

OFF THE CUF

ENGINEERING A TECH SECTOR

NYU's proposed merger with Polytechnic University would give it an engineering program for the first time in decades—it could also help New York City develop a more robust high-tech sector

NEW YORK'S CIVIC AND OPINION LEADERS SEEM NOT TO HAVE PAID MUCH notice to the recent news that New York University and Brooklyn-based Polytechnic University are negotiating a merger under which Poly would effectively become NYU's engineering school. If completed, however, the merger could provide a critical spark to the city's long-standing, and largely frustrated, efforts to establish itself as a vibrant center for technological innovation.

Though New York City's major universities capture and spend an enormous amount of federal research and development funding, the city has gotten a relatively small return, in business development terms, from that federal investment. Economic development experts long have believed that the absence of a large, first-rate engineering school in the five boroughs is a big reason why. While New York City boasts a dazzling array of top-flight scientific research institutions, from Columbia University and NYU to Memorial Sloan Kettering Cancer Center, the city has never come close to having an equally robust engineering presence. Silicon Valley and the Route 128 Corridor in and around Boston—the two regions whose natural high-tech ecology every other community in the U.S. wishes to study and clone—both grew in tandem with large and dynamic science and engineering programs at Stanford and MIT, respectively.

No school here comes close to that on the engineering side—certainly not NYU, which hasn't had an engineering program since it sold its University Heights campus in the Bronx in 1973. According to the National Science Foundation, only three New York City universities conduct more than \$1 million a year in engineering research.

The City College of New York's (CCNY) Grove School of Engineering is by a hair the smallest of the three, performing \$8.2 million of engineering research in federal FY 05. Poly is next at \$9.8 million, and Columbia's Fu Foundation School of Engineering and Applied Sciences (including the affiliated Henry Krumb School of Mines) tops the list at \$30.5 million.

These may sound like large numbers, but they are not. Taken together, the sum of \$48.5 million a year in engineering research in all of New York City is a small fraction of that spent by a single national leader like Georgia Tech (\$286 million), MIT (\$207 million), Stanford (\$156 million), or Michigan (\$154 million). Engineering in the city is also low as a proportion of total R&D spending, which is dominated by biomedicine. Polytechnic, a school focused on engineering, expends 64 percent of its total R&D toward engineering, comparable to Georgia Tech's 67 percent, and CCNY's 30 percent share is in line with many broader institutions that have no medical school. But Columbia's 6 percent is low even compared with places like Stanford or Michigan (both about 20 percent) that, like Columbia, do a lot of bioscience research.

Is any of this important? I think so, especially since New York City does not host a comprehensive branch of the State University of New York (SUNY) system with a major engineering program. There is no analogue within the five boroughs to the role played by a Purdue, a University of Illinois, an Ohio State in their regions—no place where hundreds of faculty members are daily energized by problems that industry brings to them, and annually place dozens of students in industrial jobs.

Engineers typically devote their intellectual lives to pursuing real-world applications to research, while many basic science researchers are inspired purely by the quest for understanding. Though both are important, the mixture of engineering and science can provide an

important spark for invention, commercial applications, and the economic growth opportunities that result.

I am not saying that basic physical and biomedical science cannot have economic impacts, or that science faculty don't yearn to get rich in a spin-off, or that their students don't also take jobs in industry. Of course they can, and they do. But there is no denying that the life of the bench scientist demands long stretches of intense concentration, if not isolation, conducting work that is fundable only by the federal government, before a potential commercial application comes into view. That's a far cry from how engineering faculty or their students do their work.

Moreover, as the late scholar of innovation Don Stokes effectively argued, just as society reaps the benefits of "use-inspired basic research" and should support such work as a public good, technology applications of the kind that animate engineering themselves help to shape the basic research agenda. It is this feedback loop that has been missing in New York City, and there's nothing like it at significant scale nearby. Can New York be a center of technological innovation without it? I think not.

Finally, let us consider the salutary effect of competition. If NYU and Poly achieve not just the basic fact of combination but the rapid growth that their respective presidents—John Sexton and Jerry Hultin—have indicated, the much larger Columbia may be forced to reconsider how badly it wants to be known as one of the nation's top engineering schools. A greater commitment to engineering research could also provide a programmatic focal point for the school's Manhattanville expansion. Realistically, it is not likely that Columbia President Lee Bollinger can leave his school's superb biomedicine enterprise much better than he found it, but he can sure leave a mark on engineering if he feels the heat from Downtown and Brooklyn.

Recommended Reading

Craig Matthews, Jerry Hultin and Erich Kunhardt. "Exploring the Future: The Possible Merger of New York University and Polytechnic University." Memo available on-line at <http://www.poly.edu/press/merger/letter.php>.

National Science Foundation. "Academic Research and Development Expenditures: Fiscal Year 2005." Available on-line at <http://www.nsf.gov/statistics/nsf07318/>.

Annalee Saxenian. *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*. Cambridge, Mass.: Harvard University Press, 2000 (8th printing).

John Sexton. "Memo to the NYU Community: A Future Together for NYU and Polytechnic University." Available on-line at <http://www.nyu.edu/public.affairs/releases/detail/1671>.

Donald E. Stokes. *Pasteur's Quadrant: Basic Science and Technological Innovation*. Washington, D.C.: The Brookings Institution Press, 1997.

Engineering R&D – NYC Institutions vs. National Leaders

Selected Institutions	Engineering R&D FY05 (in millions)	Total R&D FY05 (in millions)	Engineering as % of total R&D
Georgia Tech	\$285,572	\$425,386	67.1%
MIT	\$206,567	\$580,742	35.6%
Stanford	\$155,844	\$714,897	21.8%
Michigan	\$154,398	\$808,887	19.1%
UC-Berkeley	\$152,283	\$554,551	27.5%
UT-Austin	\$140,263	\$410,981	34.1%
Ohio State	\$131,921	\$608,923	21.7%
Univ. Illinois Urbana-Champaign	\$125,457	\$499,711	25.1%
Purdue	\$121,148	\$364,986	33.2%
Cornell ¹	\$75,275	\$606,804	12.4%
UC-San Diego	\$72,963	\$721,035	10.1%
Princeton	\$57,952	\$202,380	28.6%
Columbia	\$30,452	\$535,424	5.7%
Penn	\$27,645	\$654,982	4.2%
Harvard	\$21,191	\$447,196	4.7%
Brown	\$20,654	\$139,457	14.8%
Dartmouth	\$20,176	\$179,094	11.3%
Yale	\$13,769	\$431,618	3.2%
Polytechnic	\$9,775	\$15,295	63.9%
CUNY - CCNY	\$8,224	\$27,471	29.9%
NYU	\$0	\$276,198	0.0%

Source: National Science Foundation

¹ Cornell is based in Ithaca, New York. Its medical school is in New York City.

Off the CUF is a new project of the Center for an Urban Future. Periodic essays like this one will include research and analysis about economic, workforce and community development issues in the five boroughs of New York City. For more information or to sign up for our monthly e-bulletin, visit www.nycfuture.org

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