

JOINT ECONOMIC COMMITTEE Written Testimony

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Chairwoman Maloney, Vice-Chairman Schumer, members of the Committee, thank you for the opportunity to testify before your Committee on this critically important subject. Before turning to Stony Brook's experience, I would like to bring to the Committee's attention a recent report by The Science Coalition, a national organization of which Stony Brook is a member. The report, "Sparking Economic Growth," (<http://www.sciencecoalition.org/successstories/>) provides examples from communities across the country of exactly what the Committee is examining today – how federal investment in basic research leads to innovation and job creation – by tracing the origins of 100 companies, including global industry leaders like Google, Genentech, and Cisco Systems as well as up-and-comers and start-ups across a spectrum of industries, back to breakthrough research conducted at a university and sponsored by a federal agency. Collectively, these 100 companies employ well over 100,000 people and have annual revenues approaching \$100 billion.

Background. Stony Brook is located 60 miles east of New York City on more than 1,000 acres on the north shore of Long Island. Our university has been elected to the Association of American Universities (AAU), and the London Times Higher Education–QS World University Rankings placed Stony Brook University among the top 200 universities in the world. Stony Brook's main campus includes academic units in the canonical arts and sciences, engineering, marine and atmospheric sciences, business, and the health sciences, including medicine and dental medicine, a teaching hospital, Stony Brook University Medical Center, and the Long Island State Veterans Home. Our resources include:

- An exceptionally talented faculty with core strengths in the academic disciplines most relevant to the growth sectors of the global economy, including biomedicine and the life sciences, engineering, the physical sciences and computer science;

- A half-billion-dollar infrastructure of exceptional and diverse laboratories and specialized facilities;
- Annual research expenditures of \$175 million, and;
- Our longstanding partnership with Brookhaven National Laboratory, which we co-manage for the U.S. Department of Energy with Battelle Memorial Institute.

Our Long Island home, where we are the only major research university, has a population greater than 19 states; Stony Brook is its largest single-site employer, with an aggregate economic impact of more than \$4.6 billion annually. (<http://www.stonybrook.edu/sb/impact>)

Record of Success. Stony Brook illustrates how the goals and intentions of the Bayh-Dole Act of 1980 should be implemented and carried out. It is the leading technology transfers campus in the SUNY system, responsible for an average of over 90% of the licensing revenues across the entire system during the last decade. This achievement consistently places both SUNY and our campus alone among the top 25 tech transfer campuses in the nation, according to the reports of the Association of University Technology Managers. Our campus also consistently leads or ranks high in all of the other metrics of tech transfer performance: invention disclosures, patent applications, issued patents, and executed licenses. Our technology transfer program is selective: approximately 60% of patent applications turn into issued patents, and we have been able to collect over \$10 million in royalties annually that we plough back into research on campus. Whereas some universities focus on exclusive licenses, especially in biomedicine, we focus on ensuring that our technology gets out into the marketplace for societal benefit. In fact, one of our research patents has been licensed to almost 120 different industrial users.

The most successful of these licensed technologies formed the basis for *ReoPro*, which received FDA approval in 1994 and is still recommended for the 250,000 cardiac angioplasties performed annually in the U.S. Other drugs developed with Stony Brook include *Periostat*, the first systemic treatment for periodontal disease, which afflicts 25% of American adults, *Oracea*, the only oral therapy for rosacea, and *Xiaflex*, the first FDA-approved non-surgical treatment for Dupuytren's contracture. These drugs are the first

four to receive FDA approval from any SUNY campus. As a New Yorker, I regret to report to the Chair and Vice-chair that the manufacturers of these drugs – Centocor Ortho Biotech, CollaGenex Pharmaceuticals (now Galderma, which manufactures both Periostat and Oracea), and Auxilium Pharmaceuticals and their jobs are located in Pennsylvania. As a citizen concerned about our economic future, I am delighted that these products are being made in the U.S.

On the base of its talent pool – which includes its knowledgeable professional staff – its physical infrastructure as a research institution, and committed high-level leadership, Stony Brook has developed an array of economic development programs which, while not making us all things to all people, enable us to partner with businesses of any size at any stage of development, “from cradle to Fortune 500.” Recent cumulative data demonstrate that, through these programs, our university has helped to create or retain more than 17,000 jobs and assisted many hundreds of companies to obtain more than \$600 million in financing and increased corporate revenues.

Secrets of Stony Brook’s Success. Recognizing that time is short, I would like to refer you to my written testimony for a detailed summary of these programs, and to use the remainder of the time allotted to point to lessons Stony Brook has learned about the critical linkage between federally funded academic research and the growth of our regional economy. I must note, however, that New York State government was an early proponent of university-industry collaboration as a key to economic growth. State-funded programs, although generally modest in their investment of tax dollars, continue to provide considered and essential support for our efforts.

#### New York State Centers for Advanced Technology (CATs)

This program supports fifteen Centers for Advanced Technology that are mandated to encourage, facilitate and support university-industry collaborative research and technology transfer of commercial relevant technologies in industry sectors selected for their established base, research strength and future promise for the state’s economy. These include biotechnology, information technology, energy systems, and electronics.

