PLANNING STORY

Breaking the Mold Cornell Tech and the 21st-Century University

by Steven Jacobs, Karen Backus, Gilbert Delgado, and Colin Koop

How does a university develop a vision for a campus dedicated to fields that are largely defined by exponential change?

IN LATE 2010, NEW YORK CITY MAYOR Michael Bloomberg announced one of the most novel and aspirational initiatives of his mayoralty: the City of New York would try to attract a top-ranked applied sciences university to establish a new, from-the-ground-up campus at one of several cityowned sites. In addition to offering an extremely valuable commodity—free public land in New York City—the Bloomberg administration was also prepared to offer up to \$100 million in capital subsidies.

Exactly one year after the launch of this initiative, the city selected Cornell University and its partner, the Technion– Israel Institute of Technology, to develop a new applied sciences campus on Roosevelt Island. With no time to rest on their laurels, the winners of this competition immediately began to turn their vision for Cornell Tech into reality, creating a truly 21st-century urban university—a graduate-only institution wholly dedicated to technology commercialization and entrepreneurship in fields and forms that fit the economic strengths and needs of New York City. To meet the project's ambitious objectives, Cornell would have to break the mold and pursue an approach never before seen in American higher education.

PROPELLING NEW YORK CITY TO TECH PREEMINENCE

Why did New York City, one of the world's most global and energetic metropolises, feel the need to woo out-of-town universities with free land and money? Part of the answer can be found in the wake of the 2008 financial crisis. The crisis hit the finance sector hard at a time when the city's economy was still very dependent on Wall Street.

The Bloomberg administration saw the potential for the tech sector to help diversify the city's economy, yet there were a number of challenges to overcome. While New York City already boasted several academic institutions with excellent programs in engineering and the applied sciences, none ranked in the top 10 nationally. And, despite the presence of Google's east coast headquarters and a roster of successful tech start-ups, New York lagged far behind Boston and the San Francisco Bay Area as a major hub for tech companies and tech talent.

In meeting after meeting held by New York City Economic Development Corporation officials with local industry heads and thought leaders, a theme emerged: to grow New York's tech economy, the city would need many more engineers and computer scientists than it was presently producing—and it would need to keep them in New York by embedding them in the city's leading industries of finance, media, advertising, entertainment, and health care. The idea of a new, top-flight research university with a focus on engineering and the applied sciences that would transform New York City into a tech center of global preeminence began to take shape.



CORNELL'S UNPARALLELED OPPORTUNITY

In December 2010, the city issued a Request for Expressions of Interest to leading universities around the world and offered five city-owned sites for the project. The city received an astonishing 18 responses from 27 institutions both foreign and domestic; among those respondents was Cornell University. For Cornell, a private Ivy League institution and New York's land-grant university, an expanded presence in New York City was an already-established institutional goal. While Cornell's medical school and some smaller programs are located in Manhattan, the university's main campus is in the city of Ithaca in a largely rural region of central New York State that is four hours by car from New York City. Ithaca and its surrounding county together have a population of only 101,000 with no nearby large cities and relatively few transportation links.

Though Cornell's engineering school ranked in the top 10, its relative remoteness hindered both industry partnerships and recruitment of top talent. Cornell's leadership saw that a strong foothold in New York City would allow the university to more fully access and leverage the city's assets while also enhancing its land-grant mission to serve all of New York State. Further, the Bloomberg administration's offer of land and capital presented an attractive opportunity to accelerate Cornell's existing efforts to expand in New York City.

ORGANIZING AN INSTITUTION

From the start, Cornell's approach to responding to New York City's solicitation was top-to-bottom engagement, with full commitment from then university president David Skorton and the Board of Trustees. Then university provost W. Kent Fuchs led a working team comprising the deans of the College of Engineering, the faculty of the Departments of Computer Science and Information Science, and a senior administrator from the College of Engineering, supported by staff from numerous departments. This team worked closely

with four faculty committees charged with developing an interdisciplinary core program designed to address changing pedagogical needs in the applied sciences. This nascent core program would serve as the framework for the academic vision of Cornell Tech.

