ (STLC) and is housed at Syracuse University College of Law. This organization provides legal research, education, and information to entrepreneurs and companies to help commercialize new technologies from lab to market. From market landscapes to intellectual property protection to licensing options to potential funding sources, STLC has helped scores of companies and institutions make their technology vision become a commercial reality.

Syracuse University was awarded a STLC re-designation in a 2017 competition. Since 2015, the center has completed or is in the process of completing 175 research projects. Typical clients include start-up and established tech companies, as well as entrepreneurs, with the STLC providing additional services to research centers, technology transfer offices, and incubators.

Key areas of service include:

- Patent landscapes and trademark searches – While the STLC is not a substitute for intellectual property (IP) counsel, its research team performs patent and trademark searches providing valuable information that a client can share with an attorney to provide the groundwork for drafting claims and offering opinions on patentability. STLC also provides more generally applicable informational literature on intellectual property for prospective inventors seeking to be proactive in protecting their IP rights.
- Regulatory overviews – STLC provides analysis of both state and federal regulations, as well as industry-specific standards and certifications that are critical to market entry. By providing early and accessible regulatory insight, businesses are better equipped to remain in New York, create jobs, and spur innovation.
- Market research and segmenting – Clients receive in-depth analysis into who the customers are in a given market and, for innovations with multiple applications, which markets can offer the most rewards. Examples of previous projects include identifying sell points for a specialized gastroenterology therapy within the EU and the U.S. medical systems, exploring ideal sub-segments of commercial buyers for cutting edge lawn equipment, and primary market research such as surveys to determine what feature sets and price points appeal to various demographics for marketing new speaker technologies.
- Competitive landscape – Entrepreneurs and researchers attempting to commercialize new technology rarely know the full scope of their intended market's competition. STLC's competitive landscape analysis provides clients with a breakdown of potential competitors and identifies significant product differentiators, enabling clients to find underserved consumer segments and areas where the prevailing technology is vulnerable to disruption or possible licensing opportunities.

²⁴ This program is cited in Article 10a of Public Authorities Law. Funding is provided under Department of Economic Development Aid to Localities.

- Commercialization analysis – Many inventors and entrepreneurs hold valuable patents but are unclear on how to bring a product to market. STLC conducts market research and advises on potential business models, licensing strategies, or the appropriate distribution/go-to-market strategy. Clients receive analysis of competing business models based on market and team factors, promoting the development of an informed strategy.

In addition to research, STLC has continued its education and outreach efforts through participation in pre-seed workshops, FuzeHub Solutions Forums, conferences and sponsorships, publication of guidebooks, a website, webcasts, and a newsletter.

GAME DEVELOPMENT CENTERS

Program Overview and Purpose

NYSTAR-supported Game Development Centers²⁵ were established in 2016 at three New York State higher education institutions: New York University (NYU), Rensselaer Polytechnic Institute (RPI), and Rochester Institute of Technology (RIT). These universities educate some of the top designers and computer engineers in the world, and this program further equips them with the resources needed to continue paving the way with groundbreaking digital gaming research and development. These investments strengthen the state economy, create new jobs, and advance New York's position as a national leader in digital media development. The digital gaming sector now generates more global revenue than both the music and film industries combined and is expected to grow to over \$95 billion dollars by 2019, according to PricewaterhouseCoopers.

The Game Development Centers perform the following functions:

- Create collaborative activities that bring together industry, higher education, non-profit organizations, students, and individuals to foster the creation of new games or companies;
- Provide resources and mentoring to encourage students and entrepreneurs to enter the growing industry;
- Assist existing companies with digital gaming concepts, technologies and trends;
- Host events focused on assisting the digital gaming community; and
- Increase the economic impact to New York as a result of fostering innovation.

There are now over 20 academic programs related to digital games in New York State, with two of them (RIT and NYU, both home to Game Development Centers) being ranked among the ten best programs in the world, according to the Princeton Review.

Success Stories

The following are highlights of the NYSTAR-supported Game Development Centers' accomplishments.