Stony Brook is the only campus in the state with two CATs, one in Medical Biotechnology and the other in Sensor Systems. At less than \$2M per year for both, the CATs are precluded by this limited funding from fulfilling the founding vision of statewide impact in their industry sectors, but they have nonetheless achieved 50 times that amount in corporate revenue impacts for their dozens of industry partners.

#### Strategic Partnership for Industrial Resurgence (SPIR) Program

Fifteen years ago, Stony Brook led SUNY's engineering colleges in creating SPIR, which mobilizes their thousands of degreed professional engineers to provide advanced technology assistance on a fast turnaround basis to companies around the state. At Stony Brook alone, more than 400 New York companies have been assisted through 2,269 projects, creating or retaining a projected total of 11,808 jobs and helping the companies win more than \$100 million in external funding. Among the several program's roles, it serves as a de facto outsourced R&D division for small companies with limited margins, enabling them to perform new product development while preserving resources to ramp up manufacturing when the product is ready for market. The program has been able to serve about 20% of Long Island's manufacturing and technology companies – a total that does not include the region's large information technology and software sector – at its present level of state funding. The companies that have benefited are very satisfied with the results, but the population served should be doubled or tripled to have a lasting effect on the regional economy.

#### U.S. Small Business Administration Small Business Development Centers

In New York, the SBA's Small Business Development Centers are based primarily on SUNY campuses. Stony Brook has an SBDC, which provides confidential counseling at no cost on all aspects of small business start-up and management. Our SBDC has reported more than \$250 million in financing obtained for its clients. The on-campus presence of the SBDC and the recruitment of business advisers with deep experience in technology-based businesses provide a valued resource for Stony Brook's new business incubation programs. Both the SBDC and the Long Island High Technology Incubator are collaborating to help new energy businesses start up and grow through awards they

have received from the New York State Energy Research and Development Authority.

### Incubation

Incubation space and program support for start-up companies are provided in the 67,000 s.f. Long Island High Technology Incubator, our region's first, and the Stony Brook Incubator at Calverton. Just out the back door of Brookhaven Lab, it will grow to 24,000 s.f. upon completion of the planned Consumer Food Science Center, which has been developed in collaboration with participants from the East End of Long Island, the largest agricultural producer in the state. In addition, the R&D facilities in the university's Research and Development Park provide modest space for start-up companies associated with our research programs. Stony Brook's incubators have "graduated" more than 40 companies in the last fifteen years, which earned more than \$100 million in corporate revenues last year, providing jobs for hundreds of Long Islanders. Most of these companies are research-based start-ups – about half based on Stony Brook technologies or know-how – for which the SBDC is an essential business guidance resource. Some of these incubator tenants are among the recipients of the more than \$16 million in SBIR and STTR awards that the SPIR program has helped its partner companies obtain. The SBIR/STTR program provides support that is available from no other source to fund proof of concept, prototype development and technology commercialization, primarily by start-ups and small companies. A number of internal and independent studies have shown that 50% of SBIR projects reach the marketplace, an extraordinary success rate for early stage technologies. We very much hope the program can be reauthorized before the end of this Congress.

### New York State Centers of Excellence

Stony Brook is home to the New York State Center of Excellence in Wireless and Information Technology (CEWIT) and the Advanced Energy Research and Technology Center (AEC). CEWIT and the AEC respectively serve the industry sector most responsible for the productivity improvements in the U.S. economy over the last two decades and the sector whose modernization is critical to our continuing economic competitiveness and security as well as the health of our environment. Their missions are

to focus formidable research and development strengths, from the university and through the academic, research and industry partnerships they create, on these growth engines of our global economic future. CEWIT, occupying the first building in Stony Brook's 245-acre R&D Park, has completed more than 300 projects with partner companies since the inception of the program, obtained more than \$100 million in joint funding, and assisted companies in creating more than 600 jobs.

Showing that technology development follows its own pathways, CEWIT has responded to the rapid increase in demand from colleagues in the hospital and biomedical departments by adding a program in medical technologies to its multidisciplinary R&D divisions. CEWIT is also partnering with the AEC –whose building, funded by a State Senate allocation, will be completed at the end of the summer, the first Platinum LEED research facility in New York State – to develop a globally significant R&D focus in Smart Grid, the greatest technology revolution in the energy sector in more than a century. The AEC will be the home of the New York State Smart Grid Consortium, an unprecedented alliance of energy providers, regulators, state agencies, industry, and research institutions to keep New York at the forefront of this extraordinary emerging opportunity. These two facilities are engaged in cutting edge research and development in two of the hottest industry sectors in the global economy, with the goal of keeping our region, our state and our nation a world economic leader. The third building in the Park, for biomedical R&D, is already being planned, and we are already thinking about a fourth building that will provide a variety of accommodations for commercial and not-for-profit research partners.