In addition to support from university leadership and faculty, Cornell marshaled the support of its student body and alumni, many of whom were tech industry leaders in New York City, Boston, and Silicon Valley. A viral petition supporting Cornell's response to New York City's solicitation garnered over 20,000 signatures.

To serve as project manager, Cornell's leadership engaged U3 Advisors (formerly K. Backus & Associates), a New York City-based real estate consulting firm that specializes in strategic planning and development for universities and other nonprofit clients. U3 Advisors would assist Cornell with crafting its vision, identifying appropriate team members, and managing the multiple streams of work that would be required to respond effectively to the Bloomberg administration's solicitation. Cornell also hired Skidmore Owings & Merrill as its master planner in addition to procuring land use counsel, a lobbyist, and a public relations consultant.

BUILDING A NEW VISION FOR AN APPLIED SCIENCES CAMPUS

How does a university develop a vision for a campus dedicated to fields that are largely defined by exponential change? Daniel Huttenlocher, the founding dean of Cornell Tech and former dean of computing and information science in Ithaca, noted that Cornell Tech is "the first graduate research institution where someone is trying to design it from the ground up in the information age.... That is a very abstract goal and, frankly we don't understand the consequences of trying to design something for a new age right now" (Nir 2012, ¶ 7–8).

In developing a response to New York City's Request for Expressions of Interest, Cornell's leadership expanded and refined ideas they had already been considering concerning the development of a new university model for the applied sciences. A key consideration for Cornell, which also aligned closely with the objectives of the Bloomberg administration, was the creation of an academic culture that nurtures local start-ups and job creation—as opposed to the more traditional corporate sponsorship model that, while financially attractive, can siphon off innovation and jobs. Cornell did not wish to replicate existing peer models in which substantial multi-year corporate investments in joint research projects are sought in exchange for the right to use applications licensed by the university. Cornell saw from experience that this approach, while getting research funded, often tends to choke off startups and move jobs and other benefits of intellectual property to existing corporate sponsors, who are often not local.

Cornell instead envisioned a campus that promoted a different kind of commercial partnership-multidimensional, focused on students, and spanning all stages of business growth. Under this model, Cornell could position itself as the focal point of the growing tech ecosystem in New York City by seeking commercial partnerships in which dynamic companies could work directly with Cornell students, those companies' employees could work in Cornell labs, and Cornell researchers could pursue applied research topics of mutual interest. Both Cornell and New York City would benefit as the university could more effectively give its graduates and faculty the tools they needed to start their own companies and the incentive to stay close to home.

HUB-BASED MODEL

In developing this new model, it is important to note that early on Cornell rejected the idea of traditional academic departments and instead envisioned a campus that would be organized around interdisciplinary "hubs" designed to put technology and enterprise on an equal footing-and to engage

the multiple disciplines that are essential to connecting cutting-edge education and research to real-world impact. The hubs were designed to draw on the core technical disciplines of computer science, electrical "engineering, information science, and operations research and to leverage the specific strengths of the New York City economy.

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As such, the hubs would also draw on a broad range of other disciplines, including business, communications, design, economics, and public health, that are critical to technologydriven innovation.

Cornell proposed three initial hubs: (1) Connective Media, which would help New York City bridge the gap between technology and its uses in such industries as advertising, entertainment, finance, publishing, and retail; (2) Healthier Life, which would promote research focusing on technologies to drive down health care costs or improve the quality of health care services; and (3) Built Environment, in which faculty and students would use research and technology in architecture, construction, energy, and transportation to help realize the promise of a more sustainable environment. The hubs would be dynamic, evolving as needed to keep abreast of rapidly changing trends in both technology and markets.

DEVELOPING A COMPETITIVE STRATEGY

Cornell submitted its response to New York City's Request for Expressions of Interest in the spring of 2011, outlining its vision and framework for the three interdisciplinary hubs, providing high-level architecture and design plans, and stating interest in three potential city-owned sites: Roosevelt Island, Governors Island, and Downtown Brooklyn. Cornell initially proposed a project of only 650,000 square feet.



