



Entrepreneurship and Technology Innovation Center: Bringing Together Industry, Faculty, and Students

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Abstract

The School of Engineering and Computing Sciences (SoECS) of New York Institute of Technology (NYIT) is launching a new Entrepreneurship and Technology Innovation Center (ETIC). The ETIC will consolidate and expand the School's ongoing industry-academic partnerships by fostering innovation and promoting collaborations between industries, the academic community, professional organizations, and government. The ultimate goal of the partnerships is to strengthen the SoECS' educational and programmatic offerings in order to graduate engineering professionals for the 21st Century. The premise is that by creating the right learning environment for students to engage with industry in innovative real-world problem solving, project-based learning, teamwork, direct contact with practitioners, they will gain key competency and entrepreneurship skills required in today's rapidly evolving, globalized economy.

Throughout the Center's collaborative process, each business or startup company will have access to faculty and skilled students to test concepts and/or develop fully marketable products. At the same time University residence opportunities will be made available to industry practitioners at the Center, and conversely, Industry residence opportunities will be available to NYIT faculty. Additionally, students will gain operational expertise in turning good ideas into great businesses and will become confident innovators in their own right.

As a source for talent, entrepreneurship, and innovation in technology, engineering and applied science, the Center is expected to spur economic growth and ensure greater competitiveness for Long Island and the broader metropolitan region.

To document this effort and facilitate its broader adoption, this paper will provide a detailed description of the project, indicating what is being planned, designed, and/or constructed, the issues/opportunities to be addressed, and expected outcomes and deliverables of each of its constituents.

Project Description

With New York State funding from the Empire State Development Corporation, the SoECS of NYIT is launching a new Entrepreneurship and Technology Innovation Center (ETIC), www.nyit.edu/etic, to foster the School's ongoing industry-academic partnerships.

The Center is being created with the assistance of an Advisory Board made up of members of industry, government, and the venture capital community, who have agreed to work on three focus areas for the Center and review plans to create high-tech teaching and research laboratories that meet industry workforce demands and projections. This Advisory Board includes representatives from IBM; Alcatel-Lucent; AT&T; CA Technologies; Juniper Networks; Dvirka and Bartilucci Consulting Engineers; Golden Seeds, NY; Goldman Sachs & Co.; In Zero Systems; Leviton Manufacturing Co.; Motorola Solutions; Pegasus Global Holdings; Power Management Concepts, LLC; Retliff Testing Lab, and others.

The School of Engineering has signed, or is in the process of signing, non disclosure and collaborative agreements (e.g., NDAs and MOUs) with many of these as well as additional organizations such as the South Bronx Overall Economic Corporation (SOBRO); the Industrial and Technology Assistance Corporation (ITAC); the Sustainable South Bronx (SSBx); Consolidated Energy Design, Inc.; ElectroMotive Designs LLC; Vertical Axis Wind Turbines; Spin Dynamics; etc. to institutionalize the relationships between the Center and its industry and community partners. The Dean of the School of Engineering, who is active on several community and industrial boards, is leading this effort and leveraging NYIT's vast experience in administering and implementing partnerships with both the public and private sector.

The ETIC will create a paradigm shift in the way education is tied to economic growth and enhance existing programs at NYIT by infusing modern engineering tools and inventions in the classroom. Its principal role is to be a conduit for strategic partnerships between industry, entrepreneurs, venture capital/angel investors, on the one hand, and academia and the LI workforce on the other hand. By merging classroom learning and industry participation, students are engaged in real-world problem solving, project-based learning, team work, collaborations and networking with industry and developing professional and entrepreneurial skills. Thus, this approach supports students in gaining competence, an important factor in competing in the increasingly globalized knowledge economy¹

In this regard, as an example, students of the SoECS are presently engaged in the following collaborative projects with industry participation and faculty from different disciplines.

A. A team of NYIT Electrical Engineering and Computer Science students collaborated on various applications for the Motorola sponsored ThirdEye headset computer, under the guidance of Dr. Ziqian Dong, Assistant Professor of ECE. The project took 3rd place at the Golden-i@dea Competition and Partner Conference. After the competition, our students are continuing a collaboration with Motorola to develop additional headset applications in the construction field under the guidance of ECE and ECET faculty.