Performance metrics. Individually, and collectively through the AAU, AUTM, APLU, and other organizations and institutions, the higher education community is currently seeking to define appropriate metrics for the impact of our economic development efforts. Our colleagues in the public and private agencies tasked with economic development as a mission, and supportive of our efforts in this regard, measure our success by the creation and growth of jobs and of new and established business enterprises. We are persuaded of the simplicity and objectivity of these metrics, but feel

that longer timescales are needed to demonstrate sustainable success. Silicon Valley, Research Triangle and Route 128 are the product of decades of commitment by private leaders and elected officials; we look to the recent initiatives of Michael Porter and the Council on Competitiveness, Battelle's State Science and Technology Institute, the Milken Institute, the Brookings Institution, and the very recent program announcements by DOE and NIH/NSF to help us define the ingredients and trajectory of effective regional industry cluster development.

These comments focus on Stony Brook and the Long Island community. But before closing, I want to recall the Science Coalition report (available from The Science Coalition ([www.sciencecoalition.org/successstories/](http://www.sciencecoalition.org/successstories/)) referenced at the beginning and in particular two points that are particularly relevant to our discussion of economic ripple effects.

1) Companies spun out of research universities tend to perform better than typical startups, having better success rates and becoming public companies at a greater rate than the average for new businesses. There are a variety of reasons for this success including the unique ecosystem and mission of a research university and the emphasis we place on helping would-be entrepreneurs move their breakthroughs to innovations.

2) The companies universities help to create often locate close by, creating local jobs, attracting other research-intensive businesses and stimulating growth of supporting industries. Good jobs beget other good jobs. Of the 100 companies highlighted in the report 84 located in the same state as their affiliated university, and most often, within very close proximity to the university.

### Lessons Learned

- 1) **There is no magic bullet, but progress is possible on multiple fronts.** We applaud our university colleagues for learning from the experience of MIT, Stanford and the universities of the North Carolina Research Triangle and seeking to reproduce their vibrant, self-sustaining economic centers through

programs like UCSD's UC Connect and the efforts of APLU's Commission on Innovation, Competitiveness and Economic Prosperity to spread best practices throughout the higher education community. We applaud the federal government's first ventures into regional innovation cluster development in the EDA's partnership with NIH and NSF to initiate the i6 Challenge, and the proposed addition of "Innovation Ecosystem" component in the NSF Partnerships for Innovation program – as we applaud New York's support of technology-based economic development over more than two decades. However, we need to get beyond the notion that the primary contribution of research universities is the commercialization of our own technologies. It is a critical contribution, but it represents a minor fraction of the impact we can have. Example: In a speech to the Materials Research Society more than a decade ago, the then-Dean of Engineering at Stanford examined the major contributors to the total corporate revenues of Silicon Valley companies the previous year. He found that ~15% of revenues resulted from technologies licensed from Stanford, and ~40% of revenues were earned by companies that were started or populated by Stanford faculty or students. We should not to ignore the 40% while we are addressing the 15%.

- 2) **It's about talent.** Universities are great attractors and retainers of talent. Some of the talent is academically-oriented and some isn't. Universities need to overcome their natural inclinations and nurture both the students we educate and the entrepreneurs in our midst. Stony Brook has a student business competition, which a winner of the MIT \$100K helped us create. (Our prize fund is up to \$75,000 this year. We're gaining on them.) Not a business plan competition: we are interested in helping our student talent start growth businesses, not write plans. Six of our nine winners thus far are still in business. One just received a \$2.4 million venture capital investment; another has doubled its staff and is growing so steadily from revenues, after winning an SBIR Phase 1, that it is no longer looking for outside investment.

- 3) **It's about economic regions and partnerships.** I think we've all learned from the profound and perceptive work that has been done on industrial competitiveness that strong national economies are based on strong economic regions. Stony Brook's existing programs do an excellent job, within their resource constraints, to help new companies start up and existing companies – an economic resource that economic policy-makers may under-appreciate – grow and create more jobs, but we need to do much more. We are engaged in a comprehensive strategic planning exercise at Stony Brook and one of our goals for our economic development programs is to develop a continuous real-time collaborative process to support commercializable innovation wherever it may appear in our region – our faculty, other institutions' researchers, our industry partners. This will strengthen our already deep relationship with Brookhaven National Laboratory – which has committed its historic strengths in energy science and technology to the Advanced Energy Center – and which has just hired its first-ever commercialization director. Our strong collaborations with public sector economic development agencies will be complemented by new connections with regional leadership organizations. We have been instrumental in the creation and ongoing management of our region's first angel investor network, which has already funded two IT start-ups, one based on a novel Web technology for natural language information gathering that emerged from our Computer Science Department. It will be a critical resource for the commercialization of our region's new technologies.
- 4) **Basic research funding is critical.** Innovation comes from discovery and invention and, as Vannevar Bush foresaw, the federal investment in basic research makes the innovation frontier endless. Precisely because basic research is inquiry-driven, not objectives-driven, we can't tell in advance what the results will be. But sixty years of federal investment has proven its value, from lasers to the MRI to the Internet. It is the inexhaustible fountain of youth that will keep our economy ever green.

**Bayh-Dole Works.** It has been called the most important bill ever passed by Congress, and it continues to help our nation maintain its lead in bringing innovation to the people.

Thank you.

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