Soon after, the Bloomberg administration informed Cornell that, along with over 20 other leading academic institutions from around the world, it was now invited to respond to a much more far-reaching Request for Proposals. In addition to a fuller outline of the proposed academic program, the RFP would require Cornell to identify a site and provide a master plan, a phasing plan, and a detailed financial analysis that included sources and uses of funds for both Phase I and the full build-out along with operating budget projections. Perhaps most importantly, all respondents would be required to develop a concrete approach to building the innovation economy in New York City through company start-ups, industry partnerships, and a general culture of entrepreneurship.

Cornell had several advantages over its competitors. As a New York State-based institution, it had over 50,000 alumni living in the New York City metropolitan area, and its alumni and trustees were well represented among the city's business, civic, and cultural leaders. In addition, with large capital projects at Weill Cornell Medical College, the university had already demonstrated a strong development track record in New York City and could assemble a team of outside professionals with deep experience in negotiating with the City of New York and the New York City Economic Development Corporation. Further, because of its existing presence in New York City, Cornell would be able to commence classes in temporary facilities in Manhattan within a year of being chosen, giving it an important head start in delivering on the city's goals.

However, when compared to some of its competitors—most notably, Stanford University—Cornell had some significant disadvantages. While over 2,600 Cornell-related companies had been established since 2006, the university's relatively remote location in upstate New York put it at a disadvantage vis-à-vis its California peer and the latter's well-documented role in catalyzing Silicon Valley. To address this perceived weakness, Cornell's leadership reached out to the Technion— Israel Institute of Technology, the most prestigious applied sciences university in Israel and the engine behind that country's much vaunted evolution from agricultural economy to "start-up nation." Today, the Technion, which is based in Haifa, is responsible for half the Israeli companies on NASDAQ.

As a foreign public institution, Technion is not permitted to invest in capital projects on the new campus or take an ownership stake in physical facilities. However, Technion joined with Cornell in committing to a strong academic partnership that, based on both institutions' track records, would ensure an innovative, interdisciplinary academic program with direct pathways to business formation and job creation. Technion and Cornell will issue joint degrees and jointly select and fund faculty positions within the Jacobs Technion-Cornell Institute at Cornell Tech.

Early in the process, Cornell also decided that its proposed campus in New York City would adopt a design strategy that physically manifested its commitment to innovation and environmental sustainability: its flagship academic building would be "net zero," meaning that the total amount of energy used by the building on an annual basis would be equal to the amount of renewable energy created on-site. This would be achieved primarily through photovoltaic panels and on-site geothermal wells.

Finally, Cornell was able to leverage its vision—and counterbalance Stanford's far superior financial capacity—by securing a \$350 million gift from a Cornell alumnus, Charles Feeney, through his foundation Atlantic Philanthropies. This gift would be dedicated to funding the full cost of implementing the first phase of campus development, putting Cornell in a financial position that few competing universities could match.



REFINING THE VISION: THE PHYSICAL CAMPUS

Initially, Cornell had considered three city-owned sites for its new campus, but by the time it developed its response to the Bloomberg administration's Request for Proposals, the university had clearly determined that the site on Roosevelt Island was the most desirable. As the only city-owned site with excellent subway access, this 12.5-acre parcel on the southern portion of a narrow, densely populated island in the East River between Manhattan and Queens was seen as the best option for accommodating Cornell's research and teaching needs while fostering its commercial partnership mission (figure 1). The site, which was occupied by a city-owned hospital scheduled for decommission, provides quick and easy access to Manhattan and the East Side research medical corridor and is adjacent to the increasingly lively commercial centers

of Long Island City and Western Queens-neighborhoods that Cornell viewed as integral to accommodating the space needs of companies incubated at the tech campus.

While the site required rezoning and other discretionary land use approvals, Cornell elected to pursue a special district approach that would provide it with enormous future flexibility-and the ability to accommodate up to 2.1 million square feet of floor area. Of this, Cornell would devote an estimated 700,000 square feet to its academic program, leaving 1.4 million square feet for housing, an executive education center and hotel, and commercial space to accommodate tech companies, both large and small, seeking to co-locate with the research going on at Cornell Tech (figure 2). Together, these components would define an urban campus community connected to a vibrant and growing commercial technology sector.



