Supplement to the Strategic Document adopted in 2007 by the then Polytechnic University

STRATEGIC PLAN FOR POLYTECHNIC INSTITUTE OF NYU AND FOR ENGINEERING AT NYU: GOALS, STRATEGY, TACTICS, IMPLEMENTATION

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I. INTRODUCTION

The resources and reach of the former Polytechnic University, now named NYU-Poly, have been expanded considerably by the 2008 affiliation agreement with New York University (NYU). The technological base at NYU has likewise been augmented by the agreement. NYU-Poly (or Poly for short) is presently an affiliated institute of NYU specializing in engineering. It will soon become NYU’s School of Engineering, operating in broad conformity with NYU’s philosophy and practice, though one might expect that certain specific traditions of Poly will continue if they enhance the overall objectives. The transformation to the School of Engineering is expected to be formally complete in the time period between January and September of 2014. At that point, the roles of the President and Provost of Poly, and that of the Board of Trustees, will be redefined appropriately to chart the best and most fulfilling course for Poly as part of the larger research university. It is to be stressed that the present and future Poly faculty will have the same relation to NYU as the faculty in most of its other schools.

Since 2008, NYU has established comprehensive campuses in Abu Dhabi and Shanghai, and both have engineering components. The plan at NYU has been to create synergies between engineering at Poly and engineering on these two new campuses, along with the appropriate parts of the Courant Institute, the Faculty of Arts and Sciences, Medical School, Colleges of Dentistry and Nursing, and others schools of NYU such as Stern, Wagner, Steinhardt and SCPS. There are considerable elements of engineering in the new Center for Urban Science and Progress (about which more will be said later). An integrated and symbiotic operation of all these globally situated units of engineering goes by the name NYU Engineering. Its creation is entirely consistent with the goal that Poly will emerge as NYU’s School of Engineering; indeed, shaping engineering at all of NYU’s campuses and schools is a central role foreseen for the new Poly. This has been happening already, and will accelerate once Poly becomes formally the School of Engineering.

During the present transition period, Poly and NYU will continue to work together to develop engineering within NYU globally, to integrate staff, student, and administrative operations in order to consolidate and achieve efficiencies; to continue to recruit and retain quality faculty; and to better realize Poly’s research and distinctive educational aspirations. These activities will enhance its resources and distinctiveness, and enable Poly’s mission of invention, innovation and entrepreneurship (or i²e, for short) to spread throughout NYU.

Poly’s commitment to i²e means that it is willing to experiment without sacrificing its primary mission of academic excellence. It means that Poly will embody the spirit of the acronym in all aspects of its operation such as student recruitment, retention, graduation, and job placement;

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1 On October 10, 2012, the Boards of Trustees of both institutions approved moving forward with the final steps of the transformation of NYU-Poly into NYU’s School of Engineering. They enthusiastically endorsed moving forward promptly to seek external regulatory approvals and endorsements required to achieve this goal, including internal consultations with the Faculty Senators Council and the Senate Academic Affairs Committee at NYU, the Faculty Executive Committee at Poly, and other members of the universities’ communities. The process also includes conducting due diligence on financial aspects, real estate, etc.
curriculum and teaching; research and dissemination of knowledge; and wealth creation through scientific and technological development. In short, Poly aspires to educate engineers who will thoughtfully contribute to the building of a better world and to remain a vehicle through which bright and hard-working students achieve the American Dream (which, incidentally, is said to have been coined as a phrase by a Poly alumnus).

This document presents a plan for developing engineering within NYU, with the focus on Poly. It is to be treated as an addendum to the earlier document, “The Strategic Plan for Polytechnic University: 2007-2010,” which was adopted by Poly before becoming an affiliated institute of NYU and was embraced by NYU at the time of affiliation. While the overarching goals remain unchanged from those articulated in this earlier document, their implementation as elaborated here takes into account the opportunities provided by the affiliation agreement and Poly’s own improvement over the past few years.

Two further comments are appropriate. The first remark, relevant to the internal structure of the document, is that the description is primarily related to academic programs, especially research. We have deliberately not stressed unconventional directions that Poly may pursue in order to earn higher distinction among peer engineering schools; discussions on such pursuits are still under way. We have also not laid out all possible fruitful collaborations with other NYU schools. Finding the bearing within NYU so as to enhance Poly as well as NYU as a whole will take some time, but it is well understood that that is, in part, the reason for the merger.

The plan is founded on strategic and tactical principles in support of seven primary goals stated and developed in the next section. Its implementation forms the content of section III. The last section summarizes the conclusions that follow.

