

NEW YORK UNIVERSITY

SELF-STUDY REPORT ON MULTISCHOOL, INTERDISCIPLINARY PROGRAMS FOR THE MIDDLE STATES COMMISSION ON HIGHER EDUCATION

FEBRUARY 3, 2014

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Steering Committee and Working Groups

Norman Dorsen, Frederick I. and Grace A. Stokes Professor of Law and Counselor to the President, *Chair of Self-Study*

Barnett W. Hamberger, Assistant Provost, *Coordinator of Self-Study*

Steering Committee

*Alicia Bell, Graduate Student, Social Work, Steinhardt School of Culture, Education, and Human Development

Nina Cornyetz, Associate Professor, Gallatin School of Individualized Study

Martin Daughtry, Assistant Professor of Music, Faculty of Arts and Science

†Ingrid Gould Ellen, Paulette Goddard Professor of Urban Policy and Planning, Wagner School of Public Service

Randall Deike, Vice President of Enrollment Management

André A. Fenton, Professor of Neuroscience, Faculty of Arts and Science

Tracey Gardner, Chief of Staff, Wagner School of Public Service

Lisa Gitelman, Professor of English and Media, Culture, and Communication, Steinhardt School of Culture, Education, and Human Development

Heather Herrera, Director of Academic Affairs, Steinhardt School of Culture, Education, and Human Development

†Anthony Jiga, Vice President, Budget and Planning

‡Loris Jones-Randolph, Graduate Student, Media, Culture, and Communication, Steinhardt School of Culture, Education, and Human Development

†Yann LeCun, Professor of Computer Science, Neural Science, and Electrical and Computer Engineering, Courant Institute of Mathematical Sciences

* Spring 2012 to Summer 2013

† Assumed special responsibility for sections of the report

‡ Summer 2013 to present

Jacques Lezra, Professor of Spanish and Portuguese and Comparative Literature, Faculty of Arts and Science

† Roy Lowrance, Chief of Staff, Center for Data Science, Courant Institute of Mathematical Sciences

Mary E. Northridge, Associate Professor of Epidemiology and Health Promotion, College of Dentistry

James Pace, Clinical Associate Professor, Associate Dean, College of Nursing

†Cybele Raver, Vice Provost for Academic, Faculty and Research Affairs

Carol Shoshkes Reiss, Professor of Biology, Faculty of Arts and Science

Elizabeth Rohlfling, Assistant Dean of Planning, School of Law

Tazuko Shibusawa, Associate Dean, Associate Professor, Silver School of Social Work

Griffin Simpson, Undergraduate Student, Liberal Studies Program

†Marcia Thomas, Associate Dean of Planning, Finance and Administration, Global Institute of Public Health

†Jane Tylus, Professor of Italian and Comparative Literature, Faculty of Arts and Science

David Yermack, Albert Fingerhut Professor of Finance and Business Transformation, Stern School of Business

Working Groups

Public Health

Marcia Thomas, Associate Dean of Planning, Finance and Administration, Global Institute of Public Health, *Chair*

Marc Gourevitch, Professor, Medical School

Perry Halkitis, Professor of Applied Psychology, Public Health, and Medicine, Steinhardt School of Culture, Education, and Human Development

Erica Humphrey, Undergraduate Student, Public Health, Steinhardt School of Culture, Education, and Human Development

† Assumed special responsibility for sections of the report

Katty Jones, Director of Global and Program Services, Wagner Graduate School of Public Service

Pricila Mullachery, Graduate Student, Public Health, Steinhardt School of Culture, Education, and Human Development

Mary E. Northridge, Associate Professor of Epidemiology and Health Promotion, College of Dentistry

Deborah Padgett, Professor of Social Work and Global Public Health, Silver School of Social Work

Nancy Van Devanter, Associate Professor, College of Nursing

Cities and the Urban Environment

Ingrid Gould Ellen, Paulette Goddard Professor of Urban Policy and Planning, Wagner School of Public Service, *Chair*

Mosette Broderick, Clinical Professor of Art History, Faculty of Arts and Science

Wyatt Cmar, Undergraduate Student, Metropolitan Studies and Economics, College of Arts and Science

Roderick M. Hills, Jr., William T. Comfort, III Professor of Law, School of Law

Alan Lightfeldt, Graduate Student, Urban Planning, Wagner School of Public Service

Anne Rademacher, Associate Professor of Anthropology and Environmental Studies, Social and Cultural Analysis, Faculty of Arts and Science

Amy Schwartz, Professor of Public Policy, Education, and Economics, Steinhardt School of Culture, Education, and Human Development, Wagner School of Public Service

Patrick Sharkey, Associate Professor of Sociology, Faculty of Arts and Science

Humanities and the Arts

Jane Tylus, Professor of Italian and Comparative Literature, Faculty of Arts and Science, *Chair*

Michael Beckerman, Carroll and Milton Petrie Professor of Music, Faculty of Arts and Science

Toral Gajarawala, Associate Professor of English and Comparative Literature, Faculty of Arts and Science

Linse Kelbe, Undergraduate Student, Art History, College of Arts and Science

Laura Slatkin, Professor, Gallatin School of Individualized Study

April Strickland, Graduate Student, Anthropology, Graduate School of Arts and Science

Diana Taylor, University Professor, Professor of Performance Studies and Spanish, Tisch School of the Arts and Faculty of Arts and Science

Jennifer Vinopal, Librarian for Digital Scholarship Initiatives, Division of Libraries

Deborah Willis, University Professor, Photography and Imaging, Tisch School of the Arts

Larry Wolff, Professor of History, Faculty of Arts and Science

Data Science

Yann LeCun, Professor of Computer Science, Neural Science, and Electrical and Computer Engineering, Courant Institute of Mathematical Sciences, and Roy Lowrance, Chief of Staff, Center for Data Science, Courant Institute of Mathematical Sciences, *Co-Chairs*

Constantin Aliferis, Associate Professor of Pathology, School of Medicine

David Greenberg, Professor of Sociology, Faculty of Arts and Science

Michael Laver, Dean for the Social Sciences, Professor of Politics, Faculty of Arts and Science

Foster Provost, Professor of Information Systems, Stern School of Business

Michael Purugganan, Dean for Science, Schiff Professor of Genomics and Biology, Faculty of Arts and Science

Marc Scott, Associate Professor of Applied Statistics, Steinhardt School of Culture, Education, and Human Development

Margaret Wright, Silver Professor of Computer Science and Mathematics, Courant Institute of Mathematical Sciences

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In General

Kimiko Altamirano
Brianna Bates
Stacie Bloom
Deborah Broderick
Lynne Brown
Thomas Carew
Melody Cherny
Luke Dubois
Richard Foley
Christopher Hoadley
Katheryn Keegan
Constantine Kontokosta
Frank Lantz
Rachel Maxwell
David McLaughlin
Carol Morrow
Anthony Movshon
Fabio Piano
Roma Pielarska
Ellen Schall
Frederic Schwarzbach
Richard Tsien

Public Health

Robert Berne
Cheryl Healton
James Macinko
Matthew Santirocco

Cities and the Urban Environment

Peder Anker
Hilary Ballon
Vicki Been
Thomas Bender
Kristen Day
Clay Gillette
Louise Harpman
Helena Hansen

Natasha Iskander
Dale Jamieson
Mitchell Joachim
Eric Klinenberg
Steven Koonin
Lawrence Mead
Mitchell Moss
Robin Nagle
Katherine O'Regan
Tae Hong Park
Jon Ritter
Paul Romer
Paul Smoke
Gabrielle Starr
David Stasavage
Diana Taylor
Daniel Walkowitz
Beth Weitzman
Caitlin Zaloom

Humanities and the Arts

Hemispheric Institute

Liz Andrews
Macial Godoy-Anativia
Lorie Novak
Frances Pollitt
Marlène Ramírez-Cancio
Diana Taylor

Humanities Initiative

Thomas Augst
Asya Berger
Armanda Lewis
April Strickland
Daniela Valentin

Remarque Institute

Katherine Fleming
Jair Kessler
Katelyna Robinson

Abu Dhabi Research Institutes

Hilary Ballon
Reinhardt Falkenburg
Phillip Kennedy
Judith Miller

Digital Humanities

Thomas Augst

Lauren Benton

William Blake

Deena Engel

Jacob Gaboury

Lisa Gitelman

Collin Jennings

Dan O'Sullivan

John Waters

Peter Wosh

Middle States Eligibility Certification Statement

 **Middle States Commission on Higher Education**
3624 Market Street, Philadelphia, PA 19104-2680
Phone: 267-284-5000 Fax: 215-662-5501 www.msche.org

Certification Statement: Compliance with MSCHE Requirements of Affiliation and Federal Title IV Requirements Effective October 19, 2012

 New York
University _____

(Name of Institution)

is seeking (*Check one*): Initial Accreditation
 Reaffirmation of Accreditation through Self Study
 Reaffirmation of Accreditation through Periodic Review

An institution seeking **initial accreditation** or **reaffirmation of accreditation** must affirm that it meets or continues to meet established MSCHE Requirements of Affiliation and federal requirements relating to Title IV program participation, including the following relevant requirements under the Higher Education Opportunity Act of 2008:

- Distance education and correspondence education (student identity verification)
- Transfer of credit
- Assignment of credit hours
- Title IV cohort default rate

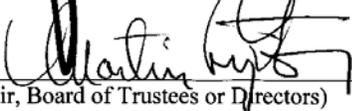
This signed certification statement must be attached to the executive summary of the institution's self-study or periodic review report.

The undersigned hereby certify that the institution meets all established Requirements of Affiliation of the Middle States Commission on Higher Education and federal requirements relating to Title IV program participation as detailed on this certification statement. If it is not possible to certify compliance with all requirements specified herein, the institution must attach specific details in a separate memorandum.

Exceptions are noted in the attached memorandum (*Check if applicable*)



(Chief Executive Officer)



(Chair, Board of Trustees or Directors)

12/12/2013

(Date)

12/18/2013

(Date)

Executive Summary

In its self-study for the decennial Middle States Commission on Higher Education re-accreditation, New York University has chosen to focus on multischool, interdisciplinary programs that exist outside or alongside the school and department structure of the University. Such programs have propelled many of the recent major initiatives at NYU, and several are being developed as University priorities. This trend is of special significance for a historically school-centric university – presenting both opportunities and challenges – and so warrants examination. The four areas on which the self-study focuses are public health, cities and the urban environment, humanities and the arts, and data science. Working groups were formed in each of these areas to explore organizational structure, leadership and governance, faculty, finances, the student community, the curriculum, the University administration, support services, and assessment procedures. In addition, information has been collected for this report from other multidisciplinary centers at NYU: the Center for Genomics and Systems Biology, the Center for Neural Science, the Neuroscience Institute, and the Media and Games Network (MAGNET).

Public Health

There is a growing recognition of the importance of advancing public health as a fundamental building block of prosperous, stable, and just societies. And universities – through their key missions of research, education, and service – can play a critical role in that effort. Improving the state of the nation’s and world’s health requires professionals and experts from across the spectrum: physicians, nurses, dentists, psychologists, social workers, policymakers, managers, engineers, and sociologists. After several years of consultation with deans and faculty, NYU was ready in 2012 to launch the Global Institute of Public Health (GIPH), which draws on the scholarship and clinical work of 11 schools. GIPH includes doctoral, master’s, and undergraduate degree programs. Ten undergraduate majors combining public health with another field provide interdisciplinary education for students entering the workforce or going onto graduate school. The master’s program prepares students to become public health researchers and practitioners. The doctoral program specializes in the biological bases of public health, health systems and services research, population and community health, and sociobehavioral health. A goal of the Institute’s new dean is to evaluate how current cross-school faculty align with research areas, such as chronic disease, infectious disease, and public health and community practice.

The Council on Education for Public Health, on an accreditation site visit to NYU in 2010, commented favorably on the resources that have been committed to public health, the smoothness of the collaborative relationship among units, and the mentoring of students, postdocs, and junior faculty. Challenges remain, including the still-strong pull toward school-

based programs and faculty as the norm; the dispersal of faculty and students over several geographic sites; the potential for conflicting policies and procedures in student and faculty affairs, and financial planning. And with an institute the breadth and scope of GIPH, there is a pressing need for ongoing communication among all participants.

Cities and the Urban Environment

For the first time in history, more than half the world's population lives in cities. By 2050, seven out of 10 people will. The world's anticipated population growth in the next few decades, from 7 billion to 9 billion, will take place largely in cities in the developing world. While urbanization has the potential to reduce poverty and promote economic development, if done too fast or without proper planning for infrastructure or human needs, it presents grave threats to the environment and quality of life. The physical, social, political, and economic forces that shape the well-being of urban residents are complex, and they demand multifaceted solutions. As a university that was founded to be "in and of the city" and makes its home in New York City, NYU is well positioned to study urban issues. It has scholars in a wide range of disciplines crucial to understanding cities: applied sciences and technology, sociology, economics, law, history, environmental sustainability, and policy and planning.

Currently, NYU has four relevant multidisciplinary undergraduate programs focused on cities and aspects of urbanization, three in the College of Arts and Sciences and one in the School of Engineering – which together enroll 300 majors. In addition, there are departments in several other schools and at NYU's global sites, which provide opportunities to study cities. Several schools, such as the Wagner Graduate School of Public Service and the Graduate School of Arts and Science, offer related master's degrees. There are a large number of active centers at the University, housed in different schools, through which faculty conduct research on urban problems, including transportation, land use, housing, culture, education, poverty, climate change, and urban growth. One of the newest is the Center for Urban Science and Progress (CUSP), which aims to collect, link, and analyze large data sets to improve urban efficiency. The University has recently launched the Marron Institute on Cities and the Urban Environment, which will span the entire University and serve as an umbrella institute for many of NYU's centers in this area. These programs are aided by a vigorous faculty, the potential for connection with an array of cities in which NYU has a study abroad presence, and a vibrant student community.

Here, too, challenges remain: some fragmentation and lack of coordination of curriculum and research, faculty allegiance to multiple departments, still-developing undergraduate programs, insufficient use of NYU's global network, and vestigial administrative barriers to multischool classes and research.

Humanities and the Arts

Since 2005, NYU has created more than 100 new positions in humanities in the Faculty of Arts and Science. The field has also grown in the Gallatin School of Individualized Study, the Liberal Studies Program, the Steinhardt School of Culture, Education, and Human Development, and the Institute for the Study of the Ancient World. Humanities and the arts are also embedded in less obvious venues, including the School of Law, the Robert F. Wagner Graduate School of Public Service, and the School of Medicine. Finally, the Tisch School of the Arts and the Institute of Fine Arts are, respectively, among the most highly regarded programs for the performing arts and art history. These are unsettling times for the humanities, as reflected in a spate of recent reports. Since the 1960s there has been a decline in the number of postsecondary degrees in the field, government support for less-commonly taught languages has been cut drastically, and the job market for graduate students in the humanities has rarely been worse. In this climate, the most competitive students seek to be conversant with more than one field in their disciplines, and NYU has been at the forefront of articulating and creating interdisciplinary connections in the humanities and arts.

In addition to the programs located in separate schools, many humanities centers exist outside the purview of a single school. This self-study concentrates on five that share common goals but differ with respect to funding, personnel, longevity, and interactions within and beyond the University.

- The Hemispheric Institute of Performance and Politics, based in the Tisch School of the Arts, has extensive contacts with over 45 institutions in the Americas as it operates a performance archive and network aimed at exploring, teaching, and enabling performance in the Western Hemisphere. The network also provides work-study and internship positions, which benefit skills training and create a supportive community for students and alumni.
- The goal of the Humanities Initiative at NYU is to mobilize “the talents and energies of our faculty and students across the University to provide a forum for cross-disciplinary discussion and collaboration in the humanities and arts.” It funds research groups, conferences, and workshops, and it partners with libraries and other humanities centers in New York State.
- The Remarque Institute, founded by the esteemed late professor Tony Judt, has become a leading interdisciplinary center for scholarship in European studies, including history, literature, politics, sociology, law, and journalism. It sponsors fellowships, lectures, and a monthly European history seminar for graduate students.
- The NYU Abu Dhabi Institute includes an outreach program designed to bring together Emirati, expatriates, and others for talks, concerts, and ongoing research. It has a conference and workshop program geared to issues that focus on Abu Dhabi and the Gulf as places of transition and geographic, economic, and cultural

intersections. And it funds large-scale research projects in the sciences, social sciences, and humanities.

- The University's digital humanities projects are engaged in the creation and use of technological methods to investigate humanities scholarship.

Taken as a group, these humanities initiatives at NYU constitute a unique assemblage, allowing a broad range of teaching, research, and collaborative projects that have national and global reach. The primary challenge for these programs consists of the three Cs – collaboration, continuity, and connectivity – as ways of enhancing a fourth C, creativity. They have common needs: adequate space, staff, and oversight. They also have the challenge of maintaining strong relations across NYU's global network to strengthen their offerings and disperse their benefits more widely. Finally, integrating undergraduates into these programs will establish strong humanistic foundations for students at the start of their studies.

Data Science

Our networked world is generating a deluge of data that no human, or group of humans, can process fast enough. Much of the new data is unstructured and is captured from the real world through a variety of means: sensors from scientific experiments, pictures and videos from the Web, location data from smartphones, link and click data from social networks, customer data from e-commerce, text from news sources, blogs and collaborative filtering websites, and more. Data science is on the cusp of revolutionizing all areas of intellectual endeavor and is becoming a necessary tool to answer some of the big scientific and technological challenges of our time. NYU has a strong presence in data science, particularly in deep learning, information visualization and visual analytics, data management, provenance and reproducibility, large-scale computation, and mathematical statistics and probability.

In 2012, NYU established a Center for Data Science to serve as a major research and education center, bringing together many of these competencies. The University also has five other data science–related graduate programs, with a sixth to start in fall 2014. In addition, many NYU research centers and departments have significant activity in the field, including the Center for Genomics and Systems Biology, the Center for Social and Political Behavior, the Computational Intelligence, Learning, Vision, and Robotics Lab; and the Division of Biostatistics at the NYU Langone Medical Center. Two principal purposes of these activities are to bring together faculty with significant research activities in data science who are currently scattered at the University. These activities are linked closely with NYU's global network, especially the Abu Dhabi and Shanghai campuses. These projects require substantial resources, including classroom and faculty space and equipment. As is common with interdisciplinary efforts, junior faculty are often concerned about the effect of their participation on promotion and tenure in their home departments. Another challenge is to

find a flexible University-wide approach to obtaining corporate sponsorship. Nevertheless, there are many opportunities to develop new NYU strengths in this area and for the University to become a leader in the field.

Overall Strengths and Challenges

As stressed throughout this report, interdisciplinary work has enormous potential for intellectual innovation and the solution of complex problems, such as rapid urbanization of the world's population, challenges in national and international economic development, public health threats, and political instability. As an urban university with an increasingly global identity and departmental strengths across a wide range of natural and social sciences and the humanities, NYU is well positioned to capitalize on interdisciplinary initiatives. Because some departments have little in the way of process for managing faculty hiring, promotion, and tenure, it is sometimes necessary to introduce new procedures. Similarly, despite increasing cooperation among faculty in different fields, there is a continuing need for oversight to assure that programs are coordinated and duplication is avoided. To be successful, interdisciplinary endeavors require significant investment of time and money and the steady development of information technology.

Multischool collaboration provides students with an opportunity to explore different epistemological traditions and to capitalize on new methodologies, technologies, and forms of analysis. An interdisciplinary focus also helps the Washington Square campus work more closely with NYU's study abroad sites. Experience in low- and middle- income countries assists students in understanding the varied nature of local problems throughout the world. Nevertheless, with multidisciplinary approaches come theoretical and pragmatic challenges. The lack of an historical anchor for some of the innovative work can be taxing for students, and the bounds of interdisciplinary topics can be more diffuse, or less easily articulated, than ideal to shape research and pedagogical aims.

This self-study makes recommendations for strengthening interdisciplinary programs and tackling the significant administrative, fiscal, operational, and above all, academic challenges they face.

The self-study covers portions of Middle State's Standards 5, 7, 9, 10, and 11. The document review addressed other portions of those Standards, as well as all of Standards 1-4, 6, 8, and 12-14.

Chapter 1: Introduction

Overview of New York University

Mission

Great cities are engines of creativity and complex environments. New York University takes its name and spirit from one of the busiest, most diverse, and dynamic cities of all. The University lives within New York and other great cities, from Abu Dhabi to Shanghai, Paris to Prague, Sydney to Buenos Aires – all magnets for talented and ambitious people.

New York University’s mission is to be a top-quality international center of scholarship, teaching and research. This involves retaining and attracting faculty who are leaders in their fields, encouraging them to create programs that draw outstanding students, and providing an intellectually rich environment. NYU seeks to take academic and cultural advantage of its location and to embrace diversity among faculty, staff, and students to ensure a wide range of perspectives, including international perspectives, in the educational experience.

History and Description

The opening of the University of London in 1828 convinced New Yorkers that New York, too, should have a university, and in 1831 a group of prominent citizens founded New York University. This was an historic event in American education. At the time, most students in American colleges and universities were members of the privileged classes. The founders of NYU intended to enlarge the scope of higher education to meet the needs of persons from other strata of society who aspired to careers in business, industry, science, and the arts, as well as in law, medicine, and the ministry. The first president of New York University’s governing council was Albert Gallatin, secretary of the treasury in Thomas Jefferson’s cabinet. Gallatin and his cofounders said that the new university was to be a “national university” that would provide a “rational and practical education for all,” regardless of national origin, religious beliefs, or social background. While the University’s commitment to these ideals remains unchanged, Gallatin would scarcely recognize NYU today. From a student body of 158 during NYU’s first semester, enrollment has grown to nearly 45,000 undergraduate, graduate, and professional students and over 8,000 non-credit students attending 18 schools and colleges at the main campus facilities in Manhattan and Brooklyn, and at sites elsewhere in the United States, Africa, Asia, Europe, Australia, and South America. Students come from every state in the Union and from over 140 countries.

NYU is the largest private university in the United States, and is known nationally and internationally as one of the most extensive platforms for learning, teaching, research, building knowledge, and developing new ways to meet humanity’s challenges. Its students,

faculty, and alumni feed off the stimulating power of intellectual and cultural currents by mastering academic disciplines, expressing themselves in the arts, and excelling in demanding professions. NYU has long had a rich culture of robust intellectual exchange and internal debate about academic priorities.

Of the more than 3,000 colleges and universities in the United States, NYU is one of the 60 that are members of the Association of American Universities. The 2013 report from the Center for World University Rankings lists NYU 19th worldwide, and 14th among U.S. institutions¹. The same year, the Academic Ranking of World Universities listed NYU 27th worldwide, and 20th among U.S. institutions (a rise from 55th and 39th respectively, since 2003)².

The faculty, which initially consisted of 14 professors and lecturers (among them artist and inventor Samuel F. B. Morse), now totals over 3,100 full-time and 4,100 part-time members, whose research and teaching encompasses the humanities, the sciences, and the social sciences. Among the faculty are 12 MacArthur Fellows, four Nobel and Crafoord Prize winners, 21 members of the National Academy of Sciences, 68 members of the American Academy of Arts and Sciences, and seven Howard Hughes Investigators. In the last two years, faculty have been recipients of the Nobel Peace Prize, the National Medal of Science, and the Pulitzer Prize, among other numerous awards and honors. NYU, with five faculty awards, ranked among the top 10 research universities for 2013-2014 Fulbright Scholar grants. There are over 9,000 administrative and staff employees. The University is large, but most of the divisions are small to moderate in size, with their own traditions, programs, and faculty.