Figure 1 Cornell Tech Context Plan





Figure 2 Cornell Tech Full Build Site Plan



MASTER PLAN

In developing a master plan for the Cornell Tech campus, the university and Skidmore Owings & Merrill (SOM) sought a design that promoted both connectivity and sustainability while making a striking visual statement (figures 3 and 4). Cornell and SOM believed that an institution dedicated to technology and enterprise must be unusually open, externally as well as internally, encouraging its constituents to reach out not only across academic boundaries but also beyond the campus perimeter. The campus therefore was designed to promote collaborative connectivity and flexibility, assuring that academic, research, and commercialization spaces would exist side by side with porous boundaries in between. As described by Dean Huttenlocher, Cornell's objective is "an environment with constant interaction ... this is a very important piece of the culture we're trying to create" (Pérez-Peña 2013, ¶ 18).

Figure 3 Cornell Tech Aerial View (1)



Figure 4 Cornell Tech Aerial View (2)





To advance these goals, SOM adopted six key design concepts to serve as planning principles for the campus master plan:

- 1. RIVER-TO-RIVER CAMPUS. Located on a narrow island between two channels of the East River, the campus will engage the riverfront esplanades on both its east and west perimeters and promote visual and physical connectivity.
- 2. DIVERSE COLLECTION OF OPEN SPACES. Anticipating that interior spaces in campus buildings will be open and collaborative workplaces, the design of exterior open spaces on campus will mirror this approach with "outdoor rooms," amphitheaters, lawns, and esplanades to create a sense of openness and accessible connections. In addition, over 500,000 square feet of outdoor space on the campus will be open to the public, creating a place where everyone is welcome to come together for lectures, sporting events, concerts, and other events-or simply to relax and enjoy the views.
- RELATIONSHIP BETWEEN INDOOR AND OUTDOOR 3. SPACES. Interior ground-floor spaces in each of the campus's diverse buildings will spill out onto the exterior public spaces in a manner that promotes casual interaction and encourages continuous dialogue among students, faculty, and commercial partners.
- 4. NORTH-SOUTH PEDESTRIAN SPINE. A physical pathway that meanders from the north perimeter to the south perimeter of the campus will serve as both a connective channel and an organizing element. The pedestrian spine will also link each of the campus's outdoor "rooms" and public gathering spaces, which are designed to be a destination and meeting ground for the entrepreneurs, scientists, and businesses that will make up the Cornell Tech community.
- 5. BUILDINGS OPTIMIZED FOR USE AND PERFORMANCE. Buildings on the Cornell Tech campus will be designed to stimulate interaction and the free flow of information. Features should include open interior spaces and

programmed exterior rooms that are connected, reconfigurable for optimal use, and designed around idea creation.

6. A LIVABLE AND SUSTAINABLE CAMPUS. The master plan for the Cornell Tech campus will incorporate stateof-the-art elements that promote sustainable design with minimal environmental impact. Beyond its plan to develop the first academic building as one of the country's largest net-zero energy structures, Cornell envisioned the tech campus as a living laboratory of sustainability, much of it guided by expertise from Cornell's Ithaca campus, where faculty and students continuously explore and implement solutions to sustainability challenges in the built environment. Consistent with this principle, Cornell also pursued cutting-edge "passive house" technology for the 250,000-square-foot residence building for students, faculty, and staff.

Importantly, Cornell committed to adhering to each of these principles through all phases of construction, promoting the concept of a "complete campus" from day one.

PRIVATE ENTERPRISE AND THIRD-PARTY DEVELOPMENT

The involvement of private enterprise on the Cornell Tech campus was always a foregone conclusion as the integration of business and entrepreneurship into degree-granting programs is a fundamental element of the project's vision. In developing a new model for the 21st-century university in which nontraditional commercial facilities such as corporate co-location offices, incubators, demo space, and ancillary retail are key, third-party development partners play an integral role. Of the almost 800,000 square feet of facilities to be built in the campus's first phase, nearly 75 percent will be owned in whole or in part by third-party developers.