II. GOALS AND STRATEGIES AND TACTICS

A. GOALS

1. DEVELOP ENGINEERING AT NYU INCLUDING THE GLOBAL NETWORK UNIVERSITY

2. ENHANCE POLY’S RESEARCH STRENGTHS

3. STRENGTHEN POLY’S UNDERGRADUATE AND GRADUATE PROGRAMS

4. STRENGTHEN THE GENERAL EDUCATION COMPONENT OF ENGINEERING CURRICULA THROUGH APPROPRIATE MERGERS WITH EXISTING NYU DEPARTMENTS

5. IMPROVE POLY’S RETENTION AND GRADUATION RATES

6. INCREASE COLLABORATION BETWEEN POLY AND SCHOOLS OF NYU

7. STRENGTHEN THE RESOURCE BASE OF POLY
B. STRATEGIC AND TACTICAL PRINCIPLES

Each of these goals is supported by the actions summarized below:

GOAL 1: DEVELOP ENGINEERING AT NYU INCLUDING POLY AND THE GLOBAL NETWORK UNIVERSITY.

a. Develop engineering at NYU, which includes the development of Poly, in cooperation with local governments and industry – in NYC (Manhattan and Brooklyn), Abu Dhabi, Shanghai, and elsewhere in the Global Network of NYU;

b. Develop engineering at NYU within the historical culture and spirit of Polytechnic – invention, innovation, and entrepreneurship (i^2e) – and the continued development of the i^2e programs within engineering;

c. Focus on three specific but broad areas, which are slated for world-class development throughout NYU globally. The three areas are: (1) Bioengineering^2 (2) Urban Systems^3; (3) Information and Communication Technology^4;

d. Develop these areas in partnership with other units of NYU and with other universities and industries. In particular, the Bioengineering component will be strengthened by collaboration with NYU’s dental and medical schools while NYU’s partnership with the University of Toronto, Carnegie Mellon University, University of Warwick, CUNY, IIT Bombay, IBM and Cisco will enhance Urban Engineering at Poly. Likewise, Poly’s collaboration with NYU’s Courant Institute will enhance research in the area of Information and Communication.

GOAL 2: ENHANCE POLY’S RESEARCH STRENGTHS.

a. Extensive faculty recruitment: The faculty hiring will be led by the NYU-Poly Provost, in partnership with its President, together with direct involvement of NYU’s Provost, who will authorize all searches, appointments, tenure and promotions. These actions will involve NYU-Poly faculty and also, whenever appropriate, will be coordinated with the faculty from NYU-NY. Faculty hiring will be facilitated through the following mechanisms:

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^2This activity in New York is located at MetroTech and also, in the near future, at the new Bioengineering Institute within NYU’s Health Complex on First Avenue. Its development will occur in collaboration with the NYU Medical School and the Schools of Dentistry and Nursing.

^3This activity will function in close collaboration with NYU’s Center for Urban Science and Progress (CUSP) to be located close to Poly, eventually at 370 Jay Street.

^4Information and Communication Technology will include wireless, big data, cyber security, digital media, games for learning, etc. It will be located at MetroTech, where it will anchor MetroTech as Brooklyn’s Center for Technology.
i. proactive searches focusing not only on leaders for “area chairs” and “signature initiatives” (such as urban and bioengineering), but also on entry and mid-career faculty recruits;
ii. extensive use of cluster hires;
iii. extensive use of joint and associated appointments with departments and schools at NYU, including NYU-NY, NYU-AD and NYU-Sh;
iv. long-term visiting arrangements of high-level people from partner universities (specifically with Toronto, Carnegie, and Warwick) – with lines and laboratories attached;
v. extensive use of external advisory committees.

b. establishing the Center for Urban Science, Engineering and Technology, and the Center for Bioengineering;
c. bridging research programs in Computer Science at the Courant Institute, Poly’s CSE and ECE departments;
d. moving NYU’s gaming and digital media activities to MetroTech and building a high-class collaborative program that is better than the sum of its parts;
e. emphasizing increased research funding, including targets;
f. encouraging joint research projects with faculty at NYU-NY, through NYU seed funds and cross-school grant applications;
g. promoting interactions with faculty at NYU-AD and NYU-Sh, through their research institutes and other sources of funding such as defense offset obligation funds.
h. significantly improving investment in staff, laboratories and infrastructure to enable the doubling of funded research by 2017.

GOAL 3: STRENGTHEN POLY’S UNDERGRADUATE AND GRADUATE PROGRAMS.

a. Continue the improvement of Poly’s undergraduates by significantly raising the cut-off for entering students, while maintaining Poly as a gateway of student opportunity and diversity into higher education. Undergraduate quality will continue to be improved by:

i. Invigorating admissions, recruitment, enrollment, retention and graduation through
  1. proactive use in Admissions of the affiliation with NYU;
  2. integration of Poly Admissions with NYU Admissions;
  3. enhanced international recruitment;
  4. not admitting applicants below an increasingly high qualification threshold;
  5. a decrease in the size of the incoming classes by 10-20%, if quality considerations dictate such a step, with the revenue loss to be offset by increasing the size of professional masters enrollments;
6. special, substantial scholarships to the most outstanding applicants;
7. greater efforts at retention and six-year graduation rates;
8. greater effort directed towards the placement of graduates.

ii. Enhancing the quality of undergraduate education through
   1. continued expansion of i²e content and activities in the curriculum and student affairs;
   2. continued support of and engagement with NYU and Poly’s i²e programs such as the Varick Street and Jay Street incubators\(^5\), the NYC Seed angel fund, the NYU Innovation Venture Fund, the NYC Media Laboratory and possible collaborations with the Brooklyn Navy Yard;
   3. incorporation of creativity, leadership, and global skills throughout the curriculum, academic activities, and student life programs;
   4. assessment and quality improvement in classroom teaching;
   5. increased use of technology and new and creative modes of instruction to augment and improve classroom learning.