The center of NYU is its Washington Square campus in Greenwich Village. One of the city's most creative and energetic communities, the Village has attracted generations of writers, musicians, artists, and other intellectuals. Elsewhere in Manhattan, major facilities for schools and programs in the health disciplines are located on First Avenue, adult degree programs and continuing education programs are located Downtown and in Midtown, and two major institutes are located Uptown.

As a result of its merger with the former Polytechnic Institute of NYU, which became the NYU School of Engineering on January 1, 2014, the University now has an Additional Location in Brooklyn, which also houses other programs. There are 13 other Additional Locations both domestically and abroad, and 10 Other Instructional Sites abroad and one in Washington, D.C. Research facilities, notably the Nelson Institute of Environmental

¹ cwur.org/top100.html

² shanghairanking.com/ARWU2013.html

Medicine, are located in Sterling Forest, near Tuxedo, New York. The University also has a branch campus in Abu Dhabi, United Arab Emirates.

NYU has established itself as a university with an expansive global network with a comprehensive liberal arts campus in Abu Dhabi, which opened in 2010 and was the first campus to be operated abroad by a major U.S. research university. A similar campus opened in Shanghai in September, 2013, and other sites for study and research are in Accra, Berlin, Buenos Aires, Florence, London, Madrid, Paris, Prague, Sydney and Tel Aviv, among other locations.

The framework of New York University's global network is, as President Sexton has written, "a planned physical presence (manifest in both facilities and the human capital of faculty, students, and staff) on six continents and [has] the ability to accommodate seamlessly a flow of personnel and programs among those campuses. . . . [T]he NYU system is designed to allow faculty and students to enrich their research and learning by offering participation locally in a set of the world's idea capitals without compromising connectivity to the rest of the university."³

NYU's schools and colleges located in New York City, in the order of their founding, are the College of Arts and Sciences; School of Law; School of Medicine; School of Engineering; College of Dentistry (which includes the College of Nursing); Graduate School of Arts and Science (which includes the Courant Institute of Mathematical Sciences, the Institute of Fine Arts, and through which degrees for the Institute for the Study of the Ancient World are awarded); Steinhardt School of Culture, Education, and Human Development; Leonard N. Stern School of Business; School of Continuing and Professional Studies; Robert F. Wagner Graduate School of Public Service; Silver School of Social Work; Tisch School of the Arts; and the Gallatin School of Individualized Study. In addition, degree programs are offered by the Liberal Studies Program; the Global Institute for Public Health; and the Center for Urban Science and Progress.

The University provides housing for over 11,000 undergraduate, graduate, and professional students. Its eight libraries hold over 4.5 million volumes. The Elmer Holmes Bobst Library and Study Center at the main campus on Washington Square alone holds over 3.3 million volumes.

³ Sexton, John. (2010, December 21). *Global Network University Reflection*. www.nyu.edu/about/leadership-university-administration/office-of-the-president/redirect/speeches-statements/global-network-university-reflection.html

Table 1: Enrollment at New York Campus Fall 2013	
Undergraduate Total	22,615
Full-time	21,365
Part-time	1,250
Male	9,066
Female	13,549
Graduate Total	18,448
Full-time	10,216
Part-time	8,232
Male	7,713
Female	10,735
First Professional Total	3,536
Full-time	3,515
Part-time	21
Male	1,840
Female	1,696
Total	44,599
Non-credit	8,261

NYU Abu Dhabi enrollment 617

NYU Shanghai enrollment 294

Source: Office of Institutional Research and Program Evaluation

Additional information is available in the University’s Annual Institutional Profile. (Appendix A) and on the website of the Office of Institutional Research and Program Evaluation at www.nyu.edu/ir .

Recent Developments and Future Plans

There have been significant developments in recent years, some of which relate directly to the topic of this self-study. In March 2012, President John Sexton announced the inauguration of the NYU Global Institute of Public Health, which will help “...galvanize the existing intellectual critical mass in global public health at NYU, [and] also...serve as a model for other multi-university initiatives that seek to create bridges across traditional academic disciplines and units.” The next month, the Mayor of New York announced that NYU’s proposed Center for Urban Science and Progress (CUSP) was a winner of the Applied Sciences NYC Initiative. CUSP has been developed in conjunction with several other educational institutions and with the support of corporate partners. It is “...an applied science and engineering institute that will conduct research, support graduate study, and fashion real-world technologies to address the challenges of an increasingly urbanized planet.” CUSP is located in Brooklyn adjacent to the School of Engineering. The University also moved its new (fall, 2013) Media and Games Network (MAGNET) to the Brooklyn location. MAGNET brings together faculty and students from four NYU schools (including

Engineering) to study the technology and cultural applications of games and is the first NYU facility in which faculty from different schools are located.

Also in 2013, NYU launched the Marron Institute on Cities and the Urban Environment, which sponsors interdisciplinary research and teaching in issues related to cities, drawing on the insights of the social sciences, the humanities, and the professions (CUSP is its applied science arm). Last year, the Initiative in Data Science and Statistics was established to address the explosion of data in many fields, including medicine, science, technology, and business, and to analyze and extract knowledge from large amounts of data.

New York University will continue to evolve as a university with an expansive global network. Provost David McLaughlin said in a September 2011 letter to the faculty: “The developing research programs in Abu Dhabi and Shanghai, coupled with the excellence of our academic programs in New York, will open a whole new range of possibilities for future development.”

Another continuing effort is the use of technology to advance the University’s academic mission. Such pedagogical initiatives are overseen by the Teaching Technology Committee, which is composed of faculty with skill or interest in this area and administrators whose work is relevant to information technology. Among the committee’s recommendations that are being implemented are a move to a single learning management system and the increased use of technology to connect faculty, students, and courses across NYU’s global network. A second faculty committee is exploring the future of technology-enhanced education, from the digital enhancement of in-person lectures to the development of online courses to meet strategic objectives, including but not limited to promoting student flexibility in moving across NYU’s global network. Finally, over the past five years, \$9.5 million has been spent on building and upgrading general purpose classrooms throughout NYU, so that 90 percent of them are now “smart classrooms” (i.e., equipped with computers, wireless Internet access, audiovisual capability, and a centralized media control system).

President Sexton announced in his 2013 end-of-the-year message to the NYU community that “we will be strengthening the Center for Teaching Excellence⁴, which provides professional development for faculty in fulfilling our teaching mission.” New staff will be added, along with expanded consultation services and digital media offerings to assist faculty with their teaching. In addition, in fall 2013 the University launched a pilot to provide coordinated and augmented support for faculty who want to use technology to enhance their teaching. This pilot is a collaboration among the University Libraries, Information Technology Services, and Global Technology Services.

⁴ Now called the Center for the Advancement of Teaching.

Although the University has added new facilities and renovated existing facilities, it faces severe space constraints. Accordingly, NYU has developed a plan (“NYU2031: NYU in NYC”⁵) to accommodate future space needs, which will enable it to add new and improved facilities for academic purposes, research, student uses, and housing at Washington Square. The New York City Planning Commission and City Council approved the plan and a lower court recently dismissed all but one challenge to the project. The plan is also being reviewed by the University Space Priorities Working Group (composed of faculty, students, and administrators). The Working Group report is expected during the spring 2014 semester.⁶ Additionally, as part of the citywide strategy, in the health corridor along First Avenue a facility is under construction to provide a new home for the College of Nursing, additional research space for the College of Dentistry, and a location for a new collaboration in bio-engineering among the Schools of Dentistry and Medicine and the School of Engineering. Recent physical renovations include the Academic Resource Center, which groups the University Learning Center and the NYU Opportunity Programs in a location with advising and tutoring facilities and classrooms; the Global Center for Academic and Spiritual Life, with new classrooms, music practice space, and a home for NYU’s communities of faith; refurbished classrooms in several locations; and renovated spaces for some academic departments.

As noted above, on January 1, 2014, the Polytechnic Institute of New York University (affiliated with NYU since 2008) merged with NYU. The merger restored to NYU a school of engineering (the Polytechnic School of Engineering), which it had for 140 years until the early 1970s.

The Self-Study

The Self-Study Process

In the summer of 2011, President Sexton asked Norman Dorsen, Stokes Professor of Law in the School of Law and counselor to the president, to chair the 2014 Middle States self-study, and Assistant Provost Barnett W. Hamberger to serve as self-study coordinator, as both had done for the 2004 self-study on undergraduate education and for the 2009 Periodic Review Report. As in earlier self-studies, NYU has chosen a topic of importance to the University (what Middle States classifies as a Selected Topics Report), multischool programs and interdisciplinary work.

We define interdisciplinary to refer to multischool programs that exist outside or alongside the school structure. We therefore have generally omitted from consideration dual degree programs (of which NYU has over 100).

⁵ nyu.edu/nyu2031/nyuinnyc

⁶ nyu.edu/about/university-initiatives/space-priorities.html

During the 2011-2012 academic year, Dorsen and Hamberger met with the president, provost, and other senior University officers, about the focus of the self-study, and deans made presentations to the senior University leadership which included information about their multischool programs. At the same time, a census was conducted of multischool activities throughout the University.

Many recent major initiatives at NYU have been interdisciplinary and have led to the creation of units outside the traditional departmental or school organization. Provost David McLaughlin's fall 2012 message to the faculty, echoing his comments the previous year, said: "In addition to all the important initiatives taking place in our schools, there are several exciting multischool projects and programs that go beyond traditional boundaries and bring together like-minded scholars and researchers. Today such interdisciplinary collaborations are natural, and a number of them are being developed as University priorities." His list includes the four areas on which our self-study focuses.

These areas are public health, cities and the urban environment, humanities and the arts, and data science. In April 2012, Sexton appointed members of the self-study Steering Committee and Dorsen appointed working groups for the four areas. Dorsen and Hamberger drafted charges to the working groups, which the Steering Committee reviewed and affirmed (see p. iv for members of the Steering Committee and working groups). In addition, Dorsen and Hamberger developed and distributed a questionnaire to a few other multischool programs to collect additional information: the Media and Games Network (MAGNET), the Center for Genomics and Systems Biology, and the Center for Neural Sciences and the Neuroscience Institute (Appendix B).

During the 2012-2013 academic year the four working groups met, interviewed members of the University community (see p. viii for the list of interviewees), gathered and analyzed information, and prepared preliminary reports which were then reviewed by the Steering Committee. Each area of primary study is discussed in a chapter of the self-study. Rounding out the report are a chapter containing insights and general principles from the chapters on the individual programs and the results of the questionnaires, as well as an introduction and conclusion. A draft of the self-study report was made available to the University community in September 2013 for comment.⁷

The Self-Study Rationale

The academic world is still structured by traditional disciplines, but increasingly the advancement of knowledge and the solutions to societal problems are based on multidisciplinary approaches. As Nigel Thrift, vice chancellor and president of the University

⁷ See Appendix C for Self-Study Timeline.

of Warwick, recently wrote, disciplines are becoming, "less central to that continuation of knowledge." Yet, he noted, the organization of "disciplinary mix" at universities is rare although there "is a slow but decisive shift toward interdisciplinary work," citing the development of "proto-subjects" (like genomics) that cross several disciplines and changes in scholarly inquiry driven by "the ability to analyze the data" (as in digital humanities).⁸

Derek Bok, former president of Harvard University, discusses multidisciplinary programs in his recent book *Higher Education in America*. He identifies key issues that tend to recur: "Along with all the benefits, [these] trends have created several problems for research universities. One difficulty is organizational. The collaborative, interdisciplinary nature of much current scientific research fits awkwardly in universities divided into separate discipline-based departments." Bok cites the reluctance to hire new faculty whose research is interdisciplinary because of competing departmental interests, the sensitivity of junior faculty to departmental pressures, and the consequent reluctance of graduate students to pursue subjects outside their departments.⁹

As a large research university which is historically school-centric, NYU has a special need to address and integrate these perspectives in its educational offerings and research activities. What have been its experiences to date? What are its opportunities for the future? What are the challenges to overcome?

As stated in our Self-Study Design, a purpose of the self-study is "to develop an understanding of [interdisciplinary] initiatives – their structure, how they function – to facilitate improvements in existing multischool programs and to guide in the development of new programs. We hope to develop interdisciplinary activities so well-grounded that they are not dependent on particular individuals, and, while operating outside of schools, have deep foundations within the schools[, and] ... to discover best practices and establish dependable structures for interdisciplinary work and predictors of success."

Charges to Working Groups

Each working group was asked to consider the following issues in its assigned area and other issues that it regarded worthy of examination:

- Organization, leadership, and governance. How do existing units in a group's interdisciplinary area relate to each other? What new organizational structures have been formed in an area or might be needed? How is the activity governed? How does a multischool activity relate to the provost's office? How is participation of NYU

⁸ Nigel Thrift. "Why Disciplines Are Becoming Less Important." *Chronicle of Higher Education* (2013): n. pag. Web. chronicle.com/blogs/worldwise/why-disciplines-are-becoming-less-important/32701

⁹ Derek Bok. *Higher Education in America*, Princeton University Press, 2013, Page 345.

Abu Dhabi or NYU Shanghai (or a study-away site), if relevant to the academic area, integrated into broader programs?

- Faculty. How are the competing agendas of the multischool activity and a faculty member's home school's expectations reconciled? Is there or should there be dedicated faculty? Can faculty participate in these programs and still meet their own research agendas? What are the issues relating to appointment? What are the ramifications of split loyalty for tenure? How are faculty teaching, advising, and other arrangements negotiated?
- Finances. What arrangements have been made on budget and finances? Are others needed?
- Administrative staff. What are staffing needs? Are they being fulfilled?
- Student community. In collaborative multischool programs that might not be housed in a school, how is a sense of identity and community created among students? How is consistent advisement provided? If applicable, how are internships, and career guidance opportunities managed?
- University administration. What types of support are needed from the University administration? How can this be assured at various administrative levels?
- Curriculum. Is there a defined interdisciplinary curriculum in an area? How was the curriculum developed and by whom? Does the special curriculum, if any, take account of perspectives from different disciplines and methodologies? Is there an apparent relationship to curricula in traditional disciplines? Does there seem to be coherence in the curriculum? Do appropriate teaching materials exist or do they need to be created?
- Assessment. How are programmatic and student learning outcome goals established? How is success defined and how are successful outcomes measured? Is there evidence that assessment results are used to improve programs? Is there a timetable for carrying out assessment activities?
- Support Services. Are additional support services and resources, or special arrangements, needed (e.g., library, IT)?

Middle States Standards

Along with the document review, the self-study will demonstrate New York University's compliance with the following accreditation standards (and selected fundamental elements) of the Middle States Commission on Higher Education. Compliance with other standards or with other fundamental elements of the standards listed below was demonstrated through a document review in October 2013.

Standard 5. Administration: The institution's administrative structure and services facilitate learning and research/scholarship, foster quality improvement, and support the institution's organization and governance.

Fundamental Element: Periodic assessment of the effectiveness of administrative structure and services.

Standard 7. Institutional Assessment: The institution has developed and implemented an assessment process that evaluates its overall effectiveness in achieving its mission and goals and its compliance with accreditation standards.

Fundamental Element: Documented, organized, and sustained assessment process to evaluate and improve the total range of programs and services; achievement of institutional mission, goals, and plans; and compliance with accreditation standards.

Support and collaboration of faculty and administration.

Evidence that assessment results are shared and discussed with appropriate constituents and used in institutional planning, resource allocation, and renewal and to improve and gain efficiencies in programs, services, and processes.

Standard 9. Student Support Services: The institution provides student support services reasonably necessary to enable each student to achieve the institution's goals for students.

Fundamental Element: A program of student support services appropriate to student strengths and needs, reflective of institutional mission, consistent with student learning expectations, and available regardless of place or method of delivery.

Ongoing assessment of student support services and the utilization of assessment results for improvement.

Standard 10. Faculty: The institution's instructional, research, and service programs are devised, developed, monitored, and supported by qualified professionals.

Fundamental Element: Educational curricula designed, maintained, and updated by faculty and other professionals who are academically prepared and qualified.

Appropriate institutional support for the advancement and development of faculty, including teaching, research, scholarship, and service.

Recognition of appropriate linkages among scholarship, teaching, student learning, research, and service.

Standard 11. Educational Offerings: The institution's educational offerings display academic content, rigor, and coherence that are appropriate to its higher education mission.

The institution identifies student learning goals and objectives, including knowledge and skills, for its educational offerings.

Fundamental Element: Educational offerings congruent with its mission, which include appropriate areas of academic study of sufficient content, breadth and length, and conducted at levels of rigor appropriate to the programs or degrees offered.

Formal undergraduate, graduate, and/or professional programs – leading to a degree or other recognized higher education credential – designed to foster a coherent student learning experience and to promote synthesis of learning.

Periodic evaluation of the effectiveness of any curricular, co-curricular, and extra-curricular experiences that the institution provides its students [partial element].¹⁰

¹⁰ *Characteristics of EXCELLENCE in Higher Education*. 12 ed. Philadelphia: Middle States Commission on Higher Education, PA.

Chapter 2:

Public Health

Overview

In 1971, the Master of Public Health program offered by the former School of Education (now the Steinhardt School of Culture, Education, and Human Development) became one of the first public health programs accredited by the Council on Education for Public Health (CEPH). The program developed professionals in community health, international health, nutrition and health education. In 2006, NYU launched its first University-wide, non-school based degree program, an M.P.H. program in global public health as a collaboration of six graduate and professional schools: College of Dentistry, College of Nursing, School of Medicine, Silver School of Social Work, Steinhardt School of Culture, Education, and Human Development, and Robert F. Wagner Graduate School of Public Service.

NYU completed a strategic review during 2008-2009, and public health emerged as a priority. As a result, under the leadership of Robert Berne, executive vice president for health, and Richard Foley, vice chancellor for strategic planning, several committees were formed to assess the public health environment at NYU and the direction to be taken. Several years of planning led to the Global Institute of Public Health (GIPH), which was launched in fall 2012. The GIPH offers doctoral, master's, and undergraduate public health degrees, each a University-wide program with multiple school partners. Undergraduate study, graduate study, hiring of faculty, and research are coordinated efforts among the collaborating schools.

The GIPH builds on the reach of NYU's global network and serves as a conduit for research and education that promotes health care for all.

Importance and Interdisciplinary Nature of Public Health

The past century has seen great improvements in the health of populations around the world, including a decline in the rate of infectious diseases, improved life expectancy in many countries, and reductions in child morbidity and mortality. For example, the World Health Organization (WHO) recently noted that:¹¹

- There are 2 million fewer children under the age of five dying annually than there were 10 years ago.
- Over the past 10 years, measles deaths have been cut by 74 percent to fewer than 114,000 child deaths worldwide.

¹¹ World Health Organization. World Health Statistics: A snapshot of Global Health (2012) who.int/gho/publications/world_health_statistics/2012/en/

- In 2010, 85 percent of children worldwide aged 12 to 23 months were immunized against measles.
- Maternal deaths were reduced by almost 50 percent between 1990 and 2010.

At the same time, WHO reminds us of many challenges:

- Between 1980 and 2008, the global prevalence of obesity almost doubled. By 2008, 10 percent of men and 14 percent of women in the world were obese, compared to 5 percent and 8 percent, respectively, in 1980.
- Great inequities persist in maternal mortality worldwide, with women in developing countries facing 15 times the risk of dying during pregnancy or from child-birth complications. Most of the countries with high maternal mortality rates are in sub-Saharan Africa.
- In Africa, only 24 percent of women aged 15 to 49 who are married or in a consensual union were using contraception, compared, for example, to 80 percent in the Western Pacific region.
- Average per capita health expenditures ranges from US\$25 in low-income countries to US\$4,692 in high-income countries.

The rate of non-communicable diseases such as diabetes and cardiovascular diseases is increasing, as are rates of violence and injury. Widespread inequities in health care and health status remain rampant, the result not only of economic disparities, but also of lack of training, resources, understanding, and evidence-based, cost-effective, public health initiatives in many parts of the world. Public health challenges vary; industrialized nations face chronic disease and aging populations, while developing countries struggle with issues such as sanitation and clean drinking water. As discussed below in the chapter on Cities and the Urban Environment, these matters are intertwined with the growth of urban areas and the fact that most of the world's population will live in an urban setting by 2030.

The next generation of public health leaders and practitioners must understand the varied cultures in which these challenges occur. They must have the skills and training necessary to conduct creative research, develop constructive policy, make effective management decisions, design and implement practical and productive programs, conduct creative research, and take carefully considered action.

Public health issues are also playing an ever greater role in the global political agenda and are a central factor in economic development. Addressing these issues are professionals from many disciplines, including physicians, nurses, dentists, psychologists and behavioral scientists, social workers, policymakers, engineers, economists, sociologists, political

scientists, educators, and others. The new dean and director of the Global Institute of Public Health, Cheryl Heaton, has put it this way:

Just as disease and political instability are not confined within borders, we know that the solutions to these problems must come from a diverse collective of scholars and leaders collaborating across both political and academic boundaries. Drawing upon the entire academic breadth of the University through collaborations between multiple schools and colleges, the GIPH prepares students, faculty and professionals to do just that.

Developing the GIPH

Since the 2009 strategic review report, approximately 100 planning meetings have taken place and over 100 NYU faculty from diverse fields have been involved in the development of the GIPH. The following faculty committees, in addition to the GIPH Deans Council, were convened:

- Undergraduate committees
- M.P.H. and doctoral faculty committees
- M.P.H. standing committees: admissions, curriculum, public health practice, student services
- Research committee
- Search committee for the GIPH dean and director
- Working groups for the development of new GIPH courses at the undergraduate and doctoral level

One of the first steps taken by the GIPH was a consolidation of the two M.P.H. programs (in Global Public Health and in Community Public Health) into a single University-wide NYU M.P.H. program.

The search committee for the GIPH director convened in October 2011. After an extensive process, Cheryl Heaton, CEO and president of the Legacy Foundation was appointed director, effective in fall 2012. Prior to Legacy, she was at the Columbia Mailman School of Public Health in New York, where she served as Chair of the Division of Socio-medical Sciences and Associate Dean for Program Development.

Dr. Heaton has prepared a preliminary plan for the GIPH (Appendix D), which she has vetted with deans and faculty, GIPH participating schools, and University leadership. The plan includes five year goals for a variety of areas, including faculty recruitment, staff hiring, space planning, academic planning, research, development, and service programming.

GIPH Degree Programs

The Master of Public Health Degree

The 46-credit NYU Master of Public Health program enrolled 227 full-time and part-time students in fall 2013. The program offers three areas of concentration (Community and International Health, Global Health Leadership, and Public Health Nutrition) as well as five dual degree options (M.D./M.P.H., D.D.S./M.P.H., M.S.W./M.P.H., M.P.A./M.P.H. and M.S. in Nursing/M.P.H.). There are 19 students in the dual-degree programs. The program aims to improve the health of diverse population groups at the local, national, and global levels by preparing students to become public health researchers, practitioners, and leaders. All students must complete a practical experience, either in the United States or abroad. The program is accredited by the Council on Education for Public Health (CEPH).