B. Industry partners are working with two research faculty of NYIT's College of Osteopathic Medicine (NYCOM), Professors William Werner, and Ely Rabin, ECE faculty Dr. Ziqian Dong, and two teams of ECE seniors on a Parkinson's Disease posture detection technology project. The team is modifying the existing technology of a moving handrail prototype to a portable, user-controlled motorized walker that delivers haptic walking-speed cues, specific to the environment by virtue of its motion to aid the gait of patients at risk of falling. The mode and pace of the walker can be set by the user, and also by sensors that adjust or halt procession according to terrain or obstacles. This cost-effective tool for improving posture and gait and to prevent falling will be modified, tested, and optimized for use by elderly individuals and individuals with Parkinson's Disease who are at a high risk of falling. The technology is being considered for commercialization.

C. Professors William Werner, and Ely Rabin and Dr. Dong in conjunction with their industry partners are also working with a team of ECE seniors on a Body Area Sensor Network for Posture Detection project. This project addresses the challenges of acquiring posture and gait data from Parkinson's disease (PD) patients. The project uses a portable body area sensor network design that provides real time posture detection and correction for PD patients. Posture and gait measurement data will then be used in a clinical study of PD patient rehabilitation. The device will assist PD patients to practice good posture in an unsupervised environment and will assist rehabilitative efforts through the data that will be collected not only in the clinic/lab, but also at home when patients are less aware of observation. This will be the first study to compare "rehearsed" and spontaneous performance during ongoing therapy, and also demonstrate how kinematic/bio data can be retrieved outside clinic/labs. The device presents another opportunity for product commercialization.

D. ECE and CS students, with faculty from both the ECE and CS departments are working in collaboration with Owl Computing Technologies, a leader in government and military cybersecurity, with over 1400 solutions deployed to provide secure, reliable, and robust one-way information sharing on a hardware security project.

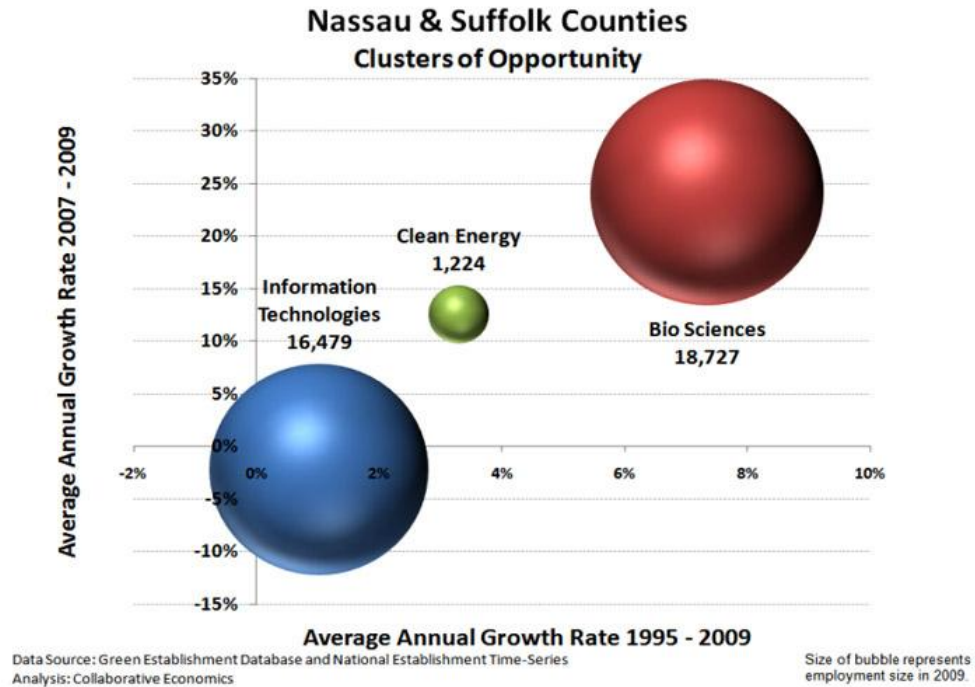
Two key NYIT initiatives are designed to support these industry-academe linkages. The first is an Industry-University Innovation program, which links existing industries and businesses to university talent and resources, leading to applied faculty research that is relevant to the local and regional economy, and key skill sets ensuring the seamless transition of students from the classroom to the workforce. The second is an Entrepreneurship Program - Turning Ideas into Companies, which provides training for startups and aspiring entrepreneurs including faculty and students, to test ideas, leading to the creation of new viable companies that can employ Long Island workers. The Entrepreneurship Program is modeled after the Golden Seeds Program taught at Barnard College.