New York University (NYU)

- Ranked as the #7 undergraduate (#6 graduate) digital gaming program in the world by the Princeton Review.
- Connected local independent developers to top game publishers including SONY, Devolver Digital, Alliance Digital Media, Buffalo Games, Microsoft, and IndieFund.
- Welcomed more than 1,500 people to the center for an annual showcase of more than 100 games.
- Provided incubator space and other assistance to two entrepreneurs who developed "Swap Sword," a mobile game released on iOS in 2016. The game was featured as a "Best New Game" in the Apple App Store and was recognized as one of the best mobile apps in 2016 by the prestigious Game

²⁵ This program is not cited in New York State statute. Funding is provided under Department of Economic Development Aid to Localities. This program was previously known as the Digital Gaming Hubs program.

Developers Choice Awards. The two developers continue to work in New York City on new projects and are supporting themselves financially through game sales, freelance game design work, and teaching at NYU.

- Assisted the company Digital Continue, which moved from Washington, D.C. to New York City to open a new studio. After a major project fell through, the company reached out to NYU for support and was hosted by the university as a Studio-In-Residence for three months, allowing them access to free office space and other resources. During their time at NYU, the company secured funding for permanent office space and additional hiring, allowing them to keep the company in New York. Since then, the company has grown and now employs several NYU graduates.

Rochester Institute of Technology (RIT)

- Ranked as the #2 undergraduate (#4 graduate) digital gaming program in the world by the Princeton Review.
- MAGIC Spell Studios was formally launched at RIT, and their first creation, “Hack, Slash & Backstab,” was successfully launched on the Microsoft Xbox and Steam platforms along with the Humble Store to audiences worldwide. RIT is the first university to ever directly publish a game to the Xbox platform.

Rensselaer Polytechnic Institute (RPI)

- REVEAL is an eight-week intensive program run by the Emerging Ventures Ecosystem at RPI, providing business training, mentoring, space, and funding for prototype development, customer discovery, and preparation to launch new start-ups. In the summer of 2017, the Game Development Center enabled digital gaming companies to join the REVEAL tech start-up accelerator for the first time. Two teams successfully completed the program with new prototypes and presented to investors at the end of the summer.
- Neon Sunset Interactive, a team of five recent RPI graduates, completed the playable prototype of their game “Nth Gear” in preparation for launching a Kickstarter campaign.
- “Not a Clone” by Omiya Games, “Rockability Beatdown” by Rumblecade, and “Waiting for Sleep” by Effigy3 have been developed and the companies remain ingrained in the Capital Region.

MATCHING GRANTS LEVERAGE PROGRAM

Program Overview and Purpose

NYSTAR reviews and coordinates requests for New York State matching grants and support letters to strengthen applicants' proposals to federal agencies, foundations, and other grant-making organizations.²⁶ Higher education and not-for-profit research institutions in New York State are eligible to apply for these state matching funds. The purpose of this program is to attract more federal R&D funding to support technology development and commercialization efforts in New York State.

Funded Initiatives

At the time of this report's writing, recent federally funded research initiatives supported through NYSTAR's Matching Grants Leverage Program included:

- Syracuse University's acquisition of an Electron Microprobe, supported by the National Science Foundation's Major Research Instrumentation Program;
- The Icahn School of Medicine at Mount Sinai's development of the Physical Activity Genomics, Epigenomics, Transcriptomic Site, supported by the National Institutes of Health;
- Rensselaer Polytechnic Institute's participation in the Advanced Robotics for Manufacturing Institute (ARM), supported by the Department of the Army; and
- Clarkson University's acquisition of a Heterogeneous Computing Platform for Biometrics Research, supported by the National Science Foundation's Major Research Instrumentation Program.

²⁶ This program is not cited in New York State statute. Funding is provided under Department of Economic Development Aid to Localities.

FACULTY DEVELOPMENT & TECHNOLOGY TRANSFER

Program Overview and Purpose

New York's world-class universities and research institutions are powerful drivers of economic development. The Faculty Development Program and Technology Transfer Incentive Program further support New York's leadership in technology-related research and commercialization.²⁷

The Faculty Development Program assists institutions of higher education in New York State in the recruitment and retention of leading entrepreneurial research faculty in science and technology fields with strong commercial potential. The Technology Transfer Incentive Program helps New York companies commercialize high-tech innovations in partnership with colleges and universities by providing awards to institutions of higher education to move leading-edge technologies from the research lab to the marketplace.