The Doctoral Degree

The GIPH University-wide doctoral program in public health, slated for fall 2014, will be an enhancement of the doctoral program in public health that had been at the Steinhardt School. The program will offer specialization in four areas: (1) biological basis of public health, (2) health systems and services research, (3) population and community health, and (4) socio-behavioral health. All Ph.D. students must complete a candidacy examination and a dissertation. The dissertation should demonstrate not only mastery of the relevant literature, but also an ability to carry out independent research that results in a genuine contribution to public health knowledge or an original interpretation of existing knowledge.

The Undergraduate Programs

The GIPH launched 10 new undergraduate majors in global public health in fall 2013, each partnered with another discipline or field at NYU. This bi-disciplinary structure responds to the increasing demand for interdisciplinary public health practitioners in the United States and abroad. The coursework is combined with experiential learning and study abroad requirements to prepare students for careers in public health fields, the workforce, or graduate education. The majors with fall 2013 enrollments are:

- Global Public Health/Anthropology (College of Arts and Science) (5)
- Global Public Health/Applied Psychology (Steinhardt School of Culture, Education, and Human Development) (12)
- Global Public Health/Food Studies (Steinhardt School of Culture, Education and, Human Development) (6)
- Global Public Health/History (College of Arts and Science) (0)
- Global Public Health/Media, Culture, and Communication (Steinhardt School of Culture, Education, and Human Development) (8)
- Global Public Health/Nursing (College of Nursing) (2)

- Global Public Health/Nutrition and Dietetics (Steinhardt School of Culture, Education, and Human Development) (10)
- Global Public Health/Social Work (Silver School of Social Work) (3)
- Global Public Health/Sociology (College of Arts and Science) (3)
- Global Public Health/Science (College of Arts and Science) (11)

All global public health undergraduate students take required courses in six core areas: biostatistics, epidemiology, health policy, environmental health, sociobehavioral health, and global public health internship. They also take courses in an additional discipline from the list above, with the number of courses varying by major, and they fill out their coursework with electives in global public health and study of a foreign language. Study away for one semester at an NYU global site is another requirement of the combined majors.

The following schools have been engaged in the undergraduate global public health programs: College of Arts and Science, Graduate School of Arts of Science, School of Medicine, Wagner Graduate School of Public Service, College of Dentistry, College of Nursing, Steinhardt School of Culture, Education and Human Development, and the Silver School of Social Work. Other schools may participate over time. In addition to the majors, the Steinhardt School offers an undergraduate minor in public health and policy, which had 60 students from four schools in fall 2013.

Research

The GIPH also houses a global public health research center, serving as a University-wide resource for multischool, multi-disciplinary and multi-site research projects. The GIPH engages in a broad program of research in collaboration with graduate and professional schools at NYU, partner agencies, community-based organizations, and domestic and global NGOs. The GIPH is dedicated to the practice of involving the subjects of research in the process and to high standards of ethical public health practice. More generally, it takes an aggressive attitude toward developing knowledge, training the next generation of practitioners, and solving health-related problems which adversely affect the United States and other countries.

Analysis

Our conclusions about public health are drawn from several sources:

- Interdisciplinary start-up committees of faculty, students, and administrators.
- A self-study and accreditation report from CEPH, which reviewed and accredited the Master of Public Health Program in April 2012 (Appendices E and F).

- Peer review of the undergraduate program by an external faculty member (Appendix G).
- A preliminary plan prepared by Dean Heaton.
- GIPH faculty and governance committee meetings.
- Surveys of M.P.H. students and alumni, and of employers, on quality assurance (Appendix H).

Strengths

The comparative advantage of the GIPH lies in its interdisciplinary infrastructure and governance.

1. The GIPH fosters a multidisciplinary identity from “patient to population”. CEPH stated during an April 2012 site visit as part of its accreditation of the M.P.H. program:

Of particular note is the breadth and depth of faculty resources that are committed to the program. During the site visit, the deans from the participating schools expressed great enthusiasm and support for the new M.P.H. program as a part of the University-wide global health initiative launched under the leadership of the Executive Vice President for Health. With approval from their respective deans, faculty of the participating schools serve on GIPH committees, advise students, direct degree programs and teach global public health courses.¹²

2. The CEPH reviewers also commented on GIPH procedures:

Site visitors were impressed with the smoothness of the collaborative relationship. Administrators posited that the culture and existing operations within NYU may uniquely support such cross-school collaborations. ... Faculty and administrators note that the priority on making NYU a Global Network University means that working in disciplinary silos is not an option.¹³

3. The collaborative model assists the GIPH and participating schools to recruit new faculty. For example, a recent faculty hire to the College of Dentistry mentioned the GIPH as a major reason for accepting an appointment. The GIPH director has formed a multischool faculty committee to identify areas in need of additional depth, and to identify up to eight potential faculty.

4. The GIPH assists research. It encourages faculty collaboration and stronger administrative coordination. Ideally, it will develop systems to improve grant submissions,

¹² Council on Education for Public Health. (Adopted October 13, 2012). Review for Accreditation of the Public Health Program. pp. 13-14.

¹³ Council on Education for Public Health. (Adopted October 13, 2012). Review for Accreditation of the Public Health Program. p. 7.

particularly within highly competitive environments such as National Institutes of Health grants, while reducing non-renewal of awards.

5. A goal of the new dean is to evaluate how current cross-school faculty align with broad research areas, such as chronic disease, infectious disease and public health practice, and community health. Other areas such as HIV/AIDs, substance abuse, child health, global non-communicable disease, infectious disease, aging, and obesity have a more particular focus. The plan is to create approximately five affinity groups to improve synergy and academic offerings by analyzing demand across disciplines.

6. The M.P.H. program has developed a rich assessment structure, including measurable objectives and targets across teaching, research and service. The structure serves as a foundation for the GIPH as a whole as well as its undergraduate, doctoral and research components.

7. The GIPH lends itself to mentoring junior faculty, doctoral students, and postdocs through a broad research infrastructure. It also encourages interdisciplinary workshops, conferences, webinars, and other events.

8. The GIPH provides many benefits to students, including:

- An interdisciplinary education with coursework across the University.
- Opportunities to network with practitioners and political and community leaders in government, not-for-profit, and private institutions.
- Opportunities for applied fieldwork in the United States and abroad at one of NYU's global sites.
- High-caliber student peers with interests in areas in or related to public health.
- Multidisciplinary advising on course selection, major selection, fieldwork, professional development, and career planning.
- Access to resources across participating schools, as well as a wide variety of student and academic services offered through the GIPH. Students benefit from events and conferences, research opportunities, student organizations and governance, and career services.

Challenges

The GIPH faces challenges, many of which also present opportunities for the University to further interdisciplinary education, research, and service. While these challenges are being addressed in the development of the GIPH, there are places where improvements can be made.

1. There remains a tendency toward school-based programs and faculty as the norm, a concern that was raised by CEPH. A multischool academic entity faces obstacles when creating a sense of community as compared to a traditional school-based model.
 - a. At the graduate level, faculty advisors may be housed at one of several schools, rather than in the same department or building.
 - b. At the undergraduate level, students may have peers enrolled in other schools who spend time at that school's activities.
 - c. Faculty affiliated with the GIPH have responsibilities in their own schools and departments, and thus there are decisions about how to allocate time; faculty members may have to spend less time at one place or the other than would be desirable.

Steps have been taken to address these challenges. For example, the GIPH offers events for students, professional development workshops, guest speakers, and alumni networking sessions, to encourage a sense of community across fields, schools, and majors. Faculty committees and councils allow for faculty participation in a way that minimizes conflict with home school responsibilities.

2. A multischool infrastructure risks conflicting policies and structures. At NYU, many academic, student and faculty policies are governed at the school (and sometimes departmental) level. Although much work has been done to address this issue, establishing policies for a seven school collaboration can be expected to present challenges, such as:
 - a. Admissions criteria: minimum GPA, SAT, GRE, TOEFL, deferral.
 - b. Registration and enrollment: transfer credit, elective requirements, class size, auditing, grading scales.
 - c. Student affairs: grade appeals, academic progress, advising, grievances.
 - d. Faculty affairs: teaching schedules, compensation, promotion and tenure, course evaluations.
 - e. Finances: financial aid, tuition, faculty and staff salaries.
 - f. Communication: websites, email lists, social media, and public relations.

The process has generally worked well, but decision-making is sometimes drawn out, typically involving the following steps: (1) review of existing policies across collaborating schools, (2) discussion among faculty (and if applicable, GIPH staff), often within a related standing committee, (3) draft policy proposal vetted by the program director, and (4) final approval by the dean and director of the GIPH after coordination among the collaborating deans. As the GIPH develops, it could benefit from a more streamlined governance and

decision-making process. Over time, as issues surface and are addressed, interactions will go more smoothly.

3. Two issues are being faced in developing additional collaborative procedures to support cross-school research projects.

- a. The structure for recognizing faculty credit for grants and other funding when principal investigators are tenured in their home school but the research is a result of a GIPH collaboration.
- b. The management of financial sharing, including indirect cost recovery.

4. There are challenges concerning faculty affairs, in addition to those mentioned above:

- a. Calculation of faculty time and effort, which varies by school.
- b. Joint appointment procedures, taking into account their costs and benefits.
- c. Evaluation of the contributions of GIPH-affiliated faculty to the Institute in promotion and tenure decisions at their home school.

5. In interdisciplinary programs, such as GIPH, there is a need for further improvement in the collaborative style of management.¹⁴ The director of the GIPH relies on the support of deans and faculty from several schools. To avoid an arduous and potentially time-consuming decision-making process, the governing structure of the GIPH should be reviewed by GIPH leadership and faculty.

6. Given the multischool nature of the GIPH, new models for tuition revenue and cost-sharing were established by the University leadership and the collaborating deans in conjunction with the Office of Budget and Financial Planning. While these models help ensure adequate and sustainable funding for the GIPH now, expected growth will lead to a continuing need to reassess how GIPH is financed and to assure a transparent and accountable governance process.

Recommendations

1. Strengthen communication across the University. As new interdisciplinary programs emerge, the University's many constituents would benefit from learning more about developments. The director of the GIPH has met with faculty, staff, and administration, and shared her plans with faculty in all participating schools before implementing them. In

¹⁴ As the most advanced interdisciplinary initiative of its kind at NYU, many of these recommendations may apply beyond GIPH.

addition, including students and alumni on committees (or otherwise obtaining their views) helps to identify challenges, foster interdisciplinary dialogue, erase misconceptions, and develop solutions.

2. Review University bylaws, policies, and procedures to identify those that facilitate or impede interdisciplinary collaborations. Such topics could include promotion and tenure, student grievances, and academic progress.

3. Improve coordination of practice-based initiatives and requirements. One of NYU's strengths is its commitment to experiential learning opportunities – locally and abroad. While the GIPH and its partner schools all have strong practice components and rich databases of relationships with organizations and agencies, efforts are not always coordinated. The University should consider establishing a committee – perhaps with the Wasserman Center for Career Development – to consider challenges and opportunities to promote practice-based activities in New York and at the global sites.

4. Create information technology platforms. There is an increasing need for technology to assist in the delivery of complex interdisciplinary academic models such as the GIPH. Three such possibilities are (a) improving access to secure communication across schools, campuses and global sites, including effective ways to share confidential information such as student and admissions data; (b) considering interdisciplinary programs when selecting and designing university-wide software systems such as Albert, UDW+, and alumni databases; and (c) developing innovative uses of technology in delivering interdisciplinary education in the classroom and the field.

5. Strengthen linkages with the public health workforce, whose needs evolve at a rapid pace. The GIPH will benefit from leveraging the expertise of constituents across disciplines. Steps have already been taken in this direction through the development of a GIPH external advisory board and an annual workforce development survey.

6. Develop platforms to facilitate interdisciplinary research. To encourage collaboration while reducing administrative barriers among schools, centers and institutes, the University should consider improving the research infrastructure.

7. Assess financial planning. As the combined undergraduate majors in this field are new to the University, it will take several years to evaluate enrollment trends and faculty assignments in the GIPH courses and their impact on partner schools' financial plans. In addition, the GIPH financial model will alter the internal flow of revenues and expenses and may present new challenges for governance, accountability, and equity. Finally, open communication and transparent processes among the collaborating schools and the University will be needed in short- and long-term financial planning.

Conclusion

The GIPH has been engaged in an innovative endeavor to bring together schools and disciplines toward a common vision – to significantly improve the health of populations around the world. In doing so, it has been a model for interdisciplinary, cross-school programs at NYU. As stated on the GIPH website, that vision reflects a core belief that global health is not merely a field of study, area of research, or a career, but a normative goal. The process of developing the GIPH has taken several years and involved faculty, students, staff, practitioners, and community constituents. Improvements can be made in areas such as communication, cross-school faculty coordination, institutional financial systems, and interdisciplinary research infrastructure.

Chapter 3:

Cities and the Urban Environment

Overview

In 1950, less than one-third of the world's population lived in cities. Today, the proportion is over half and continues to grow. The United Nations predicts that by 2050 two-thirds of the world's population will be city dwellers. Much of this urbanization has taken place in rapidly growing areas of the developing world, such as Lagos, Karachi, and Dhaka. On the one hand, this urbanization has the potential to reduce poverty and promote economic development. On the other, the continued urban growth presents a threat to the environment and quality of life as the pace of infrastructure development lags behind the pace of growth. Roughly a third of the world's urban residents are estimated to live in slums, facing dangerous conditions with little or no access to clean water and sanitation. Urbanization across the world, and especially in Asia and Africa, is a critical challenge for the 21st century.

In the United States over 80 percent of the population lives in urban areas. Many of our cities face serious problems, from aging infrastructure to high rates of poverty, elevated crime, and struggling schools. Many of our cities are highly segregated by race and class, and living conditions differ markedly across communities, depending on the race and income of the residents. Leaders across the country are looking for innovative solutions and effective management.

The design of cities has important implications for the sustainability of both the physical and human environment. High-density environments are arguably more sustainable because density minimizes the need for travel and multifamily dwellings can economize on energy use. But these environments need to be well-designed to ensure they are not sterile, isolating, and ultimately unlivable. The recent storms that have battered coastal cities around the world underscore the need for designing more resilient buildings and communities as climate change threatens to bring more volatile weather patterns.

Cities are not just about buildings. The heart of cities lies in their residents and the interaction among them. Further, cities are critical engines of national economic growth and development. Thus, the social, political, and economic institutions that shape the success and well-being of urban residents will be critical not only for the future of cities but also for the nations in which they are located.

In short, the challenges facing cities around the world are complex, and they demand multifaceted solutions. Addressing the issues affecting cities requires a rich understanding of economic development, politics, sociology, urban planning, public health, engineering, history, and design. At the same time, it requires understanding the public and private

organizations that shape urban life, such as the schools that educate children and train tomorrow's workforce, the police and fire departments that ensure their safety, the arts institutions that enrich their culture, and the tax and regulatory systems that support them all. Approaches that simply bring to bear a single disciplinary lens are unlikely to be successful. Thus, it is critical that the next generation of leaders interested in cities is trained in a range of disciplines or at least understands the need for dialogue with those bringing different backgrounds and perspectives.

The words *urban* and *cities* have many meanings in theory and practice. Different disciplines use different definitions. Political scientists define cities by their political boundaries. Economists tend to view cities as a concentration of economic activity. Scholars concerned with environmental issues pay relatively little attention to jurisdictional boundaries, as environmental threats spill over city limits. All these perspectives have merit, and we embrace both the political definition of cities as well as the definition based on the density of population and activity. As for the urban environment, we interpret it broadly to encompass the physical, ecological, social, political, and economic environment of cities.

In 1831, New York University's founders set out to establish a University that would not be an ivory tower, but would rather be "in and of the city." Thus the roots of the University's commitment to cities run deep. As an urban university with global sites in major cities, New York University is well positioned to take up the challenge of urbanization and become a leading place for students and faculty to study cities and the urban environment.

Existing Academic Programs

The University offers four multidisciplinary, undergraduate programs relating to cities, three of them in the College of Arts and Science and one in the School of Engineering.

Metropolitan Studies

metropolitanstudies.as.nyu.edu/page/home

Environmental Studies

environment.as.nyu.edu/page/home

Urban Design and Architecture Studies

arthistory.as.nyu.edu/page/urbandesign

Sustainable Urban Environments

engineering.nyu.edu/academics/programs/sustainable-urban-environments-bs

These programs serve approximately 300 majors: Metropolitan Studies (34 majors plus 31 Social and Cultural Analysis majors who focus on Metropolitan Studies); Environmental

Studies (139 majors); Urban Design and Architecture Studies (55 majors); and Sustainable Urban Environments (27 majors), based in the Department of Technology, Culture and Society in the School of Engineering. Metropolitan Studies and Environmental Studies also offer minor concentrations (15 additional students), and all these programs offer many classes that other students can take. The enrollment in these programs has generally been steady or growing, though there has been some decline in Metropolitan Studies majors over the past five years.¹⁵

Other departments in the College of Arts and Science offer relevant classes, many of which go beyond traditional surveys of urban sociology or urban economics to focus on more specialized issues. For example, undergraduates can choose from courses like Cities, Communities, and Urban Life and The American Ghetto in the sociology department; Poverty and Income Distribution and Economics of Energy and the Environment in the economics department; The Politics of Poverty and Welfare and Urban Government and Politics in the politics department; and First Cities and States in the anthropology department. The faculty have taken advantage of the University's location by offering numerous courses focusing on New York City, including New York City: A Social History, and New York City: A Cultural History in the history department, and Discovering Archaeology in New York City in the anthropology department.

The Steinhardt School of Culture, Education, and Human Development offers a rich set of undergraduate courses with a focus on cities and the urban environment. Some – such as Urban Schools in Crisis, Teaching in the City, Adolescent Learners in Urban Contexts, and Transforming Urban High Schools – focus specifically on education; others – such as The Sociology of Urban Life and Education, The Development of Urban America, and Space and Place in Human Communication – have a broader scope. Offerings in the arts include Urban Development and the Visual Arts and Art and the City. Steinhardt also offers courses focusing on environmental issues in urban settings – such as Urban Ecology, Water, Waste, and the Urban Environment, and Introduction to Urban Agriculture. Finally, Steinhardt launched a minor in Global and Urban Education Studies two years ago, which had 11 students from three different schools in fall 2013. Multidisciplinary in scope, the minor aims to give students an introduction to the range of urban education issues around the world.

The Gallatin School of Individualized Study offers a number of relevant classes, including The Global Neighborhoods of Downtown Manhattan, Architecture and Urban Design, and The Streetroots of Latin America: Introduction to the Urban Experience.

¹⁵ Enrollment figures are for fall 2013.

The multidisciplinary undergraduate programs offer several study abroad options. Three sites in Europe offer classes for students majoring in Urban Design and Architecture Studies. In Environmental Studies, students may enroll in courses such as Greening Berlin at the NYU Berlin site; this course traces the political, cultural, and planning history that has allowed that city to develop the contemporary green infrastructure that has made it one of Europe's icons of sustainable urban development. In Metropolitan Studies, students can study Shanghai's Global Connections in Shanghai, Documenting the African City in Accra, or similar courses related to cities at other sites including London and Florence.

NYU Abu Dhabi also offers an undergraduate multidisciplinary concentration in urbanization that students can take to complement their major. To complete the concentration, students must choose four approved courses out of a larger set of classes related to cities and urban growth. The concentration takes advantage of the location in Abu Dhabi to expose students to the environmental, social, economic, and planning challenges associated with rapid urbanization.

At the graduate level, the Wagner Graduate School of Public Service offers a master's degree in urban planning (wagner.nyu.edu/urbanplanning/), which enrolled 107 students in fall 2013. The program offers classes on urban economics, the history and theory of planning, urban design, environmental planning, land use, transportation, infrastructure, and housing and economic development. Students are required to take nine core courses, as well as a capstone class, in which they work in teams to help nonprofit and public organizations address particular challenges. Graduate students enrolled in other degree programs can take many of the urban planning classes as electives.

The Wagner School offers a concentration in public policy within its larger master's degree in public administration, and many of the students specializing in public policy are particularly interested in urban policy. The Wagner School also partners with the College of Arts and Science to offer several five year, dual B.A./M.P.A. and B.A./M.U.P. degree programs, with both the Gallatin School and the Global Liberal Studies Program to offer a B.A./M.P.A., and offers an M.P.A./J.D. in partnership with the School of Law, an M.P.A./M.D. with the School of Medicine, and an M.P.A./M.B.A. with the Stern School of Business. The number of spaces compared to student demand is limited (wagner.nyu.edu/mpa).

The Draper Interdisciplinary Master's Program in Humanities and Social Thought in the Graduate School of Arts and Science offers another avenue for graduate students to examine cities. The program offers a broad, multidisciplinary curriculum, centered on the humanities, and focused around six areas of inquiry, one of which is the city, which approximately 30 students typically choose each year. Students receive a Master of Arts degree after completing eight courses and a master's thesis. draper.fas.nyu.edu/object/draper.thecity

The Graduate School's Department of Art History offers a master's degree at NYU London in Historical and Sustainable Architecture. Enrollment in fall 2013 was 15 students. The program may add a component in Berlin.

arthistory.as.nyu.edu/object/ah.programsummary.ma

The University launched a new master's degree and advanced certificate in Urban Science and Informatics in the fall of 2013, with an initial master's enrollment of 24. The one-year, three-semester degree, offered through the new Center on Urban Science and Progress, aims to train students to collect and analyze large data sets with an eye toward addressing urban challenges. The program will offer core courses in urban science, urban informatics, and information and communications technology in cities. Students may specialize in particular urban issues as well as particular analytic methods. In their final semester, students complete the Urban Science Intensive. Similar to the Wagner School's capstone program, the Urban Science Intensive requires students to work on a team to address a challenge faced by a city agency client. The program is expected to build to roughly 225 students by fiscal year 2018.

cusp.nyu.edu/ms-in-applied-urban-science-and-informatics/

Other professional schools offer classes related to cities. For example, the School of Law lists Property, Land Use, and Urban Affairs as a core area of study. Students interested in this area can take classes in local government law, land use regulation, real estate, urban policy, and housing and community development.

law.nyu.edu/academicservices/advising/areasofstudy/propertylanduseurbanaffairs/index.htm

The Steinhardt School offers several master's degree programs that prepare students for work in urban settings, such as the M.A. in education and social policy and the M.A. in sociology of education, which offer opportunities to study the sociology, economics and politics of urban issues. The M.A. in educational leadership, politics, and advocacy prepares students who want to work toward social and education equity through leadership, policy, and advocacy positions in and around schools. The M.A. programs in education at Steinhardt are meanwhile explicitly focused around training teachers "on the front lines of the battle to revitalize urban education."¹⁶ steinhardt.nyu.edu/humsocsci/sociology/masters

Finally, the Schack Institute for Real Estate at the School of Continuing and Professional Studies offers a M.S. in Real Estate Development, which allows students to concentrate in sustainable development and community development, which had 34 students in fall 2013.

seps.nyu.edu/academics/departments/schack/academic-offerings/graduate/ms-in-real-estate-development.html

¹⁶ These programs had a fall 2013 enrollment of 21, 27, and 31 students, respectively.