In part, this development structure was born out of necessity; Cornell had identified a need for 700,000 square feet of academic space on a site that could accommodate over two million square feet. While this provided a tremendous opportunity to develop the types of ancillary facilities that would serve the campus's larger mission, Cornell neither had the financial resources to undertake such a massive project on its own nor was such development a core strength of the university. By relying on third-party developers, Cornell could develop the vibrant multi-use Phase I campus it sought while preserving its resources and minimizing the impact on its balance sheet.

The decision to pursue private partners and leverage outside capital was therefore an early one for Cornell. The Phase I program includes an academic building, executive education center, corporate co-location building, and residential building; of these facilities, only the first two will be wholly owned by the university (box 1). Following its selection by the city, Cornell tested market interest in the non-academic buildings by issuing Requests for Expressions of Interest to targeted developers; market interest was substantial, and the RFEIs were followed by more comprehensive Requests for Proposals for a master developer and residential developer.

THIRD-PARTY DEVELOPMENT: CHALLENGES AND **OUTCOMES**

Cornell settled on a hybrid development approach, selecting New York City-based Forest City Ratner Companies as master developer for the entire campus and developer/owner of the corporate co-location building. Forest City Ratner will also develop Cornell's first academic building on a fee basis. While Cornell originally intended for the residential building to be developed and owned by a private developer as well, it ultimately decided to co-invest and enter into a joint venture with the New York City-based developers Hudson Companies and Related Companies. Cornell will develop the executive education center and seek a developer for the hotel component in a future phase.

In pursuing these third-party development partnerships, Cornell encountered a number of challenges that arose from the start-up nature of the project and the unproven market of Roosevelt Island. Despite the site's proximity to Midtown Manhattan, Roosevelt Island had always been primarily residential and slightly isolated by its geography; it had no history of commercial development that could provide a leasing track record or rent comparables for lenders. In addition, while locations outside the central business district, primarily in the boroughs outside Manhattan, often come with city-granted tax abatements, no such abatements were available on Roosevelt Island, which is technically part of the Borough of Manhattan. Finally, the target tenants for the corporate co-location building were smaller tech companies that were likely not creditworthy, presenting additional challenges in securing financing.

As a result, Cornell found that free land and "ready-to-go" sites were not enough to attract private development to such a pioneering project. Tax relief from the city, similar to the abatements offered at other non-core locations, would be essential. In addition, developers would not be able to contribute their pro-rata share of development costs and still receive a reasonable return. Cornell, therefore, had to provide additional subsidies to leverage developer investment, including contributing site development costs as "patient" equity, leasing back one-third of the space at the corporate co-location building to give the developer a credit lease, and providing a limited pledge to cover the gap between actual commercial rents and the rents needed to yield the developer's required return (box 2). While these subsidies were not originally intended, Cornell structured them so that they optimally addressed the university's needs, limited its exposure, set clear limits, and provided long-term return on its investment capital. In addition, Cornell ensured its participation in net operating income and proceeds from capital events, such as sale or refinancing. In the case of the residential building, financing challenges arose due to uncertainties surrounding the "start-up" nature of the new



Box 1 Overview of Phase I Buildings

Third Party Development: Overview of Phase I Buildings

Academic Building

- Owned by Cornell
- Developed on fee basis by Forest City
- 150,000 SF

Corporate Co-Location Building

- Owned and developed by Forest City
- 242,000 SF commercial office building Cornell will lease 1/3 for academic space

Residential Building

- Owned by JV of Cornell and developer; developed by JV of the Hudson Companies and the Related Companies
- 256,000 SF apartment building for graduate students, post-doctoral candidates, faculty and staff

Executive Education Center

- 44,000 SF state-of-the-art executive education center to be owned and funded by Cornell
- In discussions with developer for 150–200-room hotel







Box 2 Third-Party Development: Corporate Co-Location Building Case Study

Third Party Development: Corporate Co-Location Building Case Study

Challenges

- Unproven location on Roosevelt Island
- · No rent comparables
- No as-of-right tax abatement vs. other outer borough locations
- · Target tenants not creditworthy
- · How to finance?