These programs thereby support a wide array of activities associated with commercialization, such as improvement of product prototypes and existing products, new product development, development of manufacturing processes for new products, and filing patent applications.

Requests for Proposals to these programs are issued periodically when funding is available.

²⁷ This program is cited in Article 10b of Executive Law. Funding is provided under Department of Economic Development Aid to Localities.

OTHER UPDATES

Recent Competitions / Requests for Proposals

The following is a list of competitions NYSTAR has held over the past several years.

Table 34: NYSTAR Competitions

RFP Release Date	Program	Number of Awards	Designation Period (years)	Yearly Award Amount	Purpose
10/2017	Science & Technology Law Center	1	5	\$343,000	Establish a statewide resource to assist with technology related legal issues.
2/2017	Centers for Advanced Technology	1	10	\$921,200	Spur technology-based applied research and economic growth and encourage applied research collaboration with industry.
CFA Round 7 ²⁸	Innovation Hot Spots & NYS Certified Business Incubators	5	5	\$125,000 to \$250,000	Provide significant financial support for business incubators and their programs of assistance to early stage companies.
CFA Round 6	Innovation Hot Spots & NYS Certified Business Incubators	15	5	\$125,000 to \$250,000	Provide significant financial support for business incubators and their programs of assistance to early stage companies.
10/2015	NY Manufacturing Extension Partnership	11	5 ²⁹	\$575,000 to \$1,400,000	Establish a network of ten regional and one statewide non-profit organizations that provide services, expertise and guidance to NYS manufacturers from an early stage through maturity.
CFA Round 5	Innovation Hot Spots & NYS Certified Business Incubators	10	3	\$125,000	Provide significant financial support for business incubators and their programs of assistance to early stage companies.
2/2015	Centers for Advanced Technology	10	10	\$921,200	Spur technology-based applied research and economic growth and encourage applied research collaboration with industry.
2/2015	Digital Gaming Hubs	3	3	\$150,000	Create Hubs focused on expanding regional gaming.

²⁸ CFA = Consolidated Funding Application

²⁹ With five year renewal

APPENDIX 1: ADDITIONAL REPORTING

Qualitative Impacts

Outreach to Surrounding Communities

Centers supported by NYSTAR programs are actively engaged in their local and regional economic development and innovation communities. They frequently partner with industry associations, local governments, entrepreneurial support organizations, technology-based interest groups, workforce development entities, and chambers of commerce, often on events or activities designed to increase their reach into target industries and ensure that their programs are complementary to others in the area. For example, NY MEP sub-recipients hold well over 50 such collaborative events per year targeting manufacturers. Many centers are engaged in their respective REDC as council or work group members to help shape and respond to economic opportunities in a collaborative, cross-sector fashion. Innovation Hot Spots and Certified Business Incubators typically have strong relationships with area investors, mentors, and entrepreneurs.

Invention, Development, or Refinement of New Products and Processes with Commercial Applications

The NYSTAR programs most directly involved in product/process invention, development, and refinement are the Centers for Advanced Technology, Centers of Excellence, and Innovation Hot Spots and New York State Certified Business Incubators. CATs and CoEs have a mandate to work with private industry in the development and application of new technologies, and the job growth, job retention, and economic impact metrics they report are generated by the success of new products and processes at client companies. Innovation Hot Spots and Certified Business Incubators guide and support young companies through the development and refinement of the technologies and products they seek to bring to market; an important example of such activities is the New York City Innovation Hot Spot's role as an I-Corps Node, a National Science Foundation program that assists innovators with identifying markets and tailoring their new products and processes to market needs. The High Performance Computing Consortium's services are also utilized for product and process development and refinement.

Terms of Research Sponsorship Agreements

The terms of NYSTAR-supported centers' research sponsorship agreements with client companies vary from center to center and are often determined by the policies of their parent institutions.