To support these two initiatives and to speed the innovation process from laboratory to market, NYIT plans to expand its programs and facilities to house the Center's three laboratories in the critical areas of Health Analytics & Bioengineering, IT & Cybersecurity, and Energy and Green technologies, which are aligned with the areas that exhibit the highest growth in Nassau and Suffolk County as identified by the "Accelerate Long Island" initiative. The three areas draw on NYIT's unique research and curricular strengths and on the combined interdisciplinary expertise of its highly regarded faculty in NYIT's seven schools and colleges in engineering, medicine, art, science, architecture and design, management, education, and health professions.

The Need

NYIT's ETIC will be established in the Old Westbury campus with virtual connectivity to the Manhattan campus. Old Westbury is located in Nassau County, a nexus of technological innovation and entrepreneurship. Capitalizing on the county's long tradition in advancing the fields of IT and Engineering, Biosciences, Energy, Health and Environmental Sciences, the Nassau County's

Department of Economic Development is actively working to attract state-of-the-art business ventures to the region by providing economic and other incentives. Information technologies, bioscience and clean energy have been determined to be Nassau and Suffolk Counties three main clusters of opportunity, and recent trends support continued investments in these areas, as they demonstrate the highest growth rates on Long Island with biosciences and clean energy exhibiting an average annual rate of 24% and 13%, respectively, over the 2007-2009 period².



However, the region’s success in attracting new businesses depends not just on tax credits and other incentives but also in meeting innovative companies’ demand for a highly qualified workforce (e.g. engineers and technicians) that is trained to meet the demands of industry and equipped with the appropriate skill sets. Currently, the Long Island economy faces significant challenges in this respect, as it is competing with other high tech research and development hubs sited elsewhere in the country and the world. A survey of defense companies in Long Island indicated that the dearth of “well qualified technology workers” in the region and the companies’ inability to attract talent from elsewhere due to relatively high living costs on Long Island, was one of the main reasons compromising their ability to compete in regional, national and/or global markets. Indeed, some companies have recently left Long Island, to relocate in the outskirts of Denver and other areas.

NYIT’s ETIC is a direct answer to this challenge and can play an important role in supporting Nassau County’s effort to spawn innovation and economic development while educating the next generation of qualified workers to meet current demand. By assisting established businesses and new ventures and providing talent and resources, the ETIC will help translate emerging technologies into new marketable products and services or trial new product lines and/or systems. In doing so, the ETIC can capitalize on the knowledge base of companies in Long Island, with a long tradition in advancing the fields of IT and Engineering, Biosciences, Energy, Health and Environmental Sciences. Thus, the Center will actively work to attract state-of-the-art businesses and innovators to work with our faculty and students

NYIT understands “qualification” as defined beyond the technical capabilities of its graduates. Through the ETIC, NYIT is proposing a more holistic approach to learning – one that exposes students to the complexity and “various societal and industrial challenges engineering graduates have to face in the working context.”³.

NYIT also understands that engineers are innovators and trained to develop, test and verify concepts and given appropriate resources can learn to bring their ideas from the lab to the marketplace. The ETIC can play an important role in supporting the effort to spawn innovation and economic development while educating the next generation of qualified workers to meet current industry demand.

As a job accelerator, the ETIC is addressing the goals of the Comprehensive Economic Development Strategic (CEDS) plans for NYC and Long Island. The NYC CEDS states: "New York City seeks to reinforce its historic strengths, generate improvements in the quality of life for its residents through the creation of good jobs, and better leverage its academic and corporate assets in the technology-driven growth sectors of the 21st-century economy." Similarly, the Long Island CEDS seeks to achieve the formulation and implementation of projects that create higher-skill, higher-wage jobs and raises income levels;" and to "Diversify and strengthen the economy of Long Island to better compete in the regional and global marketplaces."