The University does not offer a doctoral degree directly related to cities, though many doctoral students at the Wagner School and the Graduate School of Arts and Science concentrate on issues related to cities and the urban environment.

Faculty Research

As noted, many University faculty members focus their research on urban issues. Their disciplinary homes include sociology, economics, history, politics, anthropology, urban planning, engineering, art and architectural history, and law.

The School of Law and the Wagner School jointly offer a Colloquium on the Law, Politics, and Economics of Urban Affairs each spring, at which about 10 leading urban researchers discuss works in progress. Approximately 25 Wagner and Law students usually enroll, and the seminar is also open to other members of the University and to the broader New York City community. The sociology department frequently offers an urban seminar that is similarly open to other faculty and graduate students. The Urbanization Project at the Stern School has recently launched a weekly research seminar, and the Institute for Public Knowledge organizes forums around research and ideas focused on cities.

Many of the faculty studying cities and the urban environment undertake their research through a set of research centers at the University.¹⁷

Center for Urban Science and Progress

cusp.nyu.edu

Furman Center for Real Estate and Urban Policy

furmancenter.org

Guarini Center for Environmental and Land Use Law

law.nyu.edu/centers/elc/index.htm

Institute for Education and Social Policy

steinhardt.nyu.edu/iesp

Institute for Policy Integrity

policyintegrity.org

Institute for Public Knowledge

ipk.nyu.edu

¹⁷ See Appendix I for brief descriptions of the various centers and institutes.

Marron Institute on Cities and the Urban Environment
marroninstitute.nyu.edu

McSilver Institute for Poverty Policy and Research
mcsilver.org

Metro Center on Urban Education
steinhardt.nyu.edu/metrocenter

Rudin Center for Transportation Policy
wagner.nyu.edu/rudincenter

Urbanization Project
urbanizationproject.org

These centers tackle urban and environmental issues such as transportation, land use, housing, culture, education, poverty, climate change, and urban growth. The centers use NYU undergraduate and graduate students to assist with research, and they provide valuable opportunities for interaction between faculty and students. Many of the centers also strive to apply lessons from academic research to practice and policy through research briefs and roundtables.

One of the newest units is the Center for Urban Science and Progress (CUSP), an applied science center that aims to collect, link, and analyze large data sets to improve the efficiency of urban life, catalyze private sector innovation, and provide new social science methodologies. Much of the Center's work focuses on New York City, but the research will have far broader implications. CUSP draws on five university partners, several industry and national laboratory partners, and a few New York City government agencies (see Appendix J).

The University has recently launched a second multidisciplinary institute, the Marron Institute on Cities and the Urban Environment, which has been endowed generously by Donald B. Marron. It will span the entire University and serve as an umbrella institute for some of the centers listed above. It is establishing ambitious programs to serve as a hub for the study of cities by supporting multidisciplinary research, helping to develop new classes and curricular initiatives, and working to foster interaction among scholars and students. The Institute aims to provide a platform through which the individual urban-themed research centers at the University can find opportunities for collaboration. The Institute also hopes to connect faculty research to policymakers and practitioners in the United States and abroad.

Strengths

Centered in New York City, and with a growing number of portal campuses and academic centers in leading cities around the world, New York University is well-prepared to take up the challenge of urbanization. Accordingly, it has made the study of cities and the urban environment a central priority.

Faculty

Given the university's location, it is not surprising that a large number of NYU faculty members work on issues related to cities and the urban environment, bringing diverse disciplinary backgrounds and theoretical perspectives. The University recently received a grant from the Mellon Foundation to expand the number of faculty in the humanities whose research and teaching focuses on cities.

Research Centers

As noted above, the University already boasts a number of active research centers focused on issues related to cities and the urban environment that engage students, produce academic research, and connect the lessons from research to challenges outside of academia.

Curriculum and the Global Network

A rich set of undergraduate majors and graduate degree programs serve the large and growing number of students interested in studying cities and urban challenges in New York and its major campuses around the world.

Budding Multidisciplinary Collaboration

In addition to the Marron Institute and CUSP, the Institute for Education and Social Policy bridges the Steinhardt School and the Wagner School, in part through the Furman Center, a joint effort of the School of Law and the Wagner School. For example, a multidisciplinary team of researchers from the two centers is currently working on a study funded by the MacArthur Foundation on how the housing crisis affected student performance in New York City and urban areas in Florida and California. The two centers are also collaborating on research into how exposure to violence affects the test scores of children attending New York City's public schools and their ability to move within the system. The recently established Marron Institute is designed to foster such cross-center, multidisciplinary interaction.

Student Community

Small focus group discussions with students from multidisciplinary undergraduate programs found that they felt a strong sense of community and considerable support from faculty advisors (see Appendix K for the focus group questions).

Challenges

Despite the strengths of the existing curricular and research programs related to cities and the urban environment, there is ample opportunity for the University to do more.

Fragmentation and Lack of Coordination

Many faculty work on urban issues, and the University offers many related programs and classes. The University is large, and faculty and students know little about these programs and the research that is being done in other departments and schools. There has been inadequate coordination or exploration of synergies. The Marron Institute aims to undertake this role, and will potentially serve as a central place to learn about the full body of work being done in this field.

There is some duplication across programs that can be confusing to students. For example, a prospective master's student interested in cities can now choose from a Master of Arts degree focused on the city at the Draper Institute, a master's program in real estate development focused on sustainable development at the Schack Institute, a Master of Urban Planning degree at the Wagner School, or a Master of Science in urban science and informatics at CUSP.

The University is building connections between the Washington Square campus and the School of Engineering in Brooklyn, where CUSP is also located. There are promising synergies between the engineers focused on urban issues and the social scientists focused on similar issues. These can be more fully exploited. For example, Washington Square students do not take classes at the Engineering School as often as they might, and vice versa.

Undergraduates have expressed a desire to be better informed about the range of activities and graduate programs at NYU. As noted below, many find it difficult to learn what opportunities, including assisting with faculty research, are available.

Some graduate students expressed frustration that they felt disconnected from other urban initiatives and programs. Others also complained of administrative barriers that make it difficult to register for classes at other schools, even when the courses seem appropriate for them.

Limited Autonomy of Undergraduate Programs

None of the three multidisciplinary undergraduate programs in the College of Arts and Science (CAS) is a stand-alone department, which gives them limited autonomy in making decisions about hiring and curriculum.

- The faculty members in the Environmental Studies Program must all be jointly appointed with other departments and thus the program's hiring depends on the

needs and interests of those departments. In recent years, the program has engaged in six joint searches with other schools and departments, only one of which has been successful.

- Metropolitan Studies is a program within the Social and Cultural Analysis (SCA) department. As such, its hires have to meet the interests of the larger department. Candidates who can demonstrate connections to other units within SCA (including Africana Studies, Latino Studies, Gender and Sexuality Studies, and others) are likely to be given preference. Given the focus of the SCA department on ethnic studies, there is concern that scholars whose primary mode of analysis is urban rather than ethnic identity are at a disadvantage in this departmental setting. Since Metropolitan Studies was consolidated within the SCA department in 2005, its faculty has shrunk, with people moving to other universities or requesting line reallocations outside of the department. Some students also noted the less-than-perfect fit of Metropolitan Studies within the SCA department because, among other things, few other classes in the SCA department had a connection to urban issues.
- Urban Design and Architecture Studies is a program in the art history department, and its classes are covered almost entirely by adjuncts. The program is fortunate to have identified a core set of consistent, high-quality adjunct faculty members, but the administrative burdens on the two full-time faculty members are large.

Limited Faculty in Undergraduate Programs

In part due to the structural challenges in hiring, all three multidisciplinary undergraduate programs in CAS have limited full-time faculty and high student to faculty ratios. Moreover there are no graduate students in these programs to do teaching. As a result, the teaching burdens for faculty are high, as are administrative burdens in identifying and training adjuncts. The Environmental Studies Program is particularly stressed. It is one of the largest majors in CAS (with 139 majors and 33 minors from seven schools in fall 2013) and has one of the smallest faculties (3.33 full-time equivalent tenure track faculty and 2.5 full-time equivalent clinical faculty). The student demand for this program is robust, but the capacity to serve that demand is limited. These resource issues are arguably compounded by the ambition of faculty to deliver a truly multidisciplinary and rigorous curriculum. They may be asked to teach content not within their disciplinary training.

Joint Appointments

Many faculty members in the multidisciplinary programs are jointly appointed with other departments. All faculty members in Environmental Studies, for example, have a tenure home in another school or department and thus have to juggle the service demands of two

academic units. Faculty may naturally feel obliged to serve the unit where their tenure line is located.

Tenure Challenges for Junior Faculty

The joint allegiance to multiple departments is likely to be especially challenging for assistant professors. The world of academic scholarship continues to be organized around disciplines. Even when teaching within a multidisciplinary program, junior faculty often feel pressure to focus on research that falls within a single discipline in order to obtain tenure. Multidisciplinary work is not typically given high academic recognition as top journals tend to focus on a single discipline.

Limited Use of NYU's Global Network

While the existing undergraduate majors and master's programs permit students to spend a semester or mini-term abroad, the programs could take fuller advantage of the possibilities offered by the global sites.

Uncertainty about New Centers and Institutes

As noted above, the Marron Institute is a coordinating umbrella for CUSP, the Institute for Public Knowledge, and the Urbanization Project. While CUSP and Marron are launching exciting new programs, there is some uncertainty about the roles they will play at the University, the scope of ground that they will cover, and the impact they will have on existing programs and centers. For example, it is unclear whether the Marron Institute will ultimately offer an undergraduate program, and how that program would connect with existing classes. The degree to which CUSP will collaborate with faculty in the social sciences and the humanities is also unclear.

These new centers were initiatives of the University administration. They are still building connections to faculty research and teaching for collaborative purposes.

Gaps in Existing Research and Teaching

There are a few important intellectual gaps in the University's faculty that may present a challenge in developing its initiatives related to cities and the urban environment.

The first is the absence of a school of architecture or design. The Gallatin School of Individualized Study has hired a few architects as full-time clinical faculty to teach courses in sustainable urban design, and both the Wagner School and the Urban Design and Architecture Studies Program have hired architects as adjuncts. But the lack of a school of architecture makes it difficult to integrate design into core research and teaching programs.

The second gap is the lack of faculty focused on cities in the political science and economics departments. Some CAS and GSAS students in these departments have commented on the limited opportunities to build their social science base and quantitative skills.

Administrative Barriers to Multischool Classes and Research

Although the University increasingly encourages multidisciplinary teaching and research, barriers persist to creating multischool classes. For example, the rules for sharing of tuition revenue between schools are based on a traditional model in which 70 percent of undergraduate tuition revenue for a particular course flows to the school that teaches it, while the student's home school retains 30 percent (to cover the average cost of financial aid and advisement). The graduate model has the teaching school receiving 100 percent of tuition associated with a course. The traditional models do not readily accommodate situations in which courses are offered by a multidisciplinary institute, where the faculty are from different NYU schools – some having joint appointments – and the students are also from several schools and sometimes different campuses.

Multidisciplinary instruction is hindered when students are limited in the number of classes they can take outside of their schools. These administrative limits make it more difficult for undergraduates to build a curriculum focused on cities and the urban environment, as some graduate students also have reported.

It also remains difficult for two schools to share credit and indirect cost recovery (overhead) for sponsored research. Typically, a single school claims credit for the grant and retains the overhead.

Challenges of the New Partnership Model at CUSP

CUSP is built around international academic and research partnerships with industrial partners, requiring the development of new financial models. This membership model maps the mix of cash, in-kind and scientific staff contributions from industrial partners, while negotiations with university partners for the exchange of faculty and students must accommodate the different cost structures of each institution.

Recommendations

Improve Communication and Collaboration on Research

There sometimes has been limited coordination across units of the University. For example, in the fall of 2012, both the Institute for Public Knowledge and the Urbanization Project offered research seminars on Mondays at noon. The schools, research centers, and institutes should share calendars of events and seminars so as to avoid conflicts.

The research centers and faculty working on cities and the urban environment could collaborate more on funding proposals. This could likely produce more competitive

proposals than they could on their own. The new Marron Institute might consider holding competitions for seed grants to encourage multischool research on pressing urban topics, like informal settlements, migration, or environmental hazards. It might adopt a different theme or a set of themes each year. Similarly, it might launch an annual book series, with each volume including contributions from NYU faculty on a particular issue. The Institute could also organize a cross-campus conference each year, focused on an urban theme that might result in publications.

Departments and schools hiring in the urban area should invite relevant faculty outside their unit to attend job talks and meet candidates.

Communication to the broader community has also been limited. The University should do more to get the word out about the research being done. The new Marron Institute is well-positioned to play this role.

Improve Communication and Collaboration on Teaching

The University should explore ways to make it easier for students to learn about and cross-register for relevant urban classes outside their own units. It may also want to explore reforms to its tuition-revenue sharing policies to make sure that they are not discouraging cross-registration or the development of jointly-listed, multidisciplinary classes.

Undertake Regular Review of Graduate Programs

The University currently offers a number of master's programs related to cities, several of which compete for students. While University administrators and committees review possible areas of overlap when considering proposals for new programs, the University should review existing graduate programs to spot duplication.

Consider Establishing a New Undergraduate Program

The University has four multidisciplinary majors in cities and the environment for undergraduates and their faculty members virtually all agree that there is room for improvement.

One creative possibility would be to combine some of the existing majors into a department with greater autonomy. While many universities offer an urban studies or an environmental studies major, few if any have undertaken the ambitious task of creating a program that integrates the study of cities with study of the environment.

Alternatively, the University might consider developing a new nonduplicative multidisciplinary major that is focused squarely on cities and covers a broader range of disciplines than are currently included in the Metropolitan Studies Program, including courses in urban design, economics, policy, and data analysis. The University might also

consider creating a minor or a concentration in cities with which students could relate their majors, such as urban sociology, politics, economics, anthropology, or history.

Explore Urban Fellows Programs

The University – perhaps through the Marron Institute – should consider launching a set of urban fellows programs for different groups of graduate students and postdoctoral candidates interested in studying cities.

Master’s Students. Rather than starting yet another new master’s program, the University should consider bolstering existing programs by establishing an urban fellows program (similar to the Reynolds Program for Social Entrepreneurship¹⁸) that would offer graduate fellowships in cities and the urban environment to students from NYU’s professional schools. In addition to meeting the requirements of their individual programs, students would participate in an intensive cross-school seminar on cities and the urban environment. The University might partner with New York City or the U.S. Conference of Mayors so that students could gain experience working in city government between their first and second years.

Doctoral Students. The University currently offers no doctoral programs in urban studies. Rather than starting one, the University should explore a selective urban fellows program for doctoral students doing research related to cities and the urban environment. The fellows could receive a stipend for summer research support and be required to participate in a cross-school, multidisciplinary research seminar. Such a program could strengthen students’ research capabilities and help them to prepare for multidisciplinary environments in their careers. The Predoctoral Interdisciplinary Research Training program, a collaboration among the Steinhardt School, the Wagner School, and the Graduate School of Arts and Science, funded by the Institute for Education Sciences, is a successful model of such a program designed for students interested in education sciences.

Postdoctoral Candidates. The University might also consider establishing a multidisciplinary, postdoctoral program aimed at attracting elite junior scholars from around the world whose research focuses on urban areas and issues. These postdocs might be connected to two faculty mentors – one in their discipline and one in a different discipline. A model might be the Robert Wood Johnson Scholars in Health Policy Program, which is a two-year, highly-selective fellowship aimed at recent graduates of doctoral programs in economics, political science, and sociology who are pursuing research in health policy.

¹⁸ The Reynolds Program, managed by the Wagner School, “is designed to attract, encourage and train a new generation of leaders in public service.” www.nyu.edu/reynolds/social/index.flash.html

Develop Clearer Connections with the Global Network

The undergraduate and graduate programs focusing on cities and the urban environment should build richer connections with global campuses to expose students to urban challenges around the globe. They should consider building concentrations of courses related to cities at a few global sites to enable students to build on the education they receive in New York.

Conclusion

There is an impressive range of urban research being undertaken at the University, as well as a robust set of curricular offerings and interesting collaborations. There are opportunities for deepening the University's reach and visibility in this area based on increasing student interest, the emergence of satellite campuses in major cities around the world, and the budding initiatives at the University.

To date, the whole remains less than the sum of the parts, largely due to fragmentation. Communication and coordination have been limited. Further, multidisciplinary undergraduate majors encounter distinctive administrative problems.

Chapter 4:

Humanities and the Arts

Overview

In the last three decades, as New York University has made the transition from being largely a commuter school to a preeminent research university with excellent faculty, students, and programs, the humanities and arts undeniably have been central. NYU has taken a leading role in shaping international education at the undergraduate and graduate levels, currently offering 12 global study-away sites on five continents, plus a four-year campus in the United Arab Emirate of Abu Dhabi, and a second four-year college in Shanghai. Perhaps most important, humanities programs and departments have been especially targeted for hiring and graduate student support. Since 2005, NYU has seen the creation of over a hundred new positions in Faculty of Arts and Science (FAS) humanities departments; the growth of the Gallatin School of Individualized Study, the Liberal Studies Program, the Department of Media, Culture, and Communication in the Steinhardt School of Culture, Education, and Human Development; and the creation of the Institute for the Study of the Ancient World (ISAW), dedicated largely to humanistic pursuits.

The National Research Council study of 2010 ranked two of NYU's humanities programs in first place for scholarship and training of graduate students (Performance Studies, located in the Tisch School of the Arts, and American Studies, located in the FAS Department of Social and Cultural Analysis), while a number of other departments (Spanish and Portuguese, Philosophy, the Institute of Fine Arts (IFA)) ranked within the top 10. An international survey of universities, QS World University Rankings,¹⁹ ranked NYU's humanities departments as 14th in the world in 2012, far ahead of its rank in the social sciences and natural sciences. Two NYU faculty members won the President's Medal in Humanities in 2009 (David Levering Lewis, university professor, and Philippe de Montebello, professor in the history and culture of museums) and a third (Anna Deavere Smith, professor of performance studies) was a recipient in 2013.

Over the same three decades, the focus and nature of humanistic and artistic inquiry has changed, often dramatically. Many of these changes addressed the perceived limitations of working within individual disciplines and canons, resulting in a new interest in interdisciplinary methodologies and practices. While the humanities and the arts are embedded in schools or institutes ranging from the obvious (FAS, IFA, Tisch, ISAW) to the less obvious (the School of Law, the Wagner Graduate School of Public Service, the School of Medicine), we have examined four provostial institutes at NYU that exist outside of

¹⁹ topuniversities.com/node/4246/ranking-details/world-university-rankings/2012

schools and departments, where they are forces of integration for scholars and practitioners from NYU, the New York City community, and other universities: the Hemispheric Institute, the Humanities Initiative, the Remarque Institute, and the Abu Dhabi Institute. A fifth area, the digital humanities, for which no institute exists, is a tool for and a focus of much of the work that many of us do. Thus, while we will address the question, “What are the humanities and arts at NYU?” our primary focus is the institutes and, in the case of digital humanities, an example of successful collaborative work.

We begin with several case studies that will help to demonstrate the range of research, teaching, and artistic and community projects carried out by our colleagues. Information on analogous projects is available in the booklet, “The Humanities at NYU: Tradition and Innovation.” These case studies highlight NYU’s distinctiveness with respect to interdisciplinarity, and we hope that they will spark conversations as to how NYU can best continue to ensure effective collaboration among scholars while nurturing the individual work that most humanists and artists continue to do. In particular, the case studies provide compelling evidence that a growing number of humanities scholars at NYU are open to the kinds of collaborative models more typical of the sciences and the arts.

Case Study #1: Sylvester Manor on Shelter Island in Long Island Sound was founded in 1652 to produce provisions for the owners' sugar plantations on Barbados. It has remained in the same family ever since, and has played various roles, including as a retreat for leading literary figures in the 19th century. Today it is the site of a long-term archaeological project by a team from the University of Massachusetts Boston and it is operated as an organic farm.²⁰ It also has a rich archive, housed in the NYU Fales Library, a part of the Bobst Library. This link to NYU is the impetus for the Sylvester Manor Working Research Group at NYU. Funded for three years by the Humanities Initiative, it brings together scholars of English literature, history, law, food studies, and archaeology under the leadership of Professors Karen Kupperman (History), Pat Crain (English), and Marvin Taylor, curator of the Fales Library.

Over the past two years, the Working Research Group has sponsored presentations at Fales Library on aspects of the archive, as well as a walking tour of the Manor itself. Visiting scholars have presented their research, and Gallatin School graduate Madeline Sayet and her acting group recently presented excerpts from their Native American rendition of *The Tempest*. Exhibits and publications will emerge from this association as well. Bobst Library held an exhibition on the archive and the archaeological finds in April 2013 and, in conjunction with the opening, the group celebrated the publication of two books on Sylvester

²⁰ Sylvester Manor also hosts a variety of educational and community projects, whose range can be seen on its website: sylvestermanor.org/

Manor: *Slavery Before Race* by Katherine Hayes, who supervised the archaeological team at the Manor, and *The Manor: Three Centuries at a Slave Plantation on Long Island* by Mac Griswold, Director of Archival Research at Sylvester Manor and one of the coordinators of the Working Group. A lecture series that includes Ira Berlin, Jamaica Kincaid, and others addressed plantation culture and slavery.

Case Study #2: In March 2013, the Brooklyn Academy of Music staged a performance by Aquila Theater of Euripides' Herakles, a story of both the heroic return of the warrior and the tragedy of the alienated veteran. The performance is a project of the theater's Ancient Greeks/Modern Lives program, founded and directed by Peter Meineck, Clinical Associate Professor of Classics. Meineck specializes in the performance and history of ancient drama and is an accomplished translator of Greek comedy and tragedy. Ancient Greeks/Modern Lives celebrates performance while also creating a public discussion on combat and the afterlife of war. Conferences and post-performance panels have engaged scholars of the ancient world with veterans of the wars in Iraq and Afghanistan. A *New York Times* review noted the fascinating connection between ancient plays and modern reflections of veterans who return from war and suffer post-traumatic stress disorder.

The program has created book groups, actor readings, and workshops, thereby establishing a link between the scholarly community and the general public. It has been awarded grants from the National Endowment for the Arts and the Mellon Foundation. Within NYU, it has received the support of the Gallatin School and the Humanities Initiative, which funded a team-taught course on theater taught by Professors Peter Meineck and Laura Slatkin.

Case Study #3: Gabrielle Starr, Seryl Kushner Dean of the College of Arts and Science and Professor of English at NYU, spent part of academic year 2011-2012 collaborating with colleagues in the Center for Neural Science (CNS) on a project involving aesthetics and the brain. Her book, *Feeling Beauty: The Neuroscience of Aesthetic Experience*, has recently been published. Regarding the collaboration, Professor Nava Rubin from the CNS commented: "We wanted to exploit individual differences in people's taste in art in order to study the neural correlates of aesthetic experience from the responses to the external stimuli (the artworks). For this, we needed to compile a diverse, yet well-balanced set of artworks.... Dean Starr's expertise was invaluable for achieving this goal."