Fields of Technology with Significant Potential

NYSTAR reviews industry and technological developments to identify areas of strategic importance, for example based on industry growth expectations or relevance to the competitiveness of existing industries in the state. Currently, fields of interest include but are not limited to:

- The intersection of big data and medicine, especially pertaining to pharmaceuticals, medical devices, and diagnostics;

- Medical manufacturing, including advances in pharmaceutical production, medical device development, and biomanufacturing;
- Advanced materials tailored for unique properties and applications. Nanomaterials in particular stand out for their potential for broad applications, fast-paced development, and economic impact;
- Internet of Things as it pertains to software development, manufacturing processes, smart communities, and consumer products;
- Autonomous systems including UAVs and their commercial applications;
- Cybersecurity; and
- Artificial intelligence and machine learning.

As NYSTAR identifies technologies of strategic importance, these may be reflected in future competitions to designate new Centers for Advanced Technology or as focuses of other efforts related to commercialization and innovation.

APPENDIX 2: METHODOLOGY

General methodology

“New jobs” refers to permanent, full-time positions created in the course of business expansion resulting from the NYSTAR program’s efforts.

“Retained jobs” are those that may be at risk when companies consider relocation or production contracts. If a company credibly substantiates that jobs were at risk and that collaboration with the NYSTAR-supported center was a significant reason for their retention, those jobs are counted as retained. That substantiation must include documentation comparing operating costs vis-à-vis another location and specific offers or incentives for relocation.

“Economic impact” or “non-job impact” refers to the following impacts reported by companies served by CATs, CoEs, Innovation Hot Spots, Certified Business Incubators, and the High Performance Computing Consortium. Note that it does not reflect any increase in paid wages or the multiplier effects of these impacts, and therefore understates total cumulative changes in employment, earnings, and output in New York State attributable to the efforts of these programs.

- **Increased company revenues.** NYSTAR-supported assets frequently collaborate in new product development or existing product improvement that directly increases client revenues. In extraordinary circumstances, NYSTAR may credit impact for retained sales. In these cases, company documentation must clearly state that due to the center’s work, the company was able to retain a specific customer that it would have otherwise lost (e.g. due to quality control problems).
- **Cost savings realized by the company.** Cost savings that typically accrue from a company’s collaboration with a NYSTAR-supported center are production process improvements, the value of accessing specialized equipment, expertise, or analytical testing, and other research savings. When savings are reported because the center is providing services such as access to specialized equipment, analytical testing, or research expertise that otherwise would have to be done by the company in-house, the appropriate level of credit is not the total amount the research would have cost the company in-house, but the difference between this cost and the amount contributed by the company.
- **Funds acquired by the company.** These include any non-New York State sources of funds. They may include non-NYS government funds, for example federal sources like the Small Business Innovation Research program. They may also include venture capital and other business investments. There must be a demonstration that the NYSTAR-supported center played a substantive role in helping the company obtain the funds.
- **Capital expenditures by the company.** This includes infrastructure improvements, purchases of new capital equipment, and construction. Company documentation must specify that the NYSTAR-supported center played a substantive role in leading the company to make these investments.

NYSTAR follows documented economic impact review procedures. For most programs, impacts reported to and credited by NYSTAR meet the following conditions:

- Occurred during the current year and was not previously credited to that center;
- Actual impact rather than projected;
- Occurred within and benefited a company within New York State;
- Resulted from collaboration with a NYSTAR-funded center; and
- Documented with a company letter of attestation and other substantiating materials as noted above.

Larger reported impacts are subjected to greater scrutiny by NYSTAR and at times require confirmation from a third party. NYSTAR follows a threshold formula for determining the necessary level of evaluation.

Program-specific notes

The NY MEP program is evaluated by its federal funder, the National Institute of Standards and Technology (NIST), and a third-party evaluator engaged by NIST. In some cases, impact definitions vary slightly from those provided above.

In general, any data provided for the “number of companies served” by a center will understate the number of companies touched by a center. This is especially true in the case of NY MEP, which reaches a substantially greater number of companies through non-project activities (e.g. events and workshops) that are not subject to impact measurement.