ETIC is structured to support:

1. Collaborative Regional Innovation. The ETIC represents a clear example of an innovation cluster that creates synergies among existing regional competitive strengths. This initiative engages a diverse base of stakeholders and facilitates collaboration among urban and suburban areas – New York City (including the South Bronx) and Long Island. The Center reinforces and supports economic development through long-term public/private partnerships, including through by fostering the growth of emerging industries, startups, and supporting local existing businesses’ innovation, so that may remain competitive and dynamic players in the regional economy.

2. Public/Private Partnerships. The ETIC supports PPPs. It successfully leverages investments by New York State as well as the private sector, including investments in equipment by Juniper Networks, service support by IBM, Computer Associates, and Entrepreneurship leadership by Motorola Solutions and other companies and non-for-profit organizations such as the South Bronx Overall Economic Corporation (SOBRO) and the Industrial and Technology Assistance Corporation (ITAC).

3. National Strategic Priorities. The Center is structured to favor partnerships that will encourage job growth and business expansion. Indeed, through the three ETIC labs (IT and Cybersecurity; Energy and Green Technologies; and, Bio-engineering and Health Analytics) the Center will support business expansion and startups related to information technology, cybersecurity infrastructure, energy and green technologies (including remote monitoring of power and water management systems as well as drinking water); infrastructure resiliency, and innovations in health care and bioengineering. Moreover, given its access to a network of Fortune 500

companies, Venture Capital, and Angel Investors, the ETIC will provide access to capital for small, medium-sized, and ethnically diverse enterprises.

4. Environmentally-Sustainable Development. The Energy and Green Technologies Lab, in particular, will enable partnerships leading to investments that promote job growth in the green economy. For example, through new telemetry equipment, the lab will support the work of existing companies (e.g., Wind Dynamics) as well as startups in solar power (e.g. through Sustainable South Bronx) to advance research in the field of renewable sources of power. By helping evaluate the performance of small vertical wind turbines and/or light solar power assemblies in residential, commercial and industrial applications, the work at this ETIC lab is creating opportunities to develop new markets in energy technologies, as well as their operation and maintenance support systems.

Human Resources

The Center's creation has led NYIT to strengthen its academic resources by hiring new faculty and staff for the three laboratories, including a manager, technical staff, and six mid-career faculty members with industry experience, who will work alongside six current faculty members to staff the three labs. In order to infuse NYIT's academic programs with practical applications, faculty will have the opportunity to have summer residencies in industry and conversely, industry practitioners will have the opportunity to spend time in shared-use collaborative work spaces at the Center. One partnership with IBM is leading to the integration of Enterprise Systems computing in the curriculum and the participation of faculty in several workshops and conferences on Enterprise Systems. Another alliance with Juniper Networks will result in innovations in NYIT's MS in Network Security curriculum.

Every year ETIC will engage thirty students (graduate and undergraduate) to assist and work in close collaboration with faculty and each company representative. Students will benefit from this hands-on experience and receive a modest stipend and partial tuition remission. Most significantly, they will work in close collaboration and build lasting working relationships with companies that may become their future employers. Before starting their work at the labs, each group of students will receive "entrepreneurship training" from experts in the field, to better prepare them to work with startups, as innovators in their own right.

Facilities

The Entrepreneurship and Technology Innovation Center (ETIC) will be located in a wing of Harry Schure Hall (HSH). This approximately 8,000 square feet space will be completely renovated to include ACM abatement, new interior with new fixtures, new HVAC tied into building's chiller plant, new electrical distribution, new lighting, new data connectivity and upgrade to the FA system as well as certain permanently fixed equipment and furnishing. A description of the specific components follows.

A. **Dedicated High Performance Data Center** consisting of server racks and cooling systems (~200 sqf) with connectivity to the Manhattan Campus. The Data Center will control all activities of the center and will provide cloud access, mobile solutions, wireless sensor networks, and software solutions in the Center's three focus areas, namely: IT and Cybersecurity, Bio-engineering and Health Analytics, and Energy and Green Technologies. The data center will be located in the basement of HSH, where it will be closer to the power supply, back-up generator and cooling system.

B. Product and Project Collaborative Area (1,100 sqf). Complete renovation to house a collaborative computing area to be divided between product/design project clusters, and a business incubator/company hoteling area. Visual collaboration solution systems, embedded on the walls, will help all project teams consolidate information from multiple sources, view it and manipulate it. The systems provide more flexibility and an environment for efficient collaborations between entrepreneurs, industry, faculty, students and angel investors.