Professor Rubin continued on the shared work she and her colleagues did with Professor Starr: "Over time it will be possible to discern more general trends, i.e., about the type of skills that humanists bring to the table, or how their theoretical constructions may help in shaping new scientific questions." Likewise, Starr commented about the value of collaborating with the CNS and colleagues like Rubin because the neuroscientific framework they bring "allows us to see what used to be called the 'sister arts' of music, painting, and poetry as related domains of imaginative experience."

These case studies demonstrate exciting and at times unexpected cross-currents in the scope of humanistic and artistic practice at NYU. In their engagement with public humanities projects, the local community, and colleagues in the sciences, NYU faculty are demonstrating the kinds of initiative recommended as crucial for the success of the humanities in the 21st century, per the recent reports by the American Academy of Arts and Sciences, and Harvard University's Dean of Humanities.²¹

General Contexts

Programming in the humanities and arts has evolved considerably at NYU over the last 30 years. The Tisch School of the Arts for decades has been one of the most highly regarded schools for the performing arts in the world, while IFA has been a leading program for graduate study in art history since the 1960s. FAS, Steinhardt, and Gallatin have more recently moved into top tiers in humanities research and arts training and performance, and the innovative Institute for the Study of the Ancient World (ISAW) is an even more recent addition. The University's Partners' Program was instrumental in bringing new talent to the humanities, as over half of the 125 faculty funded by Partners were hired into humanities departments, and the Mellon Foundation is funding doctoral fellowships for 20 graduate students each year, concentrating in the Departments of History, Philosophy, and English. Steinhardt has also experienced a surge in humanities and arts hiring, and Gallatin has strengthened core humanities areas such as classics and history while also becoming the center for new areas such as the history of science.

NYU's strengths are evolving along with new conceptions of what humanistic and artistic inquiry should be. Several universities have combined traditional language and literature departments to form a single, more general literature department, and traditional canons of Western thought have given way to more global configurations of knowledge. The divisions between the sciences, social sciences, and humanities are being questioned in profound ways in neuroscience and environmental studies, which bring together fields apparently as diverse as biology, computational linguistics, and the study of aesthetics (in neuroscience), and ethics, botany, and statistics (in environmental studies).

Other changes are unsettling. Over the past few decades, there has been a decline in the number of post-secondary degrees conferred in the humanities, with BA's falling below 10 percent from 17.8 percent in the 1960s. (Since 1992, the percentage of humanities degrees at the baccalaureate level has been more or less constant, fluctuating between 9 and 11 percent.) The Title VI programs that have funded less-commonly taught languages are being

²¹ humanitiescommission.org/pdf/hss_report.pdf; and artsandhumanities.fas.harvard.edu/files/humanities/files/mapping_the_future_31_may_2013.pdf

drastically cut, thus threatening NYU's Latin American and Caribbean Studies and European Studies Programs. Universities, particularly public universities, are still reeling from the 2008 fiscal crisis. The first programs that are cut tend to be in the humanities and "soft" social sciences. A posting on *The Chronicle of Higher Education* blog suggests that tenure track positions are being cut disproportionately in humanities fields.²² The job market for graduate students in the humanities has rarely been worse.

In this tight market, the most competitive students are often conversant in more than one field within their disciplines, and students who have relevant training in more than one discipline may be even more competitive. The model for humanities research and teaching will probably continue to be interdisciplinary, even as trends in the arts, such as new developments in digital recording, film production, bridge performance and production. Training our students for a global world as well as for careers within and outside the academy means that the faculty must look beyond narrow methodologies and disciplinary practices, while acknowledging that interdisciplinarity begins with an intense knowledge of a single field.²³ At the same time, those fields are changing quickly. What was once the Department of Italian Language and Literature is now Italian Studies, with colleagues who have degrees in history, comparative literature, and art history. The creation of new departments allows an even greater embedding of disciplinary backgrounds. FAS's Department of Social and Cultural Analysis has scholars working in African history, the contemporary Indian novel, the slave trade in the Caribbean in the 18th century, and protest movements as articulated through Latin American music. The Department of Media, Culture, and Communication (MCC) in the Steinhardt School puts what the American Council of Learned Societies calls the "interpretive social sciences" into conversation with histories and theories of mediated communication. To that end, MCC is home to humanities scholars who specialize in interdisciplinary fields such as sound studies, visual culture studies, science and technology studies, and critical code studies.

NYU's global network may provide a strong model for thinking about new disciplinary and interdisciplinary homes and best practices for working across schools. Yet, for the moment, much in that model exists only at the level of potential.

Despite a range of questions, NYU can be said to be at the forefront of articulating and creating interdisciplinary connections vital for its academic future. The next section turns to

²² Mason, Mary Ann. "The Future of the Ph.D.," *Chronicle of Higher Education* (2012) n. page. Web. chronicle.com/article/The-Future-of-the-PhD/131749/

²³ The same can be said of our undergraduates, over 90% of whom, as noted above, concentrate on areas outside the humanities for their majors. In the College of Arts and Science, the percentage of humanities majors declined from 23% in 2003 to 18% in 2013. The actual number declined from 1511 to 1332. Source: Office of Institutional Research and Program Evaluation.

those connections, and asks how they are being used to address challenges and opportunities in the humanities and arts today.

Interdisciplinary Connections

Core humanities and arts are housed in seven separate units (FAS, Steinhardt, Gallatin, Tisch, SCPS, ISAW, and IFA), even as most of NYU's 17 schools and institutes house faculty and students who have humanistic and artistic background and knowledge. In addition, while the Bobst Library does not have a degree program, it is very much at the center of humanities activity, particularly in archiving, preservation, and digital scholarship.

The Morse Academic Program (recently renamed the College Core Curriculum) for many years has offered core courses for the undergraduate humanities curriculum for students in the College of Arts and Science (CAS), Steinhardt, Tisch, and the Stern School of Business, while the Gallatin School offers humanities entry-level courses for its own students. The Liberal Studies Program offers an interdisciplinary core curriculum for students who, after two years, transition to majors in CAS, Steinhardt, the Tisch School of the Arts, or Gallatin. Liberal Studies general education classes also enroll students in the Opportunities Program, Stern, and SCPS.

A number of joint- and dual-degree programs have brought together faculty and students at the graduate level; examples include joint degree programs between journalism and eight other departments, including French studies, Africana studies, and Latin American and Caribbean studies in GSAS, and dual master's degree programs, such as Hebrew and Judaic studies in GSAS, and public and non-profit management and policy in the Wagner School. ISAW offers an interdisciplinary doctoral program, which draws on all relevant disciplines, whether represented on the ISAW faculty or by other faculty at NYU and elsewhere.

By the 1970s, the model of the postwar research university was established. While the sciences had substantial government funding and prestige, there was insufficient funding for scholars doing research in traditional humanistic disciplines. Starting in the 1970s, organizations such as the Columbia Society of Fellows, the New York Institute of the Humanities, the National Humanities Institute, and the Stanford Humanities Center offered programs to support scholarly work in the humanities. There was also a strong sense that too many scholars were locked into their own disciplines, which propelled a parallel project to encourage interdisciplinary and collaborative work. Virtually all of these entities provided support for development of graduate students. Many also used funds for outreach to other universities as well as engagement with the public sphere.

In many American universities, the humanities center was often located in – and drew largely from – a school of arts and sciences, and frequently served as an umbrella for smaller institutes and centers.²⁴ NYU’s decentralized nature militated against this kind of structure. Instead it developed small centers, using centralized resources, and individual schools sponsored humanities and arts research and scholarship, e.g., the Center for Religion and Media, the Center for the Study of Gender, the Center for the History of the Book, and the International Center for Advanced Studies.

In 2005-2006, Provost David McLaughlin appointed a task force to examine the future of the humanities at NYU. The committee’s recommendations (Appendix L) demonstrated that faculty wanted the administration, alumni, donors, and students to become more conversant with their work. Equally important was the question of how best to counter the hermetic nature of academic exchange and research. At that time, NYU lacked both real and virtual spaces for humanists to meet, collaborate on research issues, share works-in-progress, incorporate graduate students into humanities research projects, and create an interdisciplinary community of fellows. Given the specialized nature of the institutes and centers, there was no research institute that was open to all scholars in the humanities at NYU, in contrast to the majority of peer institutions that had broadly conceived humanities centers (e.g., Brown, Chicago, Harvard, Northwestern, University of Southern California, Wesleyan, Yale). In particular, the task force was eager to support graduate students in humanities disciplines, and not only in financial terms. The question was how to make an impact on their professional lives and enable them to explore their research with peers and faculty. Given the increasingly interdisciplinary nature of the academy, how could they become familiar with the work of scholars outside their immediate field? With a few exceptions, NYU’s pre-existing centers grew largely out of individual disciplines. So how could genuinely interdisciplinary conversation and research be supported and facilitated in that context?

The response to the task force was the creation of the Humanities Initiative in 2007. The Institute for Public Knowledge, created the same year, was to act as a similar hub for social scientists. Simultaneously, the Hemispheric Institute for Politics and Performance, to be discussed below along with the Humanities Initiative, came within the provost’s office, along with the Remarque Institute. The provost thus committed to creating two University-wide institutes while encouraging two existing institutes to move from the aegis of a single department (Performance Studies, History) and engage with the broader community.

²⁴ The humanities center model has been immensely successful throughout the United States and internationally, and the NYU Humanities Initiative, founded in 2007, adheres most closely to that model. There are currently 154 centers and institutes worldwide, as listed in the Consortium of Humanities Centers and Institutes directory.

While the programs discussed below all fulfill a crucial function of the traditional humanities center, there is little about them that could be called traditional. At a decentralized university like NYU, with an array of schools, departments, and programs, they fulfill an essential role in bringing together scholars, creative artists, and students – both inside and outside the NYU community – in dialogues that often lead to tangible products (books, films, performances) as well as intangible ones. At the NYU Abu Dhabi Institute, that engagement extends to a part of the world where research institutes have been scarce.

Interdisciplinary Humanities Programs and Centers at NYU

We have studied these programs for the self-study:

- The Hemispheric Institute of Performance and Politics
- The Humanities Initiative
- The Remarque Institute
- The NYU Abu Dhabi Institute
- NYU's projects in digital humanities

The named institutes are radically different with respect to funding, personnel, interactions within and beyond the University, and longevity (Remarque is the oldest; the Humanities Initiative and the Abu Dhabi Institute the youngest). Nonetheless, all offer the opportunity to think about university structure, governance, and the importance and visibility of the humanities and the arts on campus. The Working Group on Humanities and the Arts interviewed Provost McLaughlin and Carol Mandel, Dean of Libraries, as well as center directors and associate directors, past directors, members of advisory boards, faculty and students associated with an institute, and staff. In the case of digital humanities, we interviewed over a dozen graduate students, faculty members, and deans who have been involved in supporting or carrying out digital projects. Digital humanities cannot exist without an administrative infrastructure that welcomes interdisciplinary study, and a technical infrastructure that enables experimentation and ongoing learning.

1. The Hemispheric Institute of Performance and Politics (Hemi)

Now in its 12th year, Hemi (hemisphericinstitute.org) is exemplary in its outreach to a “global” world. Hemi has extensive contacts with over 45 universities and institutions in North, Central, and South America, as it creates a performance archive and network aimed at exploring, teaching, and enabling performance in the Western Hemisphere. Initially a project housed in the Department of Performance Studies at the Tisch School of the Arts, the Institute now benefits from the support and collaboration of several schools within NYU, including the College of Arts and Science and the Steinhardt School of Culture, Education and Human Development, with participating faculty and students from Anthropology,

Performance Studies, Art, Visual Studies, Cinema Studies, Spanish and Portuguese, Media, Culture, and Communication, and the Center for Latin American and Caribbean Studies.

Founding Director Diana Taylor has received funding from the Ford Foundation, the Rockefeller Foundation, the Rockefeller Brothers Fund, the Henry Luce Foundation, the Nathan Cummings Foundation, and the Social Science and Humanities Research Council of Canada, among others. Hemi has now grown far beyond its original mission. Hemi's staff has grown as well, and it now includes four full-time academic personnel, part-time assistants for video and web production, and clerical staff, in addition to student interns and a teaching assistant who helps to manage the journal.

Hemi is at the forefront of technology with its innovative website, mode of publishing research, digital video archive and multilingual platform in Spanish, Portuguese, and English (soon to add Quebecois as Hemi extends to Canada). The Hemispheric Institute Digital Video Library is a significant feature, as it preserves and documents performances and events to offer free online access to sites around the world (a major resource for Abu Dhabi). Other resources that Hemi offers include an online scholarly journal, a ground-breaking digital book series developed at Hemi and published with Duke University Press; a trilingual website; the Emerging Performers Program in New York City; and public online forums. In 2008, the Institute inaugurated the Centro Hemisférico, a collaborative research center and performance space in Chiapas, Mexico, in partnership with FOMMA (Fortaleza de la Mujer Maya, a Mayan women's theater collective), as well as its Hemispheric New York initiative, a program of public events that features artistic and scholarly work produced in New York City. Hemi has also done considerable curriculum-building. While Hemi does not own its courses, since it is an institute rather than a department, it nonetheless sponsors summer courses in Chiapas, Mexico for 10 NYU students and 20 students from around the Americas. It has also had direct impact on the curriculum in Performance Studies and the Department of Spanish and Portuguese. Its online journal, *e-misférica*, has been used for courses throughout the world; American University, Brown University, Northwestern University, the Universidad Autonoma de Mexico, and the Universidad Nacional de Costa Rica are among the institutions that have benefited from it.

Hemi's work with students extends beyond the curriculum. It provides excellent work-study positions and internships, which benefit skills training and create a lively and supportive community for students and alumni. Hemi has also recently taken under its wing the Yes Lab project, a think tank for activism around the world. Moreover, the program entitled EMERGENYC offers training to emerging artists living in NYC, many of whom will apply to NYU graduate programs. This program, whose full title is the Hemispheric New York Emerging Performers Program, trains New York-based artists through workshops, lectures, and other events. In working with young artist-activists who see their art as a vehicle for

political expression and social change, the program encourages participants to take interdisciplinary leaps, and mix styles and traditions at the intersection of performance and politics. One 2011 participant writes, “I had a life-changing experience. I have been an artist my entire life and it was not until this program that I realized I am a *performance* artist. The program created a space where I was able to take my art practice to levels beyond my expectations. Everyone was incredibly committed to the intersection of art and social justice issues. . . . Strong collaborations and friendships grew from the Emerge program.”

Well respected in the foundation world as a model for integrating arts and the humanities, Hemi is paradoxically less known and recognized within NYU and its global sites – particularly Abu Dhabi, where much effort has been made to combine the teaching of artistic practice and humanistic inquiry. In order to increase its visibility on campus, Hemi would benefit from NYU support for programming, which could produce an annual student and faculty conference and possible publications.

2. The **Humanities Initiative at NYU (HI)** (humanitiesinitiative.org) was founded in 2007 as a result of the year-long task force on the humanities discussed above. The HI took as its goal the mobilizing of “the talents and energies of our faculty and students across the University to provide a forum for cross-disciplinary discussion and collaboration in the humanities and arts.” Thanks to its space in 20 Cooper Square, the Humanities Initiative has been able to serve as a physical hub for NYU’s many humanists. Its core mission is a fellowship program for 12 faculty and graduate students each year, enhanced by the presence of postdoctoral fellows from the American Council of Learned Societies and from NYU’s Postdoctoral Program for Underrepresented Minorities. This community meets for weekly lunches and coordinates an annual symposium in the humanities. The faculty members have used their fellowships and release from teaching to publish and to collaborate on activities leading to publications. The mentoring provided by the senior faculty fellows as well as the opportunities for graduate students to workshop chapters from their dissertations and to present mock job talks have helped the students get started in the academy. Most graduate student fellows have gone on to careers at other universities, including Bowdoin College, Chicago, Princeton, Wesleyan, SUNY and CUNY campuses, and Yale.

The HI funds up to 10 research groups each year on topics ranging from Caribbean Studies to an ongoing reading group on Freud, as well as three or four team-taught interdisciplinary courses. It coordinates, and funds up to \$100,000 each year, more than 20 events every semester – conferences, workshops, lectures, panels on writing a dissertation, and getting published generally – in an effort to address scholarly and professional issues that transcend single disciplines. In an effort to register the intense amount of collaborative humanities activity at NYU, it has created an archive of humanities projects that culminated in the booklet “The Humanities at NYU: Tradition and Innovation.” In 2012, it joined 10 other East

Coast universities (Brown, Columbia, and Harvard, among others) in hosting the Leadership Alliance Mellon Institute, a summer program for minority students interested in going to graduate school.

In short, the HI has been responsive to the task force's recommendations, and is now vital to the flourishing of the humanities at the University. As it entered its second five year cycle of provostial funding in 2012, it expanded its mission beyond faculty and graduate students.

- a. A core curriculum in humanities for freshman honors students began in fall 2013 as a seminar called What Are the Humanities? (a team-taught by College of Arts and Science Dean Gabrielle Starr, and Faculty Director Jane Tylus, Professor of Italian and comparative literature). Funded through a University Curriculum Development Challenge Grant, the seminar is planned as the first of many classes designed to introduce first-year students to the complexities of humanities education and scholarship. The HI is also working with Phillip Kunhardt, visiting professor in the Faculty of Arts and Science and director of the Center for the Study of Transformative Lives, and Anna Deavere Smith, professor of performance studies and director of the Institute of the Arts and Civic Dialogue, on programming that addresses large questions in ethics, morality, the arts, and the humanities designed specifically for undergraduates. Finally, the HI has been active in initiating meetings and conversations about general education at NYU, hosting in the 2012-2013 academic year a series of lunch meetings with undergraduates, faculty, and preceptors for NYU's College Core Curriculum. The increasing number of international students at NYU – 18 percent of the fall 2013 incoming freshman class were non-US citizens, compared to 4 percent of freshmen in 2002 – presents new challenges and opportunities for teaching the humanities canon. How might we engage international students in creating a curriculum that represents a “global humanities?”
- b. Partnership include other humanities centers in New York State and the New York State Council for the Humanities. Beginning in fall 2013, the Initiative has hosted a public humanities fellowship, a Ph.D. student whose work will be closely tied to a project or organization in the public sector. Additionally, the HI will be partnering with a local NYC organization of the arts, Epic Theater, a group of theatre, education, and business professionals who work with over 120 high school students a year in low-income neighborhoods.
- c. Ongoing discussions continue with the libraries and individual departments in digital humanities, discussed below. In 2012-2013, the HI presented a series of workshops and lectures in digital humanities topics, as well as conversations about the future of scholarly communications. The HI continues to work closely with Bobst Library and FAS to develop strategies for improved digital research and

collaboration. In fall 2013 it hosted the first full-day workshop for a new consortium of faculty and students in New York-area universities working on digital projects. December, 2013 witnessed a workshop for faculty and students on basic tools for digital humanities research in collaboration with the Bobst Library, and in February 2014 a panel will be offered to graduate students on incorporating social media into their work. The HI sees itself as the driver of future collaborative projects, grant proposals, and ultimately a graduate certificate in digital scholarship.

- d. Perhaps the biggest remaining challenge for the HI is how to interact more effectively with NYU's global network. While some preliminary conversations have been held with administrators in Abu Dhabi, Florence, and Shanghai, there is not yet a systematic plan for engaging HI fellows at Washington Square in NYU's global network, or for publicizing and representing the humanities work and events at global campuses on the HI's website. Nor is it clear whether there will be an early opportunity for local humanities initiatives to become part of our two other portal campuses by persuading NYU Abu Dhabi and NYU Shanghai to allow local faculty to take a one semester fellowship in New York.

3. The **Remarque Institute** remarque.as.nyu.edu, founded in 1995, is a leading interdisciplinary center for scholarship in European studies, including history, literature, politics, and sociology, as well as law, journalism, and public policy. It was directed by its founder, the late Tony Judt, Erich Maria Remarque Professor of European Studies, from 1995 until his death in 2010. The current director is Katherine Fleming, Alexander S. Onassis Professor of Hellenic Culture and Civilization, who worked closely with Professor Judt and who served as associate director from 2004 to 2010. The Institute features highly competitive visiting fellowships, academic seminars (located in Manhattan, in Paris at the Ecole Normale Supérieure (ENS), and in Florence at NYU's Villa La Pietra), and conferences, symposiums, forums, and workshops held in America and Europe. It was named for the German writer Erich Maria Remarque (author of the novel *All Quiet on the Western Front*); his widow, actress Paulette Goddard, made the bequest to NYU that founded the Institute. Because the Institute is not endowed, it has undertaken fundraising initiatives of its own.

Professor Fleming also serves as NYU's senior vice provost and vice chancellor for Europe, thus creating synergy between NYU's role in Europe and its place in European studies. Assistant Director Jair Kessler has worked at the Institute since 1995, and also serves as NYU's director of European research administration. They are assisted by an administrative aide. Despite Professor Fleming's notable achievements, a full-time director possibly would help the Institute at this point.

The Institute's distinguished lecturers and presenters have included Timothy Garton Ash of Oxford in 2011, Michael Walzer of the Princeton Institute for Advanced Study on world

government in 2010, and Wolf Lepenies of the Institute for Advanced Study in Berlin in 2008. Conferences, symposiums, and special events during these last five years have included Reinventing the Multicultural City (Rotterdam 2008), Holocaust Denial (Paris 2008), Liberalisms in East and West (Oxford 2009), Minorities in Politics (Paris 2009), Humanitarian and Human Rights (New York 2012), and Empire and its Effects (New York 2013). The Institute's 2012 Kandersteg seminar, held in Kandersteg, Switzerland, intended especially for young scholars, focused on religion in history. The 2013 seminar, also held in Kandersteg, focused on Europe on the eve of World War I.

Typically, Remarque has 25 fellows a year, not including those at the ENS. Four fellows are NYU doctoral students, while another 10 fellows -- half doctoral students, half faculty -- are part of the exchange program with ENS. They typically spend a year at NYU. The remaining external fellows, from both the United States and abroad, have semester-long stays.

The Institute has a newly enhanced role at NYU. It hosts a monthly European history dissertation seminar for graduate students, provides additional opportunities for graduate funding, contributes office space for graduate students, and has inaugurated a funded summer fellowship for a cohort of eight graduate students who will meet in Berlin to workshop their dissertations. There are also fellowships reserved for graduate students at the ENS as part of the collaboration between the ENS and Remarque Paris. In New York, Professor Fleming is reshaping the visiting fellowship priorities, increasing the number of semester-long or year-long fellowships, as opposed to single-month fellowships. In accordance with the values of Erich Maria Remarque, the fellowships will often concern dissidence, exile, pacifism, and intellectual persecution. One fellowship each year will be dedicated to a "scholar at risk" -- for example, an Iranian scholar studying the nature of civil society in Europe. Professor Fleming stresses an ongoing commitment to multi-disciplinarity, "not only among the academic disciplines, but also between academic study and public life." The Institute is employing digital resources for European studies and making use of BoardBook for conferences and workshops.