Outcomes

- Contribution of Cornell land and site development cost as patient equity
- · Cornell space lease
- "Gap rent" deal for spec space
- · Tax abatement
- Cornell receives return of invested capital and shares in upside

Box 3 Third-Party Development: Residential Building Case Study

Third Party Development Residential Building Case Study

Residential Building

- Innovative building to express essence of campus
 - · Mixing of students and faculty
 - Experimental "micro units"
 - Sustainability aspirations
- Also a challenge to finance due to "start-up" campus and need for affordable rents
- Cornell decision to co-invest its lower-cost capital and share in upside
- Project should make money for Cornell











campus and Cornell's need for rents that would be affordable for graduate students and faculty. In this instance, Cornell elected to use its lower-cost capital to co-invest with the developer while preserving its ability to receive a return on capital and participate in any future financial upside (box 3).

PROJECT IMPLEMENTATION AND CURRENT STATUS

Mayor Bloomberg announced the city's designation of Cornell at a press conference held at Weill Cornell Medical College in Manhattan just before the Christmas holidays in 2011. The Bloomberg administration, however, would take no chances that its signature project would be delayed or derailed: as part of this designation. Cornell and the city executed a pre-development agreement that committed the university to a strict schedule of performance milestones. These would ensure closing of title by the end of Bloomberg's term in 2013 and commencement of construction by January 2015. Moreover, the campus's first phase would have to open in 2017 with a minimum of 300,000 square feet of facilities and required numbers of graduate students and faculty. Failure to meet any milestone-including interim steps, such as completion of an Environmental Impact Statement-would result in significant financial penalties and, ultimately, default.

Immediately following its designation, Cornell moved quickly to begin the city's arduous environmental review and land use approval process, including the disposition of city property, rezoning, and mapping of new streets. In January 2013, Cornell Tech welcomed its inaugural class of graduate students in temporary facilities donated by Google. Cornell successfully secured all of its land use approvals in the spring of 2013. Closing on the land followed in December, and Cornell began abatement efforts and demolition of the buildings on the project site in early 2014. Construction of Cornell Tech began in earnest in early 2015.

In June 2015, against a backdrop of cranes and heavy construction equipment, Cornell held a ceremony on Roosevelt Island to thank the many elected officials, donors, university leaders, and supporters who helped make the campus a reality. Former Mayor Bloomberg announced a \$100 million gift for Cornell Tech's first academic building. which will now be known as the Bloomberg Center. Just weeks earlier, Cornell Tech's third class of computer science students and first class of Johnson Cornell Tech MBAs received their diplomas. A Phase I campus, comprising nearly 800,000 square feet of academic, corporate co-location, residential, and executive education facilities, is on schedule to open for the 2017-18 academic year with approximately 400 graduate students enrolled. Per Cornell's agreement with the City of New York, a second phase of additional academic, corporate co-location, and residential buildings will be completed in the 10 years following the opening of the Phase I campus. By 2037, the campus is expected to grow to its full 2.1 million square feet and enroll 2,500 graduate students.

Already, Cornell Tech has forged a pioneering path in applied sciences education. A traditional, highly academic approach to pedagogy has been discarded, and the wall between academia and real-world technology has been forcefully demolished. The Connective Media and Health Tech master's programs have been launched with another hub on the way. Technology leaders from Silicon Valley are frequent visitors to Cornell Tech's temporary campus, and the former chief technology officer of Twitter, a Cornell alumnus, has been ensconced as Cornell Tech's chief entrepreneurial officer, organizing weekly practicums with start-up founders. In the first such arrangement with any academic institution, the U.S. Department of Commerce has permanently stationed a patent officer on campus to help university and community alike secure patents and licenses.

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As innovative programs continue to emerge at Cornell Tech's temporary facilities in Manhattan and campus buildings begin to rise on the southern end of Roosevelt Island, the original vision of a transformative initiative in the applied sciences for New York City is most definitely being realized. In the end, it was a successful collaboration between the city, the university, and the developers, each offering mutual concessions in the service of a shared, far-sighted vision, that brought Cornell Tech to fruition.

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