B. 1. Product and Project design / research clusters will enable close partnerships with existing companies, with space to create new products or systems, conduct beta testing, develop prototypes, enabling demonstration and development of technologies and other applications.

B.2. Business incubator/ and new company hoteling area will primarily serve entrepreneurs and small businesses and help them bring their ideas from concepts to market. Entrepreneurs, including students, will be supported in several ways, including faculty advice, access to a network of angel capital investors, meeting rooms, an Entrepreneurs-in-Residence and Students Entrepreneurship programs offering entrepreneurial and training workshops and lectures, as well as regular office infrastructure and logistics, including a 3-D printer for prototyping.

This collaborative space will also provide a test bed area and enable the design, research and development of projects in:

- Information Technology
- Artificial Intelligence
- Cloud-Enabled and Crowd Source (e.g., for Disaster Detection and Needs Projection)
- Energy Efficiency Computing
- GIS and Emergency Evacuation Planning
- High Performance Network Research
- ITS for Transportation and Mobility Modeling
- Large Scale Data Mining
- Social Networking Research and Applications

C. Cybersecurity Lab (~300 sqf) will be a dedicated to cybersecurity projects. This area will enable collaborations and projects in:

- Cryptographic Algorithms for Biometric Authentication
- Cloud Computing Security
- The Efficient Integration of Compression, Encryption, and Error-Control Coding for Telemedicine
- Security Issues of Body Area Networks (BAN)

D. Bio-engineering, Health Analytics and Medical Devices Lab - (~300 sqf) will be a dedicated biomedical engineering lab and provide a test bed design area for body sensor

networks for medical applications. Besides the School of Engineering and Computing Sciences faculty, professors from NYIT's School of Osteopathic Medicine and the School of Health Professions will also provide support. This facility will include:

- Wet area with a sink, deionized water maker, compressed air, cabinetry, two circular cabinets for organic solutions, etc.
- Electronic equipment to develop bio-instrumentation and medical devices for patients with sensory/motor dysfunction profiles, and will include a soldering station.
- Test bed for body sensor networks for medical applications.
- Medical Informatics and Health Analytics area with 2-3 computer stations.
- Medical mobile solutions, including computer stations and mobile devices.

E. Energy Research Area and Training Room (470 sq ft). This multi-purpose room will include an Energy Telemetry Laboratory for renewable energy resources and provide a testbed design area for energy and green technologies. Using telemetry systems, this lab will allow the remote (smart) monitoring and performance evaluation of, for example, small vertical wind turbines that may be used in residential, commercial and industrial applications, or solar power systems, in collaboration with the Sustainable South Bronx for example. Other equipment will include a micro-grid system, with generator protection and multifunction relays that will provide a basis for training in power engineering.

F. Power Transmission & Control Graduate Research Room (920 sq ft). This room will support graduate student research, with guidance by faculty, in power transmission and control. Such research will be leading to technology innovations and potential tech transfer activities by NYIT faculty, and graduate students in collaboration with industry.

G. Small training /private meeting room (room # 105; 470 sq ft). This room will include telepresence communication capabilities to enable collaborations with external industry partners as well as presentations to angel and capital investors. In addition, since the telepresence system is a coveted communication resource, it could be used by the incubator project teams for meetings and/or for internal capacity building training / lectures, by appointment.

H. The Auditorium will be completely renovated to serve as a conference space, training facility for professional development and to support virtual connectivity and ongoing collaborations with industry and businesses. The area will also be used for public events and outreach to potential investors. The renovated auditorium will provide improved and broader opportunities to foster integration with industry and companies across the NY metropolitan region.

The renovation will include ACM abatement, a new HVAC system, new electrical distribution system, new lighting system, new A/V system with acoustical treatment, upgrade to the FA system, new floors and stage area, and new interior furnishing, in particular theater-style fixed seating.

I. Exhibit and Engineering & Technology Showcase Area (Lobby/entrance). This ample area (~800 sq ft) would be the entrance to the Entrepreneurship and Technology Innovation Center. As such, it will be always open to the public (during regular hours) and will represent a

significant resource for presentations to investors for various prototypes, products, and technologies to be developed at the Center. Therefore, the entrance space / lobby will be renovated to include a reception area and integrated with the new auditorium and the research areas:

I.1. A projects display area to showcase products and innovative technologies, including novel devices developed by ETIC partners including those created in collaboration with faculty and students.