b. Significantly increase the size\(^6\) and quality of graduate programs. Graduate programs will be improved by:
   
   i. increased number of highly qualified Ph.D. students;
   ii. increased investment in course development, marketing, and high-quality contract and adjunct faculty to teach these programs;
   iii. developing new programs (e.g., on the use of big data);
   iv. increasing the internship possibilities;
   v. increasing international recruitment, especially from Latin America, Europe and the Far East (outside of China).

c. Poly’s space plan includes instructional and research space, and also includes the acquisition of state-of-the-art equipment. It is is being implemented to develop and improve space, laboratories, and infrastructure, and consists of:
   
   i. dedication of $68M for faculty, space, laboratory renovation, and maintenance;\(^7\)
   ii. acquisition of leased space at MetroTech, initially through an allocation of part of the

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\(^5\) These incubators have been very successful, as perceived even by external evaluators. To enhance the connection between the incubators and the Poly faculty and students, we have established positions called “Engineer in Residence” for some of the faculty especially active in the entrepreneurial domain.

\(^6\) Because of a possible reduction of the size of the undergraduate class to assure improved quality, an increase in size of the professional masters programs may be required. But the differences in the discount rates do not require a one-to-one increase; rather, more like two graduates for every reduction of three undergraduates. This possible change in the student body and its impacts are currently being modeled and assessed. Our goal is to improve quality even as we are beholden to numbers because of financial needs.

\(^7\) The sources of this $68 million are: $38 million of the $50 million loan from NYU, $3 million from the National Science Foundation, $2 million from the State of New York, and $25 million for the Center of Bioengineering on the First Avenue ($10 million contribution from NYU and $15 million of additional loan from NYU).
$50M loan and then through Poly’s operating budget and multiyear fiscal plan; this space should be affordable and right on the Poly campus, framing the campus as a part of MetroTech, with appropriate power and IT infrastructure, and well-suited for faculty offices and “dry labs” for departments such as ECE and CSE;

iii. occupancy of the space to be leased at MetroTech, which enables renovation of space in Rogers Hall for innovation labs for students and some experimental and “wet” labs;

iv. development of space, with NYU, for a Center of Bioengineering on the First Avenue, in NYU’s health campus, and for CUSP at MetroTech.

GOAL 4: STRENGTHEN THE GENERAL EDUCATION COMPONENT OF ENGINEERING CURRICULA THROUGH APPROPRIATE MERGERS AND COLLABORATIONS WITH EXISTING NYU DEPARTMENTS.

a. Better integrate Poly’s basic science departments with its engineering departments or with suitable departments of NYU. For example, Poly’s department of mathematics may become part of a global mathematics department, with teaching responsibilities for Poly students, and with its faculty keeping tenure in Poly (or its new manifestation). The administrative structure of this arrangement is being worked out.

b. Decrease Poly’s humanities faculty and convert the focus to a “Technology in Society” department with most of the general education functions taken over by NYU through programs such as the NYU Core Program, expository writing, and the divisions of social science and humanities of the Faculty of Arts and Science. The department that will be regrouped will work better with engineering departments at Poly to ensure that the students receive first-rate education not only in humanities but also in the integration of technology with the society at large.

GOAL 5: IMPROVE POLY’S RETENTION RATES AND GRADUATION RATES.

a. Proactively integrate Poly’s Student Life with the NYU Office of Student Life and increase NYU-NY student life programs available to Poly students;

b. Recruit students who are better prepared for college life in an engineering school and mentor them appropriately;

c. Capitalize on the signature i²e student experience to “lock-in” students’ allegiance to NYU-Poly by embedding it into the curriculum and student life;

d. Continue to improve academic advising and mentoring by the faculty, and also the assessment of learning outcomes;

e. Increase the use of modern technology to augment classroom learning;

f. Significantly improve Poly’s educational and laboratory space and infrastructure;
g. Plan collaboratively with NYU-NY a curriculum between Poly on the one hand and NYU-Abu Dhabi and NYU-Shanghai, on the other;

h. Provide Poly undergraduate students full access to the NYU’s Global Network, encouraging at least one semester of study abroad for each undergraduate student;

i. Offer opportunity for qualified NYU-Poly students to transfer to NYU-NY if engineering and technology are not their ultimate preference.

GOAL 6: INCREASE COLLABORATION BETWEEN POLY AND SCHOOLS OF NYU.

a. To maintain Poly’s research focus, Ph.D. programs will be improved especially by encouraging research collaborations with other NYU Schools. Extensive cross appointments between Poly and NYU will be encouraged;

b. Continue development of Poly’s K-12/STEM programs in NYC, with increased collaboration with the Steinhardt School, Science within NYU’s Faculty of Arts and Science (FAS), Courant, and School of Continuing Professional Studies (SCPS). NYU-Poly has significant and well-funded programs in areas such as robotics, but they need to be developed further by interactions with NYU just schools mentioned;

c. Better integrate Poly’s programs in technology management, business, financial and risk engineering, parts of society and culture, and executive education with Stern, Steinhardt, SCPS and Wagner. A proposal to this end has already been made to Stern and Wagner;

d. While consolidating the research base, continue the development of outreach, entry, and community education programs in Brooklyn, likely at MetroTech and corporate sites. These programs will include executive education and distance or web learning and other curriculum delivery modalities. Working with NYU-NY, including SCPS, Stern, Wagner and Steinhardt, and others as needed, programs will be created that will potentially involve the development of executive education programs, professional master degree programs, and undergraduate certificate programs. Some agreements have already been concluded with Stern and SCPS (and discussions with NYU-SH have continued to take place). Further undergraduate and graduate enrollment growth in these programs will provide enrollment and revenue to offset potential reduction in enrollments and transfers to entities such as CUSP.

GOAL 7: STRENGTHEN THE RESOURCE BASE OF POLY.

a. Significantly increase philanthropic support for Poly in unrestricted, restricted and endowment gifts. Philanthropy will be increased by:

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8This includes ensuring the availability of appropriate engineering courses at all sites without jeopardizing the accredited degrees.
i. proportionate promotion of Poly’s intellectual assets;
ii. continued interaction and coordination with NYU’s Office of Development;
iii. partnering with NYU’s new fund-raising campaign;
iv. selection and recruitment of new trustees for Poly;
v. enhanced engagement in development by the next Poly President;
vi. strong ratification by NYU’s leaders of their commitment to NYU-Poly’s future
    excellence and ultimate position as a school of NYU;
vii. development of more joint-school research programs and centers to demonstrate the
    return on donor investment in NYU-Poly;
viii. joint fund-raising calls on future major donor prospects by the Presidents of NYU
    and NYU-Poly.

b. Gradually raise Poly’s tuition to roughly NYU’s level, and lower Poly’s discount rate. To
    ensure Poly’s continued role as a gateway of opportunity and diversity, the discount rate
    will, however, remain higher than NYU’s.

c. Integrate operations at Poly (such as undergraduate student admissions and aligning the
    fiscal year) with those at NYU, to increase efficiency and effectiveness.  

II. IMPLEMENTATION OF PROGRAM AND FACULTY DEVELOPMENT

With respect to the implementation of these strategies and tactics to achieve the goals identified
above, there are parts of the plan (including the undergraduate programs of admissions and
student life, operations, development, and space) where significant progress has been achieved.
We will not cover them in this section. We will focus on the implementation plans for program
development and faculty recruitment, these being of paramount importance for Poly’s
improvement.

Faculty and program development will be organized essentially around the three signature
initiatives, already noted. This small number of focal areas was dictated by the fact that Poly will
not be large as an engineering school and needs to focus on areas of great public significance (as
reflected in broad assessments such as those of the US National Academy of Engineering). The
plan does not preclude Poly from growing in certain areas that are not contained in these three
initiatives, but the quality threshold to be met in such instances will be very high. While NYU-
Poly’s five engineering departments (Chemical and Biomolecular Engineering, Mechanical
Engineering, Civil and Urban Engineering, Computer Science and Engineering, and Electrical
and Computer Engineering) have been developed in the past as “disciplinary departments,” their
future development will be organized around these three initiatives, while keeping in mind the

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A joint NYU-NY and NYU-Poly administrative team has made significant progress. The unification of operations
is being accomplished at an increasingly rapid pace. An acceptable cost-allocation model has been agreed upon by
NYU and NYU-Poly. Especially after the date (or, more accurately, the window) for merger was established in
October 2012, several groups of people are working together on different aspects of merger, already outlined in
footnote 1.
need for broad-based educational offerings at the undergraduate level. This organization will begin with a restructuring of the departments, likely with:

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(i) The new department, arising from the combination of Chemical and Biological Engineering Department with the Chemical and Biological Sciences Department will primarily host the Bioengineering initiative, though it is foreseen that a significant fraction of the initiative will also reside in other departments such as Mechanical Engineering and Electrical and Computer Engineering. The initiative will be located at MetroTech and at the new Bioengineering Institute at First Avenue at NYU’s health campus.

(ii) The functional unification of Computer Science at NYU by enhancing the cooperation of Courant’s Department of Computer Science with Poly’s Departments of Computer Science and Engineering, and Electrical and Computer Engineering;

(iii) A refocus of Civil Engineering (renamed Civil and Urban Engineering) and parts of Mechanical, Electrical and Computer Engineering into Urban Systems in conjunction with CUSP at MetroTech. The precise relationship with CUSP is currently being developed.

(iv) A more rational reorganization of Poly’s departments of Technology Management; Finance and Risk Engineering; and Technology, Culture and Society to support the three initiatives and also to provide a strong link between technology and society.

Poly’s hiring plan presently calls for the hiring of about 30 tenure/tenure track professors over the next 5 years. Of them, 22 are expected to be replacements for retirements and departures. This plan will thus result in an increase of tenure track faculty from the present number of about 100 to about 108 (though, if necessary, the size in the interim could modestly exceed the final number). These appointments will be split between the three initiatives roughly evenly, with slightly fewer (4-6) devoted to ICT because of the present size/strengths of Poly’s CSE and ECE departments.10 These 30 hires will also be split roughly evenly between assistant, associate and full professors. A visionary senior leader will be recruited for each of the two signature initiatives of Urban Engineering and Bioengineering, and two “game changers” at the mid-career

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10These appointments will be made in existing academic departments, but individual faculty research and professional commitments will be in the focus areas.
or senior level will be identified and recruited. Also in each of three signature initiatives, detailed specific research areas of the recruits will be selected opportunistically, depending upon the availability of talent.

A. The Hiring Plan

Included in this hiring plan will be a continued emphasis on recruiting and retaining faculty members at NYU-Poly who excel in research, teaching and entrepreneurial and innovative programs, and who thus reflect the entrepreneurial and economic development culture of leading U.S. engineering schools, such as Stanford and MIT, rather than the more traditional engineering schools such as Columbia and CUNY. The plan will pay attention to issues of diversity.

Funding for this hiring plan (including start-up funds and investments for faculty housing) is built into Poly’s multi-year financial plan. This plan includes the following use of the $50M loan that Poly received from NYU: $12M for faculty hiring, $13M for renovating faculty research space and the remaining $25M for capital improvements at MetroTech and at the Bioengineering facility at NYU’s “health campus” and the necessary deferred maintenance at the MetroTech campus. Should the fiscal plan underestimate salaries and start-up costs, it may be necessary to decrease the hiring plan accordingly.

These signature initiatives will be further nurtured with the $2.5M that remains in the $5M seed fund established to jump start joint research projects between Poly and NYU-NY faculty. The $2.5M that has been expended has already generated projects from nearly all departments at Poly and all Schools at NYU-NY and has produced (at the end of 2011) $10.6M in external funding, with an additional $3.8M pending at the time of this writing, and more proposals in the pipeline.

As a final point, the three signature areas will be developed synergistically with NYU’s comprehensive campuses of NYU-NY, NYU-AD, and NYU-SH – the last two of which will also be developing engineering within the same three signature areas. In fact, in each of the three signature areas, their development at Poly/NYU-NY will proceed in conjunction with NYU-AD and NYU-SH. This will bring additional opportunities for new hires – through joint and bridge appointments, affiliated appointments, and joint research activities – as well as additional sources of funding such as the Research Institute at NYU-AD and defense offset obligation funds in Abu Dhabi. The procedures for faculty hiring will be driven by a combination of the normal departmental search committees (involving faculty from NYU and NYU-Poly) and by joint searches with partner universities.

11Good examples are the new faculty members such as Claudio Silva, Juliana Freire and Ted Rappaport, who have excellent research track records and created technology companies in the recent past.

12There exists a scenario by which additional resources can be created to bootstrap and continue the recruitment process. This scenario consists in part of increased indirect recovery from research grants (the research funding is indeed increasing), increased fund-raising (which is also increasing), and the use of about $2.5M meant for seeding new research grants, which is described in the next paragraph.
B. Provisional Summary of Initiatives

1. Bioengineering
This initiative consists of a university-wide Institute for Bioengineering – located in new facilities on the First Avenue collocated with NYU’s Colleges of Dentistry and Nursing, near the Medical School, with locations also at MetroTech, Washington Square and the Medical School. The first step in the creation of this Institute has been the report of the External Advisory Committee composed of leading national experts in bioengineering, including members from our consortium partners from Toronto and Carnegie, as well as from Stanford’s bioengineering. The External Advisory Committee has advised NYU as to which of the many areas of bioengineering should be the focus, and about the actual faculty recruitment for the Institute. The precise format of its operation is still evolving.

We have begun a search for a Director of the Institute, a visionary leader in bioengineering, to lead the entire effort and be a key member of NYU-Poly’s faculty. We will invest 15 new positions in Bioengineering – approximately 10 from Poly lines, and the remaining from the Medical School, FAS Science, Courant, and neural science. Taken together with expertise already present at NYU, the faculty size of our effort in bioengineering will reach approximately 25 faculty members.

We have strengths already in place in bioscience – at Poly, in NYU Chemistry, at Courant, and at the Medical and Dental Schools. This is particularly true in biomaterials, biomedical chemistry, biomechanics (in Courant, Medicine and Poly), imaging (in Medicine, Courant and Poly), biomedical image processing (in the ECE department) and genomics. There is considerable interest from our neuroscientists at both the Square and the Medical School to develop neuro engineering. Selection of the subfields in which to specialize will await the advice of the External Committee and the selection of a Director; however, these subfields will likely include biomaterials, neuro engineering, genomics engineering/bio-informatics, and imaging.

At Poly, some of the new appointments might be in the new department of Chemical and Biomolecular Engineering, but other departments such as Mechanical Engineering, Computer Science, and Electrical and Computer Engineering are also likely homes in appropriate areas.

2. Urban Science, Engineering and Technology
Urban Science, Engineering and Technology will become the engineering component of NYU’s university-wide initiative on the “Future of Cities”, called the Institute for Cities and

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13 We have identified approximately 15,000 assignable sq. ft. of space on three floors of the new dental and nursing building being built with joint funding of $20M from Poly and $10M from NYU. Poly’s $20M comes from a new $15M loan from NYU and $5M contribution from the original loan of $50M. The operating costs will be borne by the schools in proportion to their space use.

14 There is considerable strength within NYU’s Chemistry Department in the area of Biochemistry, with substantial interactions (grants and publications) in place with scientists at the Medical School. The work in Chemistry is housed in the recently renovated space on the entire eighth floor of the Silver Center.
Environmental Sustainability (ICES). ICES is a broad umbrella encompassing city planning, design, and development; the social science of cities; legal issues of cities; health in cities; the ecology of cities; urbanization and the coastal zone; and urban engineering (which could include cyber-physical systems including sensors and actuators, cyber communication and control systems, smart grid and integration of green energy). This umbrella will cover undergraduate programs (certificate programs, minors and majors), professional masters programs, Ph.D. programs, executive education and professional certificate programs, web based (total and hybrid) programs, and research programs. ICES will be a signature initiative across all of NYU.

Urban Science, Engineering and Technology at Poly will provide the foundation for the Center for Urban Science and Progress (CUSP), which is the NYU-led consortium of university partners (Carnegie Mellon University, City University of New York, IIT Bombay, NYU-Poly, University of Toronto and the University of Warwick) and industrial partners (Cisco, IBM, Siemens, etc). Importantly, several city departments are also participants in CUSP providing for CUSP the entire city as the living laboratory. CUSP was recently announced as the second winner of the Applied Science initiative of New York City, enabling its location at 370 Jay Street, when that building – currently occupied by MTA – is renovated. In the meantime, CUSP will occupy rental space at MetroTech. Both this temporary location and the permanent site at 370 Jay Street are essentially “on the Poly campus”.

Programs at CUSP will be centered upon extensive research in urban sustainable engineering, together with Masters, Ph.D. and postdoctoral programs and research. Research will be fully supported by external funding and by funding from our industrial partners. However, the education programs at the professional Masters level will generate revenue for CUSP. A multi-year financial plan has been developed and is now in place. The precise relationship between the educational mission of CUSP and that of Poly is being discussed presently.

The CUSP consortium will immediately expand to include collaborations in the world cities of Abu Dhabi, Shanghai and throughout NYU’s Global Network University. Poly will play a central role in this effort. In Abu Dhabi, specific relationships will be developed with NYU-AD (including its engineering activities, its research institute, and its developing relationships with Masdar Institute). In Shanghai, engineering at NYU-Sh will focus upon urban engineering. Such collaborations present a vast array of opportunities for Poly and CUSP and, more generally, for ICES.

Concurrent with NYC’s announcement that CUSP was named a winner, NYU announced the appointment of Steve Koonin as Director of CUSP. Koonin is a distinguished scientist with vast experience in academic science, industrial research, and government policies. He will hold a joint faculty appointment in Poly’s department of Civil and Urban Engineering and NYU’s Stern School of Business. The new head of the Department of Civil and Urban Engineering, being recruited presently, will serve as a strong partner for Koonin in building up the Urban Systems in Poly, CUSP, and NYU. Professor Koonin began his assignment on April 16, 2012. His first tasks are to select the interim space at MetroTech; design and implement the first professional Masters program at CUSP (with the first class scheduled for Fall, 2013); and recruit the initial faculty in collaboration with Poly.
At maturity, CUSP will have about 30 university faculty and about 20 research faculty from its industrial partners. Of the 30 university faculty, about 10 will come from Poly lines and 20 will be additional lines – covered in part by tuition resources generated by CUSP’s professional masters programs and in part by our university partners (some of them on extended leave to CUSP, with the possibility of establishing their laboratories here). All faculty members will be recruited collaboratively with our partners in the consortium.

The 10 Poly lines will primarily be placed jointly in CUSP and in several of Poly’s Departments as appropriate. Interest in urban engineering exists at Courant’s Department of Computer Science and at the School of Medicine; and, of course, more general interest exists for the Future of Cities initiative in Environmental Studies, Sociology, Politics, Urban Studies, and Psychology in FAS; and in other schools such as Stern, Wagner, Law, Social Work, SCPS, Gallatin, and Nursing. There will be a considerable interest, to be developed and nurtured, from NYUAD and NYU-Sh.

3. Information and Communication Technology

This signature initiative will primarily impact the two departments of Computer Science (Poly’s and Courant’s), and Poly’s department of Electrical and Computer Engineering. It will include NYU’s university-wide efforts in digital multi-media, cyber security and gaming (and thus parts of Steinhardt, Tisch and possibly SCPS). And it will include the new university-wide efforts in Data Science, Statistics and Bio-Statistics and Broadband Communications. Throughout the areas of Information and Communication Technology (ICT), the university has considerable expertise. The goal is to develop communications and computer science at NYU, in a manner in which the whole (of activities in computer science) is far greater than the sum of the parts and so perceived nationally and internationally.

Gerard Ben Arous, in his role as Vice Provost at NYU, has been asked by the NYU Provost to take an important role in realizing this goal. He will work with the Poly Provost to design an organizational structure for computer science at the university that will enable the view of the whole. That organizational structure, together with our existing strengths and our planned investments, presents the opportunity to be viewed as one of the top programs nationally. Some progress has already been made through the establishment of a common committee looking at both units as one strategically.

Poly plans for approximately five new hires in its initiative in ICT. The center in wireless technology, with Ted Rappaport leading it, constitutes an example center of excellence. Our partner universities will be involved in the searches and probably also through the assignment of long term visitors to establish programs and co-laboratories; joint and associated appointments will be encouraged, with departments at NYU-NY and importantly with NYU-AD and NYU-Shanghai.

C. Engineering at the Comprehensive Campuses: NYU-AD and NYU-Sh

Engineering and technology at NYU-AD and NYU-Sh will be developed synergistically with
engineering at Poly and NYU’s global network. This global component of engineering and technology will include undergraduate programs, professional masters programs, graduate Ph.D. programs, research, and i²e programs (such as incubators, angel and venture funds, and research parks). This synergetic development of engineering throughout the Global Network University will form an essential component of the development of engineering at NYU generally, and at NYU-Poly specifically. Engineering programs in Abu Dhabi and Shanghai campuses will be developed as part of the “system wide” departments, a concept that is still under development. Here we briefly summarize the plans for Engineering at the comprehensive campuses, details of which can be found in the plans for NYU-AD and NYU-Sh.

At both campuses, NYU-Poly’s faculty will be directly involved – in program design, faculty recruitment, as affiliated faculty, Ph.D. student mentoring, and research. At NYU-AD, Sunil Kumar, the inaugural Dean of Engineering there, is on extended leave from NYU-Poly. As with all engineering at NYU, development will occur with partner universities (University of Toronto, Carnegie Mellon University, University of Warwick, CUNY and IIT Bombay); as an example, University of Warwick will be continually sending two affiliated faculty members to Abu Dhabi, beginning in Fall 2012. Similar arrangements can be made with other partner universities, initially through the CUSP activities.

At both comprehensive campuses, engineering will not reach the level of a full-fledged school of engineering (at least not for the foreseeable future). Rather, each will have a Division of Engineering that will recruit faculty and have programs at the undergraduate, professional masters, and research levels. The Ph.D. programs will be jointly organized between Poly and NYU programs such as CUSP, and other NYU units and departments if deemed appropriate. As with Poly, all programs in engineering will be in the focus areas of Bioengineering, Urban Engineering and ICT.

At both of these comprehensive campuses, the undergraduate program will offer a general engineering major that features leadership, communications, creativity, and a global perspective. More specific concentrations such as electrical engineering, computer engineering, civil and urban engineering and mechanical engineering will also be available, taking advantage of extensive cooperation within NYU’s global network, including, of course, Poly. Thus, NYU’s global network will provide the depth in the engineering curriculum that would not be available at small colleges of liberal arts and sciences. This requires the courses of study to be developed synergistically and consistently throughout the entire global network.

At both campuses, we will seek to promote i²e in partnerships with local engineering and entrepreneurial activities. Research topics in engineering and technology will feature areas of significant interest to Abu Dhabi (for example, as described in Abu Dhabi’s strategic plan 2130) and to Shanghai and Pudong (for example, in financial engineering and ICT). The research in engineering and technology in Abu Dhabi will be funded from the NYU-AD Research Institute together with the “defense offset obligation funds”. At all three campuses supporting

\[\text{15 ABET accreditation could become a concern if the same engineering degrees are offered at multiple campuses. In such cases the “weakest link” determines accreditation for all.}\]
engineering, emphasis will be placed on collaborative research.

In Abu Dhabi, the Masdar Institute\textsuperscript{16} (and possibly MIT) provides genuine opportunities for collaboration and joint programs, both in engineering education and research. These are being explored. Looking forward ten years, it is hard to imagine an engineering program in research and education at NYU-AD that is not in some partnership with the Masdar Institute. In a similar manner, it is of considerable interest for Poly to develop collaborative research with East China Normal University, which is the partner institution to NYU-Sh in Shanghai. These are simply two of the mechanisms by which access to larger set of opportunities present themselves for Poly.

IV. SUMMARY

A. Recapitulation

NYU pursued the affiliation with Polytechnic University because Engineering and Technology are essential for the advancement of NYU in general – and for NYU Science and Health Sciences in particular. Polytechnic University pursued the affiliation to enhance its quality to seek excellence as part of a research university, to increase its distinctiveness, to improve its financial strength, and to be part of a larger institution that affords more opportunities for its faculty and students alike. This was an extraordinary and bold move for both institutions. To realize the dreams of both institutions, there is no doubt that considerable effort and investment will be required. Much has already happened. The plan presented here transforms Engineering at NYU and also enhances science and technology in the Global Network of NYU, while at the same time elevating Poly to world-class status in carefully selected areas. This plan will place NYU-Poly at a level of genuine excellence as NYU’s School of Engineering.

This plan chooses areas of interest to NYU as a whole, growing and nurturing them, weaving them into NYU and its Global Network, while incorporating NYU-Poly’s engineering and i\textsuperscript{2}e functions into these initiatives. The plan works by building to world-class level the three signature initiatives: Bioengineering, Urban Systems and ICT. Each of these three builds from the existing strategic plan at Poly – and is embraced by NYU as a whole.

The first initiative in Bioengineering builds on existing strengths at NYU and Poly, and is synergetic with plans and interests at Washington Square as well as the Medical and Dental Schools.

In the second initiative of Urban Systems, there is some strength in NYU as a whole but it is not yet fully developed. However, we have chosen this area for development because: (i) it is important for engineering and society in the 21\textsuperscript{st} century; (ii) it fits well with the broader NYU-wide “Future of Cities” initiative, where it will interact with NYU's social sciences and professional schools; (iii) it is an area that is natural for New York, Shanghai, and Abu Dhabi;

\textsuperscript{16}Masdar Institute, located in Abu Dhabi, is a graduate level instructional and research institute devoted to interdisciplinary, collaborative research and development on advanced energy systems and sustainability.
(iv) and it underpins through science and technology the global network role that NYU wishes to play in world cities of the future. We have, in fact, successfully built our response to New City’s RFP along these lines, by developing the winning concept of a Center for Urban Science and Progress through an NYU lead consortium of university and industry partners.

The third initiative in information engineering (including gaming and digital media) corresponds to an area that is fundamental to the information revolution of the second half of the twentieth century. It will play an increasingly important role in the future; NYU, Courant, Poly as well as other units of NYU have collective strength and critical mass in this general area, and are well positioned for an even stronger place in this arena internationally.

The emphasis on these three areas will occur while keeping in mind the broad educational scope that is appropriate for a School of Engineering of Poly’s size.

**B. Issues that the document does not address**

Since the document serves as the addendum to the more visionary one adopted by Poly in 2007, it is deliberately silent on many important aspects. Some of them are worthy of stating without much discussion.

a. The document has focused largely on research plans but it does not mean that education is of lesser significance. We recognize that approaches such as project based learning, high-quality internships and undergraduate research opportunities are important in producing highly qualified and adaptive professional engineers. Engineers are the creators and custodians of the actual world in which we live, and it may thus be argued that engineering itself is a kind of humanistic discipline. We thus recognize the enormous educational opportunities that the integration with NYU provides, with its traditional strengths in humanities, arts, social sciences, physical sciences and mathematics, all of which have an important role in engineering education. It is indeed an opportunity for redefining engineering education for the twenty-first century, especially within NYU where humanistic traditions are stronger than the traditions of invention, innovation and entrepreneurship. We are aware that numerous details, including the best way of incorporating the existing strengths at Poly in these areas, require attention before this vast resource can be harnessed effectively for better education of the student body in NYU as a whole.

b. The document has also not considered the impact of increasing competition for technological education in New York City. Two examples are the appearance of Cornell University on the scene and the expansion that Columbia is seeking to make in engineering. The precise role of CUSP, an NYU entity with which Poly is – and will remain – closely associated has not been articulated fully. Operational details are emerging with each passing day. Likewise, the discussion here has not focused adequately on how the new Bioengineering Institute will embed itself within the larger NYU. These are evolving scenes. We will remain mindful of actual and potential changes and adapt ourselves towards performing at a high level in educational and research aspirations embedded in the i²e philosophy mentioned earlier.

c. The document is also silent on strategies for increasing Poly’s ranking among engineering
schools; it has also not discussed indicators to measure progress. These issues are part of a continuing but separate and intense dialogue within NYU as a whole, and NYU-Poly in particular. Specifically, Poly has been tracking its own progress for some time, and has been developing specific strategies towards increasing its ranking.

d. The document has deliberately avoided explicit mention of Poly’s aspirational peers. Because of its size (of the order 100 tenured and tenure-track faculty), Poly cannot aspire to compete with institutions such as MIT, Illinois and Stanford (even though it does aspire to have on its faculty scholars of comparable reputation and will strive to establish research groups of comparable reputation in areas of its choice); however, it does explicitly intend to compare itself with similarly-sized institutions of higher national ranking (e.g., Rice). The existence of the Global Network at NYU, of which Poly is part, defies direct comparisons: this feature brings with it both opportunities and responsibilities that are absent at other institutions. Comparisons can thus be partial at best, but such comparative studies have, in fact, been made for guidance.

e. Finally, the document does not discuss broad threats facing engineering education in the US. NYU is mindful of the exemplary role that Poly has played in providing opportunities for students coming from disadvantaged backgrounds, immigrant children or children of immigrant parents, and those among the first generation in their families to attend college. To remain affordable and to continue to be a means by which bright and hard-working students achieve the American Dream is a matter of pride and concern for Poly in particular, and for NYU at large.

C. Conclusion

The present plan develops engineering and technology, in Brooklyn and elsewhere in NYU’s Global Network, particularly in the comprehensive campuses of NYU-AD and NYU-Sh. This unified development of engineering throughout the global network presents resources and opportunities that are not otherwise available with more of a silo approach. This synergetic approach is fundamental to our development plan.

In particular, this document articulates an approach to bringing about a development of engineering within NYU as a whole, with a focus on Poly. While it deliberately avoids stipulating a step-by-step procedure, it provides a detailed and specific plan with strategic and tactical steps including implementation. While we readily acknowledge that some variants on details might be necessary, the document paints the overall picture accurately. For the most part, it focuses upon program development, departmental reorganization, faculty hiring and quality teaching and research; some other parts of the plan – such as selected administrative and financial aspects – are further along than others. In essence, these four areas (program development, department reorganization, and faculty hiring, and the quality of teaching and research) will be built upon the three signature initiatives, thereby enhancing NYU-Poly’s excellence and increasing the value and efficacy of engineering and the i²e outlook across all of NYU. We believe that the plan as presented is both pragmatic and institutionally compelling.