4. The **NYU Abu Dhabi Institute** (nyuad.nyu.edu/research/nyuad-institute.html), now completing its seventh year, is a pillar of the NYU Abu Dhabi enterprise, focused on building community both within Abu Dhabi, and among Abu Dhabi, New York, and the rest of the world. The Abu Dhabi Institute has three distinct missions (or, as Philip Kennedy has said, "concentric circles"):

- a. The first component of the Abu Dhabi Institute is an outreach program designed to bring together Emirati, expatriates, and others for talks, concerts, and ongoing research. Created in 2007, and overseen by Professor Kennedy, the series hosts NYU faculty from Washington Square to give lectures. Talks are now given by

artists, public intellectuals, and professors from around the world. Some talks attract 20 to 30 people, while others bring in 200.

- b. In 2008, the Abu Dhabi Institute also created a conference and workshop program designed for NYU scholars from Washington Square and Abu Dhabi for collaborative scholarship. Overseen by Reindert Falkenburg, NYU Abu Dhabi vice provost for intellectual and cultural outreach, the conference mission is geared to issues that focus on Abu Dhabi and the Gulf as places of transition and geographic, economic, and cultural intersections. Recent conferences of interest have included the Indian Ocean Project, the Tales of the Arabian Nights, Genomics, the Coral Reef project, and a workshop on Women and Computing.
- c. Abu Dhabi's explicit research mission funds large-scale projects in the sciences, social sciences, and the humanities, primarily to bring graduate students and research faculty to a campus that is still exclusively undergraduate, although graduate programs are anticipated. Nine of these projects are in the sciences, in areas such as astronomy and genomics, one in the social sciences, and one in the humanities (the Library of Arabic Literature, a translation series of great Arabic texts).

The Institute is funded exclusively by the Crown Prince. The demand that the lecture series attract Emirati is high and some interviewees expressed concern that topics at the Institute will become increasingly narrow. An additional concern is that the well-funded research projects are almost entirely in the sciences. The successful Library of Arabic Literature is the only project that has a significant humanities component. To what extent might the scientists gathering in Abu Dhabi be encouraged to broaden their research horizons to include humanists, particularly in areas of computation and neuroscience? And how can NYU's humanists become more competitive applicants for the next round of projects? Another issue involves the perceived lack of interaction between the Abu Dhabi Institute and NYU Abu Dhabi, possibly because of the relatively few arts and science scholars, despite the fact that NYU Abu Dhabi's core is liberal arts.

Upcoming challenges for the Abu Dhabi Institute include the impending move to Saadiyat Island, where the Institute will be less connected to the downtown scene, but will have much additional space. How will the Institute fill the two conference rooms (one seats 300, another 180) and smaller workshop spaces on a regular basis? How will long-term and one-semester students at NYU Abu Dhabi be involved in Institute events? Finally, as operations continue to expand, how can communication between Washington Square and the Institute be enhanced? We urge the NYU Abu Dhabi administration to work with the administration at Washington Square on these issues and on its website presentation.

5. **Digital Humanities (DH)** is the creation or use of technology and methods to investigate humanities scholarship, as well as the practice of subjecting these computational technologies to a humanities-based inquiry. Thus, DH involves both theory and practice. DH research relies on technical experimentation, iterative development and prototyping, and cross-disciplinary collaboration. It requires an advanced technical infrastructure that encourages innovation. Recent work in DH at NYU includes the Hemispheric Institute's Digital Video Library, noted above. Another pioneering example is MediaCommons, a community-driven network for scholars, students, and practitioners in media studies, promoting the exploration of new forms of collaboration and publishing within the field (mediacommons.futureofthebook.org). In addition, the NYU Press is doing extensive work with the libraries and scholars at NYU on new forms of book production and manuscript review, in collaboration with Kathleen Fitzpatrick of the Modern Language Association, who also has an honorary appointment in the Department of English.

It is widely recognized that students need to gain digital literacy, and the technical and critical thinking skills, central to contemporary research and to finding jobs in and out of the academy. A graduate DH certificate that was cross-disciplinary and well integrated into the students' home departments would go a long way to establishing this goal. Such a certificate would include a practicum, internship opportunities, and career guidance. NYU could also help students acquire DH skills by facilitating the process for cross-school registrations, creating a central clearinghouse for relevant courses, and adding budgetary incentives to departments for taking outside students.

NYU needs to provide an IT infrastructure that is secure while also allowing for online collaboration and experimentation. Even simple projects such as creating a website or installing and using popular software (for example Wordpress or Omeka) are difficult in our current technical environment, requiring NYU scholars to contract with external vendors for server space to accomplish their work. There are several bright spots in the IT landscape; for example, NYU Global Technology Service is working with faculty to realize teaching projects and build reusable processes, tools, and infrastructure.

While some University funding exists for cross-disciplinary DH scholarship (e.g., the NYU Poly Cross-Institution "Seed" Research fund, poly.edu/research/cross-institution), scholars feel that more University support is needed. NYU should consider how it can fund both start-up initiatives and established projects. Some interviewees suggested creating cohort residencies (including course release time), which could result in a collective project or series of projects. Other forms of potential support could include NYU's Development Office help on grant writing, released time for project and curriculum development, and support for professional development.

NYU also needs more efficient methods for knowledge sharing as well as the physical spaces ("collaboratories") that bring people together for technical experimentation and long-term collaboration. NYU's Interactive Telecommunications Program (itp.nyu.edu/itp/) provides an example of a solid interdisciplinary model for DH programs. Interviewees identified the Humanities Initiative and NYU Libraries as the logical entities to foster the necessary knowledge and skills for cross-disciplinary collaboration. The Humanities Initiative has begun to coordinate a series of DH programs and should be encouraged to continue. The libraries also are where it is appropriate to establish a cross-disciplinary collaborative workspace because, as one of our interviewee's said, "the library is the only place that is really central to the University." Thus, NYU's Digital Library Technology Services has been partnering with faculty on preservation, digital publishing, and website development projects.

The Chronicle of Higher Education²⁵ and a series of sessions at the January 2014 Modern Language Association meeting discussed ongoing issues related to DH, including funding and technical infrastructure. Other issues that will need to be addressed are criteria for promotion and tenure, skills acquisition, DH as collaborative work, archiving and preservation, the use of DH in undergraduate education, and how DH can provide "practical and marketable skills" and curriculum development for graduate students.

Distinctiveness of NYU

The Hemispheric Institute and the Abu Dhabi Institute are unique. No other programs exist that so aggressively bring together universities in the Americas, and the work done in NYU Abu Dhabi to create a presence for an American institution in the Arabic-speaking world is unparalleled. The Remarque Institute may be like other small research institutes, but its focus on 20th-century European studies makes it distinctive. The fact that the Humanities Initiative works with schools outside of FAS, such as Steinhardt, Law, Tisch, and the Medical School, while most humanities centers are located solely within colleges of letters/arts and science, means that its impact is highly unusual. As for digital scholarship, few well-established DH programs are University-wide, even if they may extend beyond a single department (such as the Center for History and New Media at George Mason or the Literary Lab and Spatial History Project at Stanford). As DH projects become better coordinated, NYU will be poised for national and international leadership in this area.

Challenges

The primary challenge for the programs described above consists of the three "Cs": collaboration, continuity, and connectivity, as ways of enhancing a fourth "C": creativity. The "three Cs" emerged in conversations with almost all program directors and staff as well

²⁵ The Chronicle of Higher Education, Volume X, Number 17, January 1, 2014, pages A26-A32.

as faculty and students regarding the digital humanities. How can there be effective communication among these areas in the humanities and the arts and between these groups and the larger community? How, that is, do we guard against isolation of an individual institute or project?

Despite the differences among the programs surveyed here, they have common needs.

- a. Space emerges as a constant challenge for all but the Abu Dhabi Institute, which in 2014 will be moving to Saadiyat Island. The programs housed at Washington Square are in a very different situation. Were the Humanities Initiative able to fund postdoctoral fellows, as it would like, where would they be housed? Where would additional IT resources be located should a consolidated program emerge in digital humanities?
 - b. Adequate staffing is a perennial issue, particularly as the institutes grow. The Hemispheric Institute has the largest cohort of staff, and it is growing. Remarque has the smallest, with a faculty director, assistant director, and clerical staff person. One need across the Institute is someone dedicated to fund-raising and grant writing. (The Abu Dhabi Institute is a special case, since its money comes from the Emirates.) Additionally, the departments of faculty members who serve as directors receive no assistance with funding for course releases, which are, in any case, uneven. If the University values the missions of these centers, it should fund directors' replacement costs.
 - c. These issues raise a larger question about oversight: Do we have the proper structures in place for overseeing the Institutes, and are the budgets appropriate for these programs?
3. The relations to NYU's global network are important to all of these programs. But more systematic conversations are needed before these entities will be fully a part of NYU's global network. In addition, scholars from NYU Abu Dhabi and NYU Shanghai are likely to benefit from association with these research institutes while they are in New York. Such faculty might be offered honorary affiliations with one or more of the relevant institutes when they are on sabbatical; ideally, such affiliations could eventually be extended to all faculty who teach in programs abroad. On the other hand, it is unclear to what extent the outreach mission of each institute should involve global sites. Hemi operates independently of the sites, while Remarque is fully integrated into NYU's global network, with its connections to Florence, Paris, and Berlin – a natural outgrowth of its focus on Western Europe. How should the other programs participate in the sites most appropriate to their own focus?

Equally important is what scholars and practitioners of the humanities and arts have to offer the global mission. These programs are ideally situated to provide a critique of the

University's immersion in global education, one aspect of which involves the importance of students' and teachers' familiarity with a site's language, culture, and history. NYU's many sites are zones of differentiation as much as of integration; responding to that complexity is something these programs can do. For example:

- a. Hemi has a solid track record of reaching out to and collaborating with colleagues at universities in the Americas, and could serve as a model for such efforts at NYU's sites.
- b. In 2008, the Humanities Initiative's fellows visited Villa La Pietra where they met with the faculty on curriculum issues, including ways to generate new minors and new courses specific to the site. A report with recommendations for curricular changes and innovation resulted (Appendix M). Such collaborative conversations should be encouraged across the global sites.

4. Finally, integrating undergraduates into the research mission of a top-tier research university is a particular challenge in the humanities, which lacks laboratories and other natural spaces for collaboration. The institutes, devoted largely if not exclusively to research, tend to be geared to faculty and graduate students and the larger community. Since one of the most innovative aspects of the NYU Abu Dhabi undergraduate curriculum is bringing together artistic practice and the humanistic study of art, these innovations can take on more of a public face through Institute involvement.

A challenge is to draw undergraduates into research projects. The institutes at Washington Square can help to foster the kind of research programs supported by CAS, such as the Dean's Undergraduate Research Fund. Some of the institutes might play a role helping NYU to develop curricular innovation, including a digital humanities curriculum. The institutes do not offer courses, but as discussed above they promote small-scale forms of innovative teaching as well as partnerships with departments.

Recommendations

In addition to the proposals made above, we suggest:

1. Despite financial and space constraints, steps should be taken to ensure that the institutes can accomplish their respective missions. Support in helping the institutes to engage in competitive fundraising and grant-writing, and for maintaining and finding appropriate additional space, will be key in enabling them to achieve their long-term goals such as offering diverse communities in the arts and humanities postdoctoral opportunities and expanding their virtual presence.
2. The institutes should become an integral part of the University's global mission. For example, the administration should explore ways for scholars at the global sites to interact

with the appropriate institute in New York – perhaps by creating a grant-in-aid similar to that which now allows faculty and graduate students at Washington Square to study at the sites.

3. The institutes should be encouraged to engage more fully with the University’s undergraduate communities, and to explore with departments and deans shared possibilities for curricular innovation.

4. The digital humanities should be acknowledged as an increasingly important aspect of humanities and arts scholarship. Coordination among the institutes as well as ongoing collaboration with the Library, schools and departments will be key in aiding faculty and student research, developing an NYU “Profile” in DH, and ensuring that NYU plays a lead role in digital innovation.

Conclusion

The FAS Department of Social and Cultural Analysis, Steinhardt’s Media, Culture, and Communication, the Institute for the Study of the Ancient World, and other recently created units are signs of a healthy rethinking of what were once conceived as fixed departmental boundaries, even as traditional departments such as Art History, Classics, and History continue. The institutes are also extra-departmental insofar as they exist outside of traditional disciplines and foster collaborative work among scholars from varied backgrounds.

Current humanities and arts scholarship takes place along a continuum that moves from the intense and solitary labors that happen in an archive, a library, an art gallery, or at home; to systematic dialogue among scholars in spaces that facilitate those conversations; to collaborating on projects with a team, a class, an exhibition, a symposium, or an online or print publication in order to arrive at a final common product. The programs we have examined allow for work at all points of the spectrum as they encourage individual scholarship through fellowship and grants (the HI, Remarque), provide a space for serendipitous conversation and possible partnership (the HI, Remarque, DH, Abu Dhabi Institute, Hemi, a future digital humanities “collaboratory”), and actively shape the research projects of faculty and students toward collaborative products (NYU Abu Dhabi Institute, Hemi, DH).

A final question is how NYU’s humanities and arts scholars in the institutes can best interact with institutes and groups outside the humanities. One of the missions of the NYU Abu Dhabi Institute as well as of the Humanities Initiative might be to bridge humanities faculty with those in the sciences – most likely, perhaps, with those in medical humanities, but also in mathematics, neuroscience, computer science, and biology where there are areas of overlap. Some of the research groups sponsored by the HI are pursuing this kind of research; the WRG in Voice Studies, for example, has bridged the work of speech pathologies, musicians, medical doctors, animal behaviorists, and theater arts professionals. The third case

study cited at the beginning of this chapter is an example of the innovative research that happens when scientists and humanities converge; neuroaesthetics is an exciting new field in which NYU is poised to make great strides. What other kinds of bridges should we be building to the Silver School of Social Work, the Medical School, the Stern School of Business, the Law School, and the Wagner School of Public Service? The board members of the institutes reflect a broad diversity of faculty, but it remains to be seen how easily projects can be integrated and interdisciplinary conversations – between mathematicians and philosophers, art historians and neurologists, cinematographers and economists – brought to fruition.

Chapter 5:

Data Science

Overview

We live in the "Age of the Petabyte," soon to become "The Age of the Exabyte."²⁶ Our networked world is generating a deluge of data that no human, or group of humans, can process fast enough. The vast data are transforming the way business, government, science, and health care are conducted. An increasing amount of new knowledge is being derived by automatically analyzing the data. A new discipline is emerging whose object is to produce and study the theory, methods, and tools to derive knowledge from data, and to apply them to a wide variety of domains. This emergent discipline is known by several names. We will call it Data Science.

Data science is on the cusp of revolutionizing all areas of intellectual endeavor. It is becoming a necessary tool to answer some of the big scientific questions and technological challenges of our time: How does the brain work? How can we build intelligent machines? What is the structure of the universe? How do we find cures for diseases? How can we understand social structures and predict human behavior? Indeed, how does life work?

Much of the new data is unstructured and is captured from the real world using a variety of means: sensors from scientific experiments, pictures and videos from the Web, Web usage data, location data from smartphones, link and click data from social networks, customer data from e-commerce websites, transaction data from financial companies, text from news sources, blogs, and collaborative filtering websites, usage data from payment processing companies and utilities, and more. These data are readily interpretable only by machines.

An increasingly large number of traditional disciplines will spawn new sub-disciplines with the adjective *computational* or *quantitative*. There already are computational physics, computational neuroscience and computational biology. Soon there will be computational economics, computational history, computational psychology, and many others.

The theory underlying data science comes from the mathematical and computational sciences, including

- probability, statistics, some areas of pure mathematics: e.g., geometry and harmonic analysis
- many areas of applied mathematics, such as optimization and numerical analysis

²⁶ A petabyte is 10^{15} bytes. An exabyte is 10^{18} bytes. This represents an exponential increase in the need for computers to store data and the opportunity to use the data to develop insights.

- some areas of theoretic computer science, such as computational learning theory and statistical learning theory

The methods come from the interaction of the mathematical sciences and the computational sciences, particularly

- machine learning
- computer perception, natural language processing, and other areas of artificial intelligence

The tools come from core computer science areas, such as

- visualization
- databases, distributed systems
- scientific computing
- some branches of programming languages

Application domains span a wide spectrum in the sciences that include

- the physical sciences: astrophysics, cosmology, high-energy physics
- life science: biology, genomics
- cognitive sciences: neuroscience, psychology

Applications are not limited to the sciences; they also include

- business: business analytics, finance, customer care
- medicine and healthcare: medical informatics and bioinformatics, causal inference
- engineering: prediction, fault detection
- social science: politics, economics, sociology, history
- law: text analysis for indexing and retrieval, data-driven economic modeling
- government: prediction, policymaking, causal inference

Large data-driven companies populate the New York area, including AT&T, IBM, NEC Labs/Princeton, SRI/Princeton, and Alcatel-Lucent. These companies also include large Web companies that have R & D organizations in New York City, such as Google, Microsoft, Yahoo!, Twitter, and Facebook. Wall Street companies are also in need of data science experts to make their algorithmic trading systems react quickly to changing conditions. New York also has many media companies that need data science to predict advertising effectiveness.

New York, second in size only to Silicon Valley, is fertile ground for data-driven startup companies. Quickly-growing companies such as FourSquare, Etsy, bit.ly, Knewton and many others are focused on data science. They create a critical mass of people who can acquire knowledge and expertise simply by taking a graduate program in data science. A similar technical melting pot has been an important element in the success of Silicon Valley.

Several universities have started initiatives in data science. Apart from NYU, Columbia is investing in its new Institute for Data Science and Engineering, while Cornell is setting up an applied science campus in New York with a heavy emphasis on data science. Just outside New York, Rutgers and Princeton are working on new research and education programs in this field.

The tight interaction between normally separate fields is key to the success of a data science initiative. The subject lies at the intersection of mathematics and statistics, computation, and domain expertise. NYU already has a strong presence in data science methodology, but in a number of application areas, the relevant people have been scattered across many schools and departments, without a common ground on which to exchange questions, ideas, methods, tools, and datasets.

Although there is a huge demand for data scientists in industry, existing undergraduate and graduate programs do not train students with the required set of skills: computer science programs have too little emphasis on statistics and mathematics; statistics programs have too little emphasis on computational and practical issues and on big-data issues; mathematics programs have too little emphasis on programming skills as well as on practical issues. Most important, few generalist programs provide training in how to apply the methods to problems in science, business, engineering, health care, and government.

The University-Wide Initiative

In the fall of 2011, NYU launched a University-Wide Initiative in Data Science and Statistics (UWIDSS) (nyu.edu/datascience) to:

- bring together researchers interested in data-driven science and the (automatic) extraction of knowledge from data
- fill the educational gaps in data science education, and create bridges and synergies between existing programs and courses
- establish NYU as a premier institution for research and education in data science

The UWIDSS is overseen by a steering committee led by Gérard Ben Arous, vice provost for science and engineering development and director of the Courant Institute of Mathematical Sciences. Its members include the deans from participating schools and the director of the

Center for Data Science. The role of the UWIDSS is to create synergy across schools and centers.

The budget of the UWIDSS comes from the provost's office and funds the Center for Data Science, the M.S. in Data Science, the Ph.D. in Data Science, and other aspects of the University-wide initiative.

A Data Science Working Group (distinct from the self-study working group on data science) was formed in spring 2012 with representatives from almost all NYU schools. The working group recommended the creation of a research center, two graduate programs, and a postdoctoral fellowship program (Appendix N).

- The Center for Data Science (CDS) will be a research and education center with 15 to 20 co-located core faculty. About 10 of the core faculty would be hired on new faculty lines, while the others would be existing full-time faculty. The center would also have a number of associated and affiliated faculty from the University. The CDS topics will cover methods (including statistics, machine learning, applied mathematics), tools and infrastructure (distributed databases, data curation, visualization, programming languages for data science), as well as disciplines in which data science methods can be useful. Areas of interest include the physical sciences (e.g., cosmology, high-energy physics), life science (e.g., genomics, neuroscience, cognitive science), social science (e.g., politics, sociology, economics, social psychology, education policy), medicine, digital humanities, business, and law. CDS will also work with other NYU initiatives, particularly the new Marron Institute on Cities and the Urban Environment and the Center for Urban Science and Progress (CUSP).
- A Master of Science in Data Science degree will satisfy the huge demand for people trained in all aspects of data science and will provide financial support for significant research. It is also designed to fill a gap in introductory courses for students in graduate programs who need training in the statistical, mathematical, and computational methods of data science. The degree is a two-year, 36-credit program with six required courses (focused on methods and tools), and six electives (on application domains or on more methods and tools). New York State approved the program in January 2013.
- A robust Ph.D. program is key to the success of CDS. Such a Ph.D. program is pending; it has been approved by the University's Graduate Commission and is now subject to approval by the New York State Education Department. Core or associated CDS faculty will be able to recruit and advise students through the Ph.D. program.

- Two new CDS Postdoctoral Fellows will teach special courses and carry out research. The appointments will be for two years, and they will not be linked to a particular grant or particular faculty members.

A director and a chief of staff/managing director will have day-to-day management of the Center and the two degree programs. Since the CDS is not a department, core faculty hiring, tenure, and promotions are handled by the faculty's primary home department, with input from senior core CDS faculty. Broad policy decisions pertaining to the interaction of the CDS with the rest of the University will be made by the UWIDSS steering committee and the provost's office.

If the CDS becomes a department, a possible model would be the Center for Neural Science. CNS has become a degree-granting department, with a large number of affiliated and associated faculty from many parts of the University.

Data Science Research at NYU

Research in data science theory, methods and tools involves more than 70 faculty in many disciplines and organizations, with particular concentrations in Courant, the School of Engineering, the Stern School of Business' Information Operations and Management Science (IOMS) department, and the Center for the Promotion of Research Involving Innovative Statistical Methodology (PRIISM) in the Steinhardt School of Culture, Education, and Human Development.

Several areas of data science at NYU are particularly strong, including

- **Deep Learning.** When one develops predictive models, the set of features used in constructing the models can be a critical determinant of their accuracy. Domain-specific expertise is required to identify the best features for use. Deep learning seeks to learn such features through automated means. A deep learning-based model often operates as two linked stages. In the first, all the features are available as inputs, and the outputs are the features that are judged best by appropriate criteria. In the second stage, the best features are used for prediction. Deep learning has recently revolutionized image understanding and natural language processing.
- **Information Visualization and Visual Analytics.** These techniques facilitate analytical reasoning by visual representations and interactive interfaces. They exploit the human cognitive system for sense-making and large-scale exploratory analysis of complex data. The fundamental and applied contributions of NYU faculty have had a significant impact on systems biology, genomics, neuroscience, oceanography, urban science, ornithology, climate science, and ecology.

- Data Management, Provenance, and Reproducibility. These are key requirements for data-intensive science. As the volume of scientific data grows and manipulation processes become more complex, scientists must expend substantial time managing data, designing and optimizing analyses, and tracking steps so that results can be reproduced.
- Large-Scale Computation. Faculty at Courant engage in important data science disciplines, including efficient distributed algorithms for ultra-large-scale linear algebra and stochastic optimization methods.
- Mathematical Statistics and Probability. The future of data science hinges on the emergence of new methods to represent data in high-dimensional spaces and to extract greater knowledge from available data. NYU is a world leader in a number of relevant research areas, including random matrix theory, Monte-Carlo methods, variational inference, and stochastic processes.