I.2. An interactive display area with large monitors on the walls, to provide 4D visualization and introduce visitors to innovation research carried out at the Center. The area will have space for a multi-touch digital table and several computer stations that will showcase projects during public events.

J. **Hallway** (750 sq ft) will be completely renovated to stand heavy foot traffic. The walls will be renovated to include sensor network research capabilities, which will enable research and testing of sensor activated devices (e.g. walkers for patients with Parkinson Disease; guidance systems for blind people)

Expected Outcomes

The ETIC laboratories will benefit different parties and the regional economy as follows:

Companies will be able to:

- Demonstrate, test, incubate and advance new ideas and technologies in a resource-rich university environment
- Access an employment base of skilled students
- Expose their products to the public at-large to generate awareness and interest for subsequent commercialization
- Attract government and investor support
- Foster expertise and spawn innovation in science, technology and engineering by engaging with students and faculty
- Serve as role models in leadership, entrepreneurship and venture business practices

NYIT students and faculty will be able to:

- Apply classroom theoretical knowledge to real-world, open-ended design projects, with guidance from industry experts and advisors
- Work on solving problems with relevance to industry
- Collaborate with industry leaders on applied research or venture development
- Engage in interdisciplinary and service-oriented learning activities

Government will be able to:

- Learn about innovations as they happen and thus make informed decisions to support regional development
- Develop strategic partnerships with key industries and faculty

- Have access to a pool of talented and creative workers

The Broader Community will:

- Be informed about state-of-the art scientific events as they develop
- Prepare for upcoming employment opportunities by upgrading their skills and credentials through short courses and training programs in relevant areas
- Provide open access and opportunities for creative, hands-on activities, and inspire K-12 students to pursue degrees and careers in science and engineering fields

Assessment

Table 1. below, summarizes the performance criteria (i.e. metrics) to assess the constituency outcomes and to provide answers to the questions that follow. It should be noted that most technology startup companies are funded through outside venture capitalists that are attracted to those startups that are distinguished by their risk/reward profile and scalability or are “internal startups” of large or well established companies have a high failure rate^{5,6}. This is true even with respect to technology innovations that lead to product development.

Many technology start-up business plans typically project revenue of \$50 million in the first five years. However, the reality, according to research supplied by data visualization company Tableau Software, is that most tech giants come nowhere near those numbers in the first five years. Oracle Corp., one of the world’s largest software makers, reached \$50 million in revenue in its 10th year and it took software giant Microsoft Corp. eight years to hit that milestone. In fact only 28% of the nation’s top software companies met this mark in less than 6 years⁴.

With this in mind it should be clear that the assessment metrics of Table 1. have a time frame of 5 to 10 years.

Table 1. Outcome Assessment Summary

Constituencies	Goals	Assessment Metrics
Industry Partners	1. Incubate & test new ideas and technologies 2. Commercialization 3. Attract investor support	1. No. of industry technologies tested at NYIT 2. Feedback that improved new products 3. No. of faculty/student collaborative innovations 4. Venture capital funding 5. Public funding 6. No. of Industry Residences at NYIT

Faculty	<ol style="list-style-type: none"> 1. Applied research relevant to the local and regional economy 2. To infuse academic programs with practical industry applications 	<ol style="list-style-type: none"> 1. Incorporation of new technology into coursework 2. No. of Faculty “startups” 3. Venture capital investment in faculty projects 4. No. of industry grants to faculty 5. No. of Faculty Residences in Industry
Students	<ol style="list-style-type: none"> 1. Infuse modern engineering tools into the curricula 2. Develop entrepreneurial skill sets 3. Job opportunities 4. Real world open-ended design projects 	<ol style="list-style-type: none"> 1. No. of students impacted 2. Employment figures 3. Experiential activities including internships 4. Capstone Senior Design projects 5. Research projects
Government/NYS Empire State Development Corporation	Local & regional economic development	<ol style="list-style-type: none"> 1. Employment figures 2. New Industries, start-ups, products, patents 3. Business expansions
SoECS/NYIT	<ol style="list-style-type: none"> 1. Expand on-going industry-academic partnerships 2. The creation of three (3) Labs in the areas of Bioengineering, Cybersecurity and Energy & Green Technology 	<ol style="list-style-type: none"> 1. Collaborative agreements (NDAs, MOUs) in the public and private sector 2. Funding from private and public sources for the Labs

Questions that the Outcomes Assessment Plan will answer:

1. How many students collaborated with faculty and/or industry through the ETIC?
2. How many faculty were involved in any of the student and/or industry collaborations?
3. Did the faculty member incorporate new industry grade technology into their coursework?

