

Innovate **New York** A Project of The **LEVIN** Institute

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**Innovate NY is a partnership between
The LEVIN Institute and the New York
Academy of Sciences exploring the city's
potential to become a global leader in
innovation across sectors.**



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for their generous support.**





Matthew Nimetz
Chair,
The Levin Institute

The Levin Institute is an innovative system-wide institute within the State University of New York (SUNY). Our focus is on New York in the World. Our mission, put simply is:

“To support New York’s and the nation’s economic and social vitality through innovative and competitive responses to the challenges of today’s global economy.”

We pursue our mission by developing new models of learning for students and working professionals; conducting relevant research and public engagement projects, and fostering global and local collaborative relationships among institutions of higher education as well as other entities in the public, private and non-profit sector. We also work to identify appropriate action to provide for a sustainable economy and society in New York and the nation.

Previous projects and publications have dealt with the evolving global talent pool, China’s innovation policy and plans in science and technology, and the future of New York City as the world’s business hub. Innovate New York builds on this experience. We hope you will find the insights and information in this publication useful.



Garrick Utley
President,
The Levin Institute

There was a time when a person could be admonished with the words, “don’t just stand there...DO something”. Today the equivalent phrase is, “don’t just stand there... INNOVATE!” Innovation is seen as the indispensable path ahead to compete and prosper in today’s global economy. But how much innovation are we seeing in New York City today? There is certainly abundant energy in the city along with creative talent. There is money too to be invested. But meaningful innovation usually requires more than any one of these individuals factors. It is when energy, talent and funding are harnessed together that truly effective innovation is achieved.

Innovate New York was conceived as an ongoing series of discussions on New York City’s ability to mobilize and better utilize its creative, intellectual, financial and other resources to maintain its competitive position in today’s global economy. Launched in 2008 with the generous support of the Alfred P. Sloan Foundation, and in collaboration with the New York Academy of Sciences, Innovate New York is a response to the concern of many informed New Yorkers that the City has not been as innovative as it could, should and, indeed, must be.

The initial discussion event was entitled, “Is New York a Center of Innovation?” It was followed by other discussions focused on particular fields. At each of these sessions experienced figures in these fields offered their expertise, and then engaged in often spirited discussions with other participants. Although the subjects ranged wide, common themes emerged as you will see in the following summaries. For this publication we invited the three speakers at the first Innovate New York session to offer their thoughts and draw the lessons of New York City in the arena of innovation.

We all share the romantic image of the solitary inventor achieving a “Eureka!” moment of insight and creativity. But innovation is not invention. It is building and improving on what others have created before. It is usually the result of many individuals working together (and sometimes not together); each one having his or her own little “eureka” moment.

As the moderator of the sessions, I felt humbled by the magnitude of the challenges New York City faces, and yet encouraged by the resourcefulness and commitment by the many participants who call New York City home. We look forward to engaging with you as we move ahead with the next phase of Innovate New York.

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The State of Innovation in New York: Are We Meeting