Current research spans the following areas:

- Methods and Algorithms: machine learning, applied statistics, computer perception, data and web mining, information retrieval, predictive modeling/time series, visualization;
- Theory, Applied Mathematics, Mathematical Statistics: algorithms for large-scale computation with massive data, computational learning theory, probabilistic graphical models and structured prediction, probability and mathematical statistics, optimization, sparse modeling;
- Software Tools and Infrastructure for Data Science: databases, data provenance, and workflow, high-performance, parallel, and distributed computing, numerical programming languages.

NYU researchers have pioneered the use of data-driven research in diverse areas of science. Many of these projects involve collaboration between methods researchers and domain scientists:

- using genome-wide micro-arrays to analyze plant responses to dynamic, fluctuating environments;
- devising learning algorithms that may explain how the visual cortex trains itself to recognize objects in images;
- relying on a worldwide grid of 1.5 million central processing units to predict the 3-D structure of proteins and the boundaries of active domains;
- understanding voters' opinion and behavior using data-driven methods;

- studying the cognitive development of infants by recording, archiving, and analyzing large amounts of video data;
- using large-scale machine learning methods to perform economic prediction of, for example, real estate prices.

A number of research centers and departments at NYU have significant activities in data science:

- The Center for Genomics and Systems Biology focuses on data-driven genomics, proteomics, metabolomics, and phenomics across all six kingdoms of life.
- The Center for Social and Political Behavior applies data-driven methods to human behavior in social and political contexts.
- The Center for the Promotion of Research Involving Innovative Statistical Methodology (PRIISM), a University-wide interdisciplinary effort focused on statistical methods for social, behavioral, education, and health sciences.
- The Center for Urban Science and Progress (CUSP) is a public-private research center which uses New York City as its laboratory and classroom to help cities around the world become more productive, livable, equitable, and resilient.
- The Computational Intelligence, Learning, Vision and Robotics Lab at the Courant Institute houses expertise in machine learning, machine perception, and artificial intelligence.
- The Division of Biostatistics in the NYU Langone Medical Center has active research programs focused on study design and collection, analysis, and interpretation of data to improve human health through innovation in methodology, theory, and application of biostatistical methods across the spectrum of biomedical research.
- The Information Operations and Management Science Department (IOMS) at the Stern School of Business has experts in machine learning, statistics and optimization.

NYU does not have a statistics department, but there are many statisticians at the University, notably in the IOMS department at Stern and in PRIISM at Steinhardt. The presence of many statisticians, machine learning experts, and applied mathematicians can help us to make strides in deriving knowledge from data effectively without a history that a department of statistics would bring.

Data Science Education at NYU

There are many courses on data science at NYU, although they are often called by other names. Typical data science course titles include machine learning, statistics, stochastic processes, data mining, quantitative methods in X, and data analytics. As of summer 2013,

the only program with significant data science content is Courant's M.S. in Scientific Computing. Other graduate programs contain some data science content:

- Center for Urban Science and Progress: M.S. and Advanced Certificate in Applied Urban Science and Informatics.
- Courant Institute: M.S. programs in computer science, information systems, mathematics in finance, and mathematics, Ph.D. in computer science and mathematics. Degrees are awarded by GSAS.
- GSAS: M.A. and Ph.D. in economics, M.S. and Ph.D. in biology
- Langone Medical Center: the health informatics and bioinformatics center
- Engineering: M.S. in information management, bioinformatics
- Stern: M.B.A. in information systems, operations management, digital marketing, Ph.D. in statistics, information systems, operations management

New Graduate Programs in Data Science

Five data science-related graduate programs were launched in September 2013, and one will begin in September 2014.

- M.S. in Data Science (two years, 36 credits): Offered by the CDS, this program is targeted at students with a strong mathematical and computational background and focuses on advanced methods for data science. The program started with a class of 29 students in fall 2013 and plans to increase to 50 to 60 new students per year in four years. The degree is awarded by GSAS.
- M.S. in Applied Urban Science and Informatics (12 months, 30 credits): Offered by the Center for Urban Science and Progress (CUSP), it is targeted at students whose primary interest is data science applied to cities. There were 24 students in fall 2013 when the program began.
- M.A. in Applied Quantitative Research (12 months, 32 credits): Offered by GSAS Department of Sociology, the program focuses on applications of large-scale statistics to the social sciences. Twenty-three students were enrolled in fall 2013.
- M.S. in Business Analytics (12 months): Offered by the IOMS department at the Stern School of Business, the program is targeted at students with a solid quantitative background and aims to equip graduates with the ability to analyze data for decision-making and business strategy. Students will share their time between Washington Square and NYU's Shanghai campus. Fall 2013 enrollment was 60 students.
- M.B.A. with a specialization in Business Analytics (two years, 60 credits): Offered by Stern, this M.B.A. emphasizes data analytics and its use in business decision-making and strategy. There were 269 students in the specialization in fall 2013.

- M.S. in Applied Statistics for Social Science Research: To be offered by the Center for the Promotion of Research Involving Innovative Statistical Methodology (PRIISM) starting in July 2014. This program will provide a firm foundation in statistical modeling tools. Students will become proficient in the use of advanced statistical methods, including causal inference and the development and evaluation of statistical models. The degree will be awarded by the Steinhardt School.

In 2014, following New York State approval, the CDS will launch the Data Science Ph.D. program. A major objective of the program is to establish itself as the premier source of top data scientists in the country. As data science becomes an established discipline, graduates from the program will take faculty jobs at other universities and, it is hoped, solidify NYU's reputation in this field.

The Center for Data Science

The Center for Data Science (CDS) (cds.nyu.edu/) eventually will house 15 to 20 core faculty whose primary research interest is data science methods and applications. The CDS will be housed in temporary space starting in 2014, with about 25,000 square feet of new space becoming available in 2016. The CDS facility will host the core faculty, about 50 Ph.D. students, several scientists-in-residence from industry, visiting scholars, technical staff and administrative staff. It will also have laboratory space, a computer room, as well as space for classes, seminars, and scientific interaction.

The data science initiative, the creation of the CDS, and the launch of the M.S. program were announced in February 2013. Two websites were rolled out, the NYU Data Science Portal at nyu.edu/datascience and the CDS website at cds.nyu.edu

Connection with the Global Network

NYU Shanghai is examining the possibility of creating a major research and educational activity in data science, with an emphasis on applications in neuroscience. The researchers and graduate students who work in New York may spend significant time in Shanghai. Conversely, the prospect of joining the NYU activity in data science, with the possibility of spending time in NYC, will attract students and faculty to the Shanghai campus.

The connection with NYU Abu Dhabi will depend in part on the availability of computational facilities in Abu Dhabi, which would attract research projects on large-scale machine learning. Abu Dhabi's location near Africa and the Indian subcontinent would facilitate the application of data science methods to issues in the developing world, including health care, disease outbreak detection, tracking and control, efficient energy management, and resource and infrastructure management.

New communication technologies would help overcome geographic constraints by helping faculty to collaborate and students to take desired courses. For example, conference rooms should be equipped with video links that enable interactions between audiences across continents. Students and researchers can virtually attend lectures, talks and seminars through video streaming and recording equipment, as well as the systematic recording of all lectures and seminars.

Faculty

The initial core faculty will be a subset of the associated faculty, plus newly-hired faculty on core data science lines. The different types of affiliations are defined as follows:

- Core CDS faculty: Faculty whose interest in data science is strong enough to want to spend significant time at the CDS physical space. Most of their Ph.D. students and postdocs will be located at CDS. They are likely to teach courses in the data science programs. They will retain their present employment arrangements. Most faculty are envisioned to be core faculty.
- Associated CDS faculty: Faculty whose main research activities are centered on data science, but who will not be located at CDS. Associated faculty may teach courses in data science programs and may advise data science Ph.D. students.
- Affiliated CDS faculty: Faculty with significant research interests and activities in data science.

Since CDS will not be a department initially, there are three ways of handling the question of recruiting new faculty on a CDS-designated position:

- CDS-affiliated lines assigned to a particular department (or two)
- Half of a joint line from a school, the other half from a data science new line
- CDS-affiliated lines whose home department is designated by the steering committee in consultation with CDS faculty

Competing agendas may emerge related to faculty hiring decisions. In accord with University procedures, hiring departments and schools will make these decisions with advice from CDS faculty. Tenure decisions for CDS-designated positions may be handled differently, in a way to be determined.

To help discover faculty interests that would lead to cross-location research projects, we propose a visiting scholars program to permit any NYU site to offer a year of research on data science at another geographic location.

Core Faculty Co-Location

Scientific interaction between faculty members often occurs when their doctoral students and postdoctoral fellows collaborate on projects. The younger generation of researchers in data-driven science will be less attached to the traditional boundaries between disciplines than their advisors. They will want to co-locate with their peers. Hence, one of the main uses of the CDS physical space will be to host Ph.D. students and postdocs from core and associated faculty. This in turn will motivate their advisors to spend significant time at the Center.

The core CDS faculty, while still members of the home departments, will be the closest thing to dedicated faculty. For practical purpose, these core faculty may elect to operate collectively as a department, except for promotion and tenure. If the CDS becomes a stand-alone department, it would create dedicated faculty and would further encourage co-location of faculty from other departments and schools in the CDS physical space.

Promotion and Tenure

Junior faculty in some departments may resist co-location for fear that their lack of daily interaction with the senior faculty in their departments will negatively affect their tenure prospects. Maintaining two offices is neither efficient nor comfortable, but experience has shown that faculty with joint appointments rarely have problems gaining support from senior faculty from the department in which they have a secondary office. For example, there have been successful joint appointments between the Department of Biology and Courant. Junior faculty must be actively reassured on this issue.

Finances

The CDS will be financed primarily through tuition from its master's students and students from other programs taking its classes, sponsored research projects through government grants and sub-contracts, contributions from corporate sponsorships, and private gifts. The University is investing start-up funding and remodeling costs for space.

The CDS budget will increase to a projected steady-budget of approximately \$4 million by fiscal 2020. Tuition from the master's degree program is expected to provide the lion's share of support for the Center. As the CDS curriculum model developed, it has become clear that a significant number of the credits taken by CDS students will be in classes offered by other NYU schools or programs, such as CUSP. Under the University's "balance of trade" system, tuition for graduate courses is generally retained by the teaching school. The University will need to adjust the balance of trade rules or the CDS budget plan in order to ensure that there is an appropriate match between tuition and expenses at CDS.

In addition to the balance of trade, there is a question whether the strategic management of the budget should be set at the University level or at the Courant Institute, which has day-to-

day oversight of the Center's finances. For example, should the master's program in data science be advertised and, if so, to what extent? Such decisions have been made by Courant but it is arguable that marketing budgets and strategy are better made at the University level because the decisions affect University-wide programs.

Administrative Staff

The proposal for the initiative calls for these full-time equivalents in the fifth full year of operation: one administrative aide, one program administrator, one managing director/chief of staff, a half full-time equivalent person for admissions and development, and four technical staff.

The main computing facilities of CDS will be managed by the NYU High Performance and Computational Resources Group, alleviating the need for significant system administrator staff. The four technical staff will include software engineers to develop, maintain and distribute tools for data scientists.

Student Community

As noted above, a common identity and community for CDS will be facilitated by physical space which will house Ph.D. students and postdocs, along with the core faculty. The Center will have appropriate seminar rooms and labs. All students in a cohort in the M.S. and in the Ph.D. programs are required to take five required courses.

The CDS plans to maintain contact with students post-graduation and offer a means for potential employers to advertise positions.

M.S. and Ph.D. students will each be assigned a faculty member as an academic adviser. Feedback on student progress will be provided every semester.

Although no internships will be required, the M.S. program requires a capstone project that may be done in collaboration with an adviser within or outside the University, working with data provided by the adviser. This program is likely to create opportunities for internships at data-driven companies in the New York City area.

Career guidance will be provided by a staff member with experience in industry. In addition, an active student placement process is planned, through coaching of students on their resumes, a search site for potential employers, and a posting facility to include jobs appropriate for summer employment, recent graduates, and graduates with industry experience.

Curriculum

The Master of Science in Data Science will offer five new courses. They will be available to students in other departments.

- Introduction to Data Science. This course introduces students to basic algorithms and software tools, and teaches how to deal with data, representing data, and methodology. It provides hands-on experience using various software environments.
- Statistical and Mathematical Methods. This course briefly introduces basic statistical and mathematical methods needed in the practice of data science. It covers methods in probability, statistics, linear algebra, and optimization.
- Machine Learning. This course covers a wide variety of topics in machine learning, pattern recognition, statistical modeling, and neural computation. It covers the mathematical methods and theoretical aspects but primarily focuses on algorithmic and practical issues.
- Big Data. This course covers methods and tools for automatic knowledge extraction from very large datasets. Methods include online learning, feature hashing, class embedding, distributed databases, parallel implementations, map-reduce frameworks, and applications.
- Inference and Representation. This course covers graphical models, causal inference, and advanced topics in statistical machine learning.

The five required courses build on each other through a three-semester sequence, culminating in the capstone project. The courses have coordinated syllabi to avoid repetition and to assure prerequisite material is covered before dependent material is taught.

- a. In the first semester, all students take Introduction to Data Science and Statistical and Mathematical Models.
- b. In the second semester, all students take Machine Learning and Big Data.
- c. In the third semester, all students take Inference and Representation and the capstone project course.

With six elective courses, the program gives students an opportunity to pursue interests in application disciplines or in more methods.

What needs to be defined is a set of recommended elective course sequences for students interested in particular application domains. These sequences must include courses from the departments associated with the CDS.

Students in many disciplines will be able to take advantage of the increased availability of data to derive knowledge by automated means. These students may want to take some of the master's degree courses that focus primarily on methods (mathematical and computational) because other data science-related programs at NYU tend to focus more on applications, often in specific domains.

The capstone project course needs to be developed from scratch. The key to success will be external partners who will offer their data and problem statements and advise student teams on working problems.

Data science is very popular in online learning, particularly in open online learning courses (some Massive Open Online Courses, or MOOCs, that teach data science have enrolled over 100,000 students). But their effectiveness in teaching the material is not known and little scientific research has been done on this issue.

Recommendations

1. In its commitment of resources to CDS, line items should be clearly maintained for faculty or administrative positions, space, equipment, and Ph.D. student support.
2. The M.S. in Data Science will require additional classroom space. The first offering of the Introduction to Data Science course was completely filled for the fall 2013 semester. The course has been offered in two sections each with 60 seats. Seating for at least 200 students should be provided.
3. The University's program to assist academic initiatives seeking corporate sponsorship for research and philanthropic gifts should be examined and strengthened. Obtaining financial support is a challenge faced not only by CDS, but by many other units. As partnerships with corporations are likely to increase, a flexible University-wide approach is needed that will meet the needs of schools and programs.
4. The High Performance Computing group should provide planning support and facilities and operational support for the necessary structure for computers, coordinating all needs across NYU.
5. An undergraduate major should be established in data science. The present University-wide initiative and the CDS are focused on developing a research program and related graduate degrees, but there is demand in industry and from undergraduates for training and education in data science. In New York, there is substantial demand from companies on Wall Street, in advertising and media, pharmaceuticals and other life sciences, and insurance. A minor in data science is probably needed and the syllabi of some undergraduate courses should be made data science aware.
6. The University should pursue the question of how to make teaching data science in the classroom with an online component more effective than online teaching without an in-class experience.

7. Financial decision-making should be streamlined to respond to the quickly changing environment that affects decisions on marketing, equipment, and educational offerings.

8. A conversation should be started about the creation of career paths for scientists and engineers with non-traditional backgrounds in which impact is measured by usage of software, tools, and data sets rather than traditional academic publications.²⁷

Conclusion

NYU has a significant opportunity to become one of the leaders in data science research and teaching. It starts with strengths in the technical disciplines, in many of the most relevant application domains, a long history of cross-department and cross-school collaboration, and its location in New York City, which promises to become the epicenter for data science.

²⁷ NYU was recently one of the universities to receive a multi-million dollar grant from the Gordon and Betty Moore Foundation and the Alfred P. Sloan Foundation (nyu.edu/about/news-publications/news/2013/11/12/nyu-part-of-five-year-initiative-to-harness-potential-of-data-scientists-big-data-with-support-from-moore-sloan-foundations.html). A major purpose of the grant is to build an ecosystem of analytical tools and research practices that is sustainable, reusable, extensible, learnable, easy to translate across research areas, and enables researchers to spend more time focusing on their science. Building such an ecosystem requires creation of roles that have durable and attractive career paths.

Chapter 6:

Insights and Conclusion

As discussed in previous chapters, interdisciplinary inquiry brings with it tremendous potential for intellectual innovation. The promise offered is to solve complex problems that exist across disciplinary boundaries. As is clear from the examples provided, problems such as rapid urbanization of the world's population, challenges in national and international economic development, public health threats, and increasing political instability are not confined within a single intellectual discipline. For instance, perspectives offered by classics, anthropology, and literary study are central to the cultural, intellectual, and political understanding of the legacies of slavery and war. The sheer complexity of many scientific problems leads many of NYU's most accomplished scholars to reach beyond their traditional departmental or disciplinary structures, as illustrated by examples in neuroscience, in the use of interactive technologies for human learning, and in genomics. Those problems are more likely to be solved if researchers are able to marshal the strengths that interdisciplinary intellectual inquiry can offer.

This chapter summarizes the strengths and challenges of this interdisciplinary approach at NYU. As an urban university with an increasingly global identity and departmental strengths across a wide range of natural sciences, social sciences, allied health disciplines, and the humanities, NYU is well-positioned to capitalize on interdisciplinary initiatives in many areas. We highlight benefits and challenges from previous chapters as issues for further discussion. We integrate those issues with short survey responses provided by additional centers or institutes in neuroscience, genomics, and media and games.

In addition, we outline evidence for ways that these interdisciplinary initiatives address key Middle States standards, and we also present recommendations for New York University and its scholarly community.

Chapter 1 outlined the fundamental elements of the Middle States standards addressed by the self-study (pages 10-11). While focused on a particular set of programs, the report itself provides an example of periodic and ongoing assessment as required by Standards 5, 7, 9, and 11. The working groups examined administrative and governance structures and issues (Standard 5), discussed ways to improve programs and further the University's mission (Standard 7), examined the current state of services and support for students and how to improve them (Standard 9), and likewise looked at the effectiveness of the educational offerings covered by the self-study (Standard 11).

The composition of the Steering Committee and the four working groups demonstrates compliance with the fundamental element of Standard 7 that institutional assessment have the

"support and collaboration of faculty and administration." The discussions in the various chapters demonstrate compliance with the selected fundamental elements of Standard 10 as to the design and maintenance of curricula by the faculty, support for faculty teaching and research, and a recognition of the "linkages among scholarship, teaching, student learning, research, and service." Finally, the areas selected for the self-study are indicative of "educational offerings congruent" with NYU's mission as an institution "in and of the city" and as a global network university. The overarching self-study theme – multischool, interdisciplinary programs – reflect educational offerings designed "to promote synthesis of learning" (Standard 11).

Strengths and Challenges

Organization, Leadership, and Governance

New York University's multischool initiatives stand against a backdrop of institutional change. Over the last 30 years, NYU has been transformed: As mentioned in the chapter on humanities and the arts, it has shifted from "being largely a commuter school to a preeminent Research 1 University" that spans national and international sites. The introductory section of this report explains that the University's size offers both challenge and opportunity: As the nation's largest private university, there are substantial organizational hurdles to be overcome in providing interdisciplinary training and educational offerings to nearly 45,000 students. Yet the depth and breadth of scholarship in many departments are major assets for interdisciplinary initiatives that can creatively overcome those obstacles.

Senior faculty members have devoted much time and effort to these interdisciplinary areas. They have shaped mission statements, strategic plans, operational plans, and degree proposals in order to realize their visions. And they have crafted compelling reasons to their departments, their deans, and the University administration for creating interdisciplinary institutes across University units, some of which have degree-granting and other authority similar to those of a school (e.g., Center for Urban Science and Progress (CUSP) and the Global Institute of Public Health (GIPH)) and others of which award degrees through an existing school (e.g., the Center for Data Science and the Media and Games Network, known as MAGNET) and still others coordinate research and academic activities rather than degree programs (e.g., Hemi, the Humanities Initiatives, Remarque).

Intellectual innovation at NYU has been supported in institutionally powerful ways: the president, provost, executive vice president for health, and other senior leaders have placed those interdisciplinary efforts at the forefront of NYU's academic and research priorities. The provost's office has committed substantial resources to hiring top leadership for the institutes and centers, as, for example, in funding the GIPH, a translational center for neuroscience that bridges NYU's School of Medicine and the corresponding Washington Square campus program, and CUSP. Procedures for governance of those new initiatives are being

established, similar to those used in most of our newer schools. Thus, advisory boards have been selected for all centers and institutes, and yearly monitoring is provided by the provost's office in order to ensure that services are fully delivered.

These programs offer visions for the future and address practical concerns, such as avoiding duplication. A high premium is placed on formal and informal coordination. Examples in the previous chapters include joint grant proposals, graduate and undergraduate training programs, and other collaborations across schools.

This coordination places high demands on faculty and administrators. Several chapters show that while the programs can manage day-to-day operations, there is little in the way of a roadmap or process for departmental functions, such as managing faculty hiring, tenure, and promotion. It is therefore sometimes necessary to consider amending school and departmental governance structures to serve these initiatives (e.g., a transparent reporting structure from the director of an interdisciplinary center to the provost's office). Mechanisms are needed so that concerns can easily filter back to department chairs with whom the new programs are coordinated. In addition, representation on governance bodies such as the Faculty Senators Council and University-wide committees may need to be established or modified.

Faculty

The central strength of these interdisciplinary, cross-school initiatives is that faculty in different programs and schools can work together in ways that are collaborative, connected, creative, and continuous (to borrow the four Cs of an earlier chapter). Similar programs, such as those focusing on neuroscience, can avoid duplication of effort and jointly hire scholars. In data science, despite the absence of a statistics department and the centrality of big data within the natural sciences, social sciences, applied mathematics and finance, a large number of schools and departments house faculty with relevant knowledge. For places such as the Center on Genomics and Systems Biology, there is also heightened opportunity for new efficiencies. Affiliated faculty employ administrative and technical staff and mentor large numbers of doctoral students who could be more closely connected through a single University support system. For smaller centers and institutes, faculty can leverage their shared interest in digital archiving and scholarship to justify University investment in new technologies.

Widespread concerns are faculty hiring and retention, and the allocation of faculty time to meet the rapidly rising demand for instruction in new programs. Senior leadership has made joint hires a key priority to meet this demand. Earlier chapters reveal that the University needs to align hiring priorities and processes. The apparently desirable concentration of faculty within a single facility carries risks. The chapter on data science, for example, highlights the ways in which relocating faculty to a single building could lead junior faculty

to be “missed” by their home departments, and thus cause strain or a sense of distance at a vulnerable point in their careers.

A key mechanism for maintaining support and oversight of faculty will be continued program review in ways that meet Standards 7 and 10 of the Middle States Standards. Current mechanisms include, (1) processes of tenure (2) promotion at the faculty level (with review continued at levels of the department, school, and provost’s office), (3) annual program reporting at the departmental level, and (4) dean’s reviews by external reviewers every five years. As cross-school initiatives mature, they will be incorporated into these review processes.

The provost’s office recently carried out a review of the director of the Institute for the Study of the Ancient World, following the protocol for school deans. This included extensive preparation and review of relevant documents (such as mission statements), a site visit by three external reviewers from other universities, and interviews of faculty, students, and lead administrative staff by the external review team. In this and similar cases, senior University leadership discusses the report with the dean or director. This process provides evaluation of the dean’s or director’s oversight of and engagement with faculty, including issues germane to Standard 7, such as leadership and governance at the institute level.

The review also addresses the Middle States Commission on Higher Education’s Standard 10, where issues such as faculty workload and the quality of instruction are evaluated. This process will be extended to directors of cross-school initiatives after they complete five years of service.

Students

Cross-school collaboration provides students with an opportunity to explore different epistemological traditions as they study a scientific or intellectual problem. In some cases (such as public health and data science), the combination of disciplinary perspectives occurs through sequenced course-taking in different fields. In other cases, students engage in discussion of the intellectual value of a course of study through a single capstone course, such as the What Are the Humanities? course that introduces first-year students to the complexities of humanities education and scholarship. Cross-school programming through these initiatives allows students to meet pedagogical goals of critical thinking, fluency in causal inference and quantitative reasoning, and the development of communication skills. In the humanities as well as genomics, the study of cities, and data science, large questions in ethics, morality, and global citizenship are addressed.

Cross-school initiatives also are likely to spur students to become producers of knowledge in a rapidly evolving intellectual landscape. For example, interdisciplinary work expands our understanding of what counts as “artifact” or data. It also enables us to capitalize on new

methodologies, technologies, and scholarly frameworks, and to interpret artifacts and data in new ways.

In some areas of interdisciplinary scholarship, there is a vibrant new market for training students. For instance, there is high demand for curricular focus on interdisciplinary perspectives on Global Public Health as illustrated by 10 undergraduate joint majors with departments as wide-ranging as anthropology (in the Faculty of Arts and Science), nursing (in the College of Nursing), and media, culture and communications (in the Steinhardt School). As an index of high demand, the chapter on Cities and the Urban Environment also identifies a large number of NYU undergraduate programs with hundreds of undergraduate majors. Data Science represents another opportunity to tap high student demand for an interdisciplinary program of graduate training for careers in business analytics, genomics, and cognitive neuroscience. NYU hopes that the Center for Data Science becomes a key contributor to training a highly skilled workforce that will provide broad benefits for the city, the region, and the nation.

Interdisciplinary training may also be the way forward in an increasingly tight labor market in humanities and the arts. As discussed in that chapter, the most competitive students are often trained across two disciplines. With the rise of new technologies, job markets will likely continue to be interdisciplinary – examples in digital media from the MAGNET collaboration and the arts, such as new developments in digital recording and film production, demonstrate the need for students to bridge performance and production. Faculty must expand their curricular offerings beyond narrow methodologies to prepare students for diverse job markets.

This interdisciplinary focus also helps the Washington Square campus to connect with study away and portal campuses throughout NYU's global network. For example, multidisciplinary undergraduate programs capitalize on our sites in Abu Dhabi, Accra, Berlin, Florence and Shanghai for case studies of urban study and design. Similarly, policy and practical experience in low and middle income countries assists students enrolled in the graduate program in global public health. And the Center for Genomics and Systems Biology (CGSB) in New York is developing a sister center at NYU Abu Dhabi, whose director is also the provost of NYU Abu Dhabi. Currently, the faculty hired at NYU Abu Dhabi in biology link to both the Abu Dhabi and New York CGSB.

These curricular offerings are complemented by opportunities for scholarly exchange with investigators around the globe. For example, the NYU Abu Dhabi Institute offers conference and workshop programming designed to bring NYU scholars from Washington Square and elsewhere to Abu Dhabi for collaborative scholarship. The Abu Dhabi campus and other NYU global sites have tremendous potential as interdisciplinary crossroads, as demonstrated

by recent conferences on the Indian Ocean Project, the *Tales of the Arabian Nights*, Genomics, the Coral Reef Project, and a workshop on Women and Computing.

The downside of this level of innovation is what might be termed “the challenge of the new” – on both theoretical and pragmatic fronts. The lack of an historical anchor to some of this innovative work can be taxing for students, and the bounds of the interdisciplinary topic can be more unclear, or less easily articulated, than needed to shape research and pedagogical aims. Our study of cities illustrates the challenge. Research on physical and human dimensions of cities includes engineering, political science, sociology, history, architecture, law, and urban planning. Indeed, it may be hard to define what fields would not fit within such an expansive intellectual umbrella.

There is a risk that the scholarly boundaries, in crossing multiple disciplines, can become too amorphous, expansive, and diffuse. From a student perspective, in particular, the heterogeneity of programs across schools may be confusing. For example, an undergraduate degree can be sought from the Environmental Studies Program within the social sciences, the Metropolitan Studies Program, the Urban Design and Architecture Studies Program within the humanities, and programs in the School of Engineering. In such cases, one or more faculty members from each of the programs take responsibility for coordination. In addition, directors of programs meet regularly with the Senior Vice Provost of Academic Affairs in University-wide committee meetings to address issues of potential overlap. The process of self-study for this report is an important step in addressing the challenge of multiplicity.

All cross-school, interdisciplinary programs have strong incentives to communicate to students their scholarly aims, pedagogical objectives, and learning goals. Programs also must meet accreditation benchmarks for assessment of student learning. Programs will continue to be monitored by several associate deans of academic affairs to insure that they meet Standard 11, i.e., that the “educational offerings display academic content, rigor, and coherence that are appropriate to its higher education mission.” Programs also receive extensive support from administrators at school and University levels to put assessment processes in place so that they also meet Standard 14, insuring that “students have knowledge, skills, and competencies consistent with institutional and appropriate higher education goals.”

To meet these standards, extensive support is given to cross-school initiatives from the schools’ Offices of Academic Affairs. In addition, support is available through the University’s Office of Academic Program Review and the Office of Academic Assessment. The Office of Academic Program Review is responsible for new program registration with the New York State Education Department, as well as monitoring changes to currently registered programs. In that role, the senior leadership offers regular consultation as well as oversight of new degree-granting programs that span multiple schools. Similarly, staff members from the Office of Academic Assessment meet with program faculty, staff, and

administrators to aid in the design, analysis, and use of assessment plans. Administrators from new interdisciplinary programs are invited to participate in University-wide training opportunities and coordinating bodies, such as the University's Assessment Council.

Administration

This report shows that faculty interest in interdisciplinary work must be matched by significant investment of time and money. Schools make substantial investments by dedicating resources to cross-school initiatives. The provost's office has provided programmatic support, teaching and meeting space, and specialized facilities. Among NYU's anticipated expenses are high startup costs, including associated computing facilities costs and administrative effort to get new degree-granting programs crafted, reviewed, and prepared for launch.

Of particular importance to many initiatives is increased investment in information technology. Three NYU-based digital humanities projects highlight the rapidly rising demand for more sophisticated technologies. The MediaCommons is a community-driven network for scholars, students, and practitioners in media studies. The Hemispheric Institute's Digital Video Library and the Data Library for modeling human behavior within the data science initiative will place massive storage demands on NYU units, and a higher level of demand is also likely as the University adjusts to new forms of book production and manuscript review. These investments are aligned with major priorities identified by the University's faculty and senior leadership and are part of long-range planning.

In addition, the University's administrative structure allows for regular oversight of these cross-school initiatives, in keeping with Middle States Standard 5. This includes extensive annual budget review through the University's Office of Budget and Financial Planning, which is responsible for preparing and managing the consolidated annual operating and capital budgets and multi-year financial plans for New York University's Washington Square and international campuses. Reporting to the University's chief financial officer and the provost, the vice president of budget and planning and his staff work closely with center directors, unit fiscal officers, deans, and the University Leadership Team to establish budgetary and financial planning parameters, budgetary controls, and decision-support analysis for all new cross-school initiatives. Oversight is also provided during senior leadership meetings.

The leaders of programs, departments, and schools are sufficiently flexible in governance to permit these multischool efforts to flourish. For example, MAGNET works with four deans and their academic staffs (Tisch, Steinhardt, Polytechnic, and Courant).

New institutional structures may have to be crafted to meet the research and training objectives of faculty who work at, for example, CUSP, the Marron Institute on Cities and the

Urban Environment for Cities, the Center for Data Science, MAGNET, a new Center for Genomics and Systems Biology, and GIPH, all of which need administrative and governance structures, academic offices, fiscal arrangements and appropriate space. Interdisciplinary work in the humanities and the arts also spans provostial research institutes as well as departments and schools: These include the Hemispheric Institute, the Humanities Initiative, the Remarque Institute, and the Abu Dhabi Institute.

Assessment

The University has extensive processes in place for performance review and improvement at the school level, including review of each school's dean every five years. This includes confidential reporting to the provost by an external team comprised of prominent scholars and administrators from NYU's peer institutions. The review process might be extended to include center directors as the centers mature. The University has also initiated an extensive project on the use of quantitative metrics to track departmental and school-level progress in meeting academic, scholarly, and fiscal benchmarks (Appendix O).

As pointed out earlier, the size of NYU's faculty, its quality, and rankings have risen substantially since NYU's last review by the Middle States Commission on Higher Education. Since 2005, NYU has seen the creation of over 100 new positions in the Faculty of Arts and Science humanities departments, the creation of the Institute for the Study of the Ancient World and the growth of the Gallatin School of Individualized Study. Bodies such as the National Research Council have placed some NYU programs in first through fifth place for scholarship and training of graduate students (e.g., in American Studies, Comparative Literature, Performance Studies, Mathematics, Microbiology, and German) and other departments (e.g., Spanish and Portuguese, Philosophy, the Institute of Fine Arts) within the top 10. As cross-school initiatives become more firmly anchored, faculty and administrators will have the opportunity to set and meet new targets.

In addition, all degree-granting programs offered through these cross-school initiatives pass through an extensive University review. As mentioned earlier, these include the University's Office of Academic Program Review, as well as the University-wide committees on undergraduate curriculum or the Graduate Commission. These committees include a representation of deans as well as senior members of the provost's office. The Graduate Commission reviews all new master's and doctoral program proposals to ensure that they maintain comparable standards of work and there is no curricular overlap. Each new program proposal must pass four levels of review:

1. School level
2. University level: Undergraduate Curriculum Advisory Committee
nyu.edu/academics/academic-resources/program-approvalprocess/advisory-

[committees.html#ucac](#) or Graduate Commission [gsas.nyu.edu/object/grad.about.apr.htm](#) which review new program proposals four times each academic year.

3. Office of Academic Program Review [nyu.edu/academics/academic-resources/program-approvalprocess.html](#) and Office of Academic Assessment [www.nyu.edu/academics/academic-resources/academic-assessment.html](#)
4. New York State Education Department

New program proposals that are submitted to the Graduate Commission must contain extensive data on maintenance of standards, comprehensiveness, and non-duplication with existing programs. New programs must also include a student learning outcomes assessment plan approved by NYU's Office of Academic Assessment. In this way, programs meet threshold criteria in keeping with Middle State's Standards 11 and 14.

Additional support is available to aid multischool initiatives in meeting Standard 14. Each interdisciplinary program is required to comply with the same University-wide academic assessment requirements expected of discrete degree offerings. The programs must not only identify student learning outcomes for their educational offerings, but must demonstrate that they are actively engaging in the collection, analysis, and interpretation of a range of different types of student assessment. In many cases, interdisciplinary offerings, such as cross-unit dual degrees, comply with this requirement through the assessment cycles of the programs that comprise the interdisciplinary offerings. In other cases, interdisciplinary programs have chosen to define distinct learning outcomes and assessment cycles independent of their single-degree affiliations.

Centers that cross schools and disciplines are encouraged to use the resources offered by the Office of Academic Assessment (OAA) to meet these standards. Reporting directly to NYU's academic leadership, the OAA collaborates with the Office of Academic Program Review and the Office of Institutional Research and Program Evaluation to provide decision-making bodies with insights from aggregated course, program, and student learning assessment results and how programs are using results to improve learning opportunities.

As multischool programs begin to offer degrees, their academic officers will continue to work with the OAA to implement and strengthen their assessment plans. For example, the M.P.H. program offered in GIPH offers a rich assessment structure, including measurable objectives and targets across teaching, research and service. GIPH recently filled the new position of director of planning and assessment, who will oversee the evaluation requirements for recently launched GIPH-related offerings. Student learning assessment for these new, combined degree programs (e.g., B.A. in Global Public Health and Anthropology)

requires an increased level of cross-unit collaboration, as faculty from separate schools and departments must jointly define appropriate learning outcomes and assessment strategies.

The development of cross-school programs and centers has strengthened a broader sense of assessment, beyond just student learning outcomes. For example, the Center for Data Science, which consists of its own faculty and faculty from other departments and schools, has been developing a new series of metrics and benchmarks designed to assess goals associated with student learning outcomes, recruitment, reputation, advertising, graduate placement, use of learning technology, finance, and compliance with NYU policies. A review of different programs' missions, benchmarks of student learning, and different targeted job markets will help programs to communicate their distinctiveness.

Conclusion

The theme of multischool programs and their interdisciplinary features has proved a powerful lens to study the current and future New York University. Using it, working groups of faculty, administrators, and students from across the University have examined a variety of initiatives that have ambitious research and pedagogical plans for the first decades of the 21st century. They have also articulated pathways for deepening these programs and tackling the significant operational, fiscal, administrative, and, above all, academic challenges that lie ahead.

To achieve these goals the University must maintain a level of excellence in multi-disciplinary work that will justify the effort and resources that are necessary to invest. However such efforts are organized, whether school-centered or not, the University must have the good judgment and flexibility to make appropriate adjustments. Similarly, NYU will have to take account of its extensive global campuses and sites in assuring that faculty and students maximize the benefits of interdisciplinary study.

New York University has achieved high ranking and visibility as a research university. With the increasing prevalence of interdisciplinary inquiry and its potential to address intellectual and societal issues, the development of multischool programs that span a range of disciplines should help to maintain the University's trajectory for a long time to come.

List of Recommendations

Public Health

1. Strengthen communication across the University. As new interdisciplinary programs emerge, the University's many constituents would benefit from learning more about developments. The director of the GIPH has met with faculty, staff, and administration, and shared her plans with faculty in all participating schools before implementing them. In addition, including students and alumni on committees (or otherwise obtaining their views) helps to identify challenges, foster interdisciplinary dialogue, erase misconceptions, and develop solutions.
2. Review University bylaws, policies, and procedures to identify those that facilitate or impede interdisciplinary collaborations. Such topics could include promotion and tenure, student grievances, and academic progress.
3. Improve coordination of practice-based initiatives and requirements. One of NYU's strengths is its commitment to experiential learning opportunities – locally and abroad. While the GIPH and its partner schools all have strong practice components and rich databases of relationships with organizations and agencies, efforts are not always coordinated. The University should consider establishing a committee – perhaps with the Wasserman Center for Career Development – to consider challenges and opportunities to promote practice-based activities in New York and at the global sites.
4. Create information technology platforms. There is an increasing need for technology to assist in the delivery of complex interdisciplinary academic models such as the GIPH. Three such possibilities are (a) improving access to secure communication across schools, campuses and global sites, including effective ways to share confidential information such as student and admissions data; (b) considering interdisciplinary programs when selecting and designing university-wide software systems such as Albert, UDW+, and alumni databases; and (c) developing innovative uses of technology in delivering interdisciplinary education in the classroom and the field.
5. Strengthen linkages with the public health workforce, whose needs evolve at a rapid pace. The GIPH will benefit from leveraging the expertise of constituents across disciplines. Steps have already been taken in this direction through the development of a GIPH external advisory board and an annual workforce development survey.
6. Develop platforms to facilitate interdisciplinary research. To encourage collaboration while reducing administrative barriers among schools, centers and institutes, the University should consider improving the research infrastructure.

7. Assess financial planning. As the combined undergraduate majors in this field are new to the University, it will take several years to evaluate enrollment trends and faculty assignments in the GIPH courses and their impact on partner schools' financial plans. In addition, the GIPH financial model will alter the internal flow of revenues and expenses and may present new challenges for governance, accountability, and equity. Finally, open communication and transparent processes among the collaborating schools and the University will be needed in short- and long-term financial planning.

Cities and the Urban Environment

1. Improve Communications, Collaboration, and Coordination on Research

There sometimes has been limited coordination across units of the University. For example, in the fall of 2012, both the Institute for Public Knowledge and the Urbanization Project offered research seminars on Mondays at noon. The schools, research centers, and institutes should share calendars of events and seminars so as to avoid conflicts.

The research centers and faculty working on cities and the urban environment could collaborate more on funding proposals. This could likely produce more competitive proposals than they could on their own. The new Marron Institute might consider holding competitions for seed grants to encourage multischool research on pressing urban topics, like informal settlements, migration, or environmental hazards. It might adopt a different theme or a set of themes each year. Similarly, it might launch an annual book series, with each volume including contributions from NYU faculty on a particular issue. The Institute could also organize a cross-campus conference each year, focused on an urban theme that might result in publications.

Departments and schools hiring in the urban area should invite relevant faculty outside their unit to attend job talks and meet candidates.

Communication to the broader community has also been limited. The University should do more to get the word out about the research being done. The new Marron Institute is well-positioned to play this role.

2. Improve Communications, Collaboration, and Coordination on Teaching

The University should explore ways to make it easier for students to learn about and cross-register for relevant urban classes outside their own units. It may also want to explore reforms to its tuition-revenue sharing policies to make sure that they are not discouraging cross-registration or the development of jointly-listed, multidisciplinary classes.

3. Undertake Regular Review of Graduate Programs

The University currently offers a number of master's programs related to cities, several of which compete for students. While University administrators and committees review possible

areas of overlap when considering proposals for new programs, the University should review existing graduate programs to spot duplication.

4. Consider Establishing a New Undergraduate Program

The University has four multidisciplinary majors in cities and the environment for undergraduates and their faculty members virtually all agree that there is room for improvement.

One creative possibility would be to combine some of the existing majors into a department with greater autonomy. While many universities offer an urban studies or an environmental studies major, few if any have undertaken the ambitious task of creating a program that integrates the study of cities with study of the environment.

Alternatively, the University might consider developing a new nonduplicative multidisciplinary major that is focused squarely on cities and covers a broader range of disciplines than are currently included in the Metropolitan Studies Program, including courses in urban design, economics, policy, and data analysis. The University might also consider creating a minor or a concentration in cities with which students could relate their majors, such as urban sociology, politics, economics, anthropology, or history.

5. Explore Urban Fellows Programs

The University – perhaps through the Marron Institute – should consider launching a set of urban fellows programs for different groups of graduate students and postdoctoral candidates interested in studying cities.

Master's Students. Rather than starting yet another new master's program, the University should consider bolstering existing programs by establishing an urban fellows program (similar to the Reynolds Program for Social Entrepreneurship) that would offer graduate fellowships in cities and the urban environment to students from NYU's professional schools. In addition to meeting the requirements of their individual programs, students would participate in an intensive cross-school seminar on cities and the urban environment. The University might partner with New York City or the U.S. Conference of Mayors so that students could gain experience working in city government between their first and second years.

Doctoral Students. The University currently offers no doctoral programs in urban studies. Rather than starting one, the University should explore a selective urban fellows program for doctoral students doing research related to cities and the urban environment. The fellows could receive a stipend for summer research support and be required to participate in a cross-school, multidisciplinary research seminar. Such a program could strengthen students' research capabilities and help them to prepare for multidisciplinary

environments in their careers. The Predoctoral Interdisciplinary Research Training program, a collaboration among the Steinhardt School, the Wagner School, and the Graduate School of Arts and Science, funded by the Institute for Education Sciences, is a successful model of such a program designed for students interested in education sciences.

Postdoctoral Candidates. The University might also consider establishing a multidisciplinary, postdoctoral program aimed at attracting elite junior scholars from around the world whose research focuses on urban areas and issues. These postdocs might be connected to two faculty mentors – one in their discipline and one in a different discipline. A model might be the Robert Wood Johnson Scholars in Health Policy Program, which is a two-year, highly-selective fellowship aimed at recent graduates of doctoral programs in economics, political science, and sociology who are pursuing research in health policy.

6. Develop Clearer Connections with the Global Network University

The undergraduate and graduate programs focusing on cities and the urban environment should build richer connections with global campuses to expose students to urban challenges around the globe. They should consider building concentrations of courses related to cities at a few global sites to enable students to build on the education they receive in New York.

Humanities and the Arts

1. Despite financial and space constraints, steps should be taken to ensure that the institutes can accomplish their respective missions. Support in helping the institutes to engage in competitive fundraising and grant-writing, and for maintaining and finding appropriate additional space, will be key in enabling them to achieve their long-term goals such as offering diverse communities in the arts and humanities postdoctoral opportunities and expanding their virtual presence.
2. The institutes should become an integral part of the University's global mission. For example, the administration should explore ways for scholars at the global sites to interact with the appropriate institute in New York – perhaps by creating a grant-in-aid similar to that which now allows faculty and graduate students at Washington Square to study at the sites.
3. The institutes should be encouraged to engage more fully with the University's undergraduate communities, and to explore with departments and deans shared possibilities for curricular innovation.
4. The digital humanities should be acknowledged as an increasingly important aspect of humanities and arts scholarship. Coordination among the institutes as well as ongoing collaboration with the Library, schools and departments will be key in aiding faculty and

student research, developing an NYU “Profile” in DH, and ensuring that NYU plays a lead role in digital innovation.

Data Science

1. In its commitment of resources to CDS, line items should be clearly maintained for faculty or administrative positions, space, equipment, and Ph.D. student support.
2. The M.S. in Data Science will require additional classroom space. The first offering of the Introduction to Data Science course was completely filled for the fall 2013 semester. The course has been offered in two sections each with 60 seats. Seating for at least 200 students should be provided.
3. The University’s program to assist academic initiatives seeking corporate sponsorship for research and philanthropic gifts should be examined and strengthened. Obtaining financial support is a challenge faced not only by CDS, but by many other units. As partnerships with corporations are likely to increase, a flexible University-wide approach is needed that will meet the needs of schools and programs.
4. The High Performance Computing group should provide planning support and facilities and operational support for the necessary structure for computers, coordinating all needs across NYU.
5. An undergraduate major should be established in data science. The present University-wide initiative and the CDS are focused on developing a research program and related graduate degrees, but there is demand in industry and from undergraduates for training and education in data science. In New York, there is substantial demand from companies on Wall Street, in advertising and media, pharmaceuticals and other life sciences, and insurance. A minor in data science is probably needed and the syllabi of some undergraduate courses should be made data science aware.
6. The University should pursue the question of how to make teaching data science in the classroom with an online component more effective than online teaching without an in-class experience.
7. Financial decision-making should be streamlined to respond to the quickly changing environment that affects decisions on marketing, equipment, and educational offerings.
8. A conversation should be started about the creation of career paths for scientists and engineers with non-traditional backgrounds in which impact is measured by usage of software, tools, and data sets rather than traditional academic publications.