4. Did the faculty member gain any patents as a result of his collaboration?
5. Did the faculty member integrate the professional experience gained from their participation in the ETC into the classroom, as the integration of scholarship and teaching is particularly responsive to the applications-oriented mission of NYIT and the School of Engineering?
6. Did the faculty's experience with ETIC lead to any technical consulting activities, external funding through grants or contracts?
7. If students were engaged in completing a project to complete their senior level "capstone sequence", how did this "course work" affect ABET Student Outcomes (SOs): "c", "h" and "k".

c. "an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability";

h. "an understanding of the larger-scale impact of engineering solutions; in a global, economic, environmental, and societal context";

k. "ability to use the techniques, skills, and modern engineering tools necessary for engineering practice"

using our established SO performance criteria.

8. Did the student receive a job/internship/coop offer from his/her industry collaborator?
9. Did our industry participants hire any of our student collaborators? If the answer is yes, how many students were hired, at what salaries and with what title?
10. Did our industry participants show any interest in partnering with the SoECS faculty to market any faculty ideas for commercialization?
11. How many industry technologies were tested at NYIT?.....did they receive positive feedback?.....did the feedback they received result in new ideas for the improvement of their product?
12. Did any new industries come about in the regional economy?
13. Did the collaborative agreements that NYIT signed with our industrial partners benefit any of the economically depressed areas of our regional economy? If the answer is yes, which ones, and by what measure (i.e. employment figures, business expansion, new industries etc.).
14. What has been the job growth in the "green economy"?
15. How many "startups" in the "green economy" have resulted from the initiatives of the ETIC and its focus on sustainable development?
16. Have the initiatives from ETIC's Cybersecurity, and Bioengineering/Health Analytics laboratories met any of the National Government's strategic concerns with respect to terrorism, and health care innovations to reduce costs. If the answer is yes how have the innovations in health care reduced costs, by how much and have they maintained a level of acceptable care?
17. How many "startups" received backing from "venture capitalists" or industry investments?

Broader Impacts and Conclusions

This project will generate employment opportunities at several tiers and different skill levels, ranging from construction to technical to knowledge-based and educational jobs. Besides the individuals who will be employed at the ETIC, the center will impact the entire School of Engineering and Computing Sciences at NYIT, its fifty full-time and part-time faculty, over 1,500 students and 10,000 alumni. Most significant, the ETIC programs and laboratories will support between six to eight companies and/or startups per year, each representing new jobs and investment in the region. The ETIC has already received the support of the School's Industrial Advisory Boards in Mechanical Engineering, Electrical & Computer Engineering, Computer Science, Energy and Environment, and the Dean's Executive Advisory Board comprised collectively of over 35 members (<http://www.nyit.edu/engineering>). Members feel that in today's market American students and industry are facing dramatic global competition and the only solutions will be found through industry/academic collaborations. Today's students need to be prepared as never before as they must cope with a world where the pace of change is increasing exponentially. They must be armed with the best collaborative education that NYIT can provide.

Besides the School of Engineering and Computing Sciences, the ETIC will also impact NYIT's School of Management (ca. 35 full-time faculty), the School of Architecture and Design (ca. 30 full time-faculty), the School of Health Professions (ca. 43 full-time faculty), the New York College of Osteopathic Medicine (ca.1,604 full- and part-time faculty), and the College of Arts and Sciences (ca. 68 full-time faculty), through interdisciplinary collaborations in the project's three thrust areas, on Long Island and globally, as all these schools are driven by NYIT's mission to conduct applied research that benefits the larger world.

In conclusion, we strongly believe that this unconventional model can serve as a good reference for other higher education institutions that wish to respond to the demand for technology innovation and entrepreneurship as a basis for local and regional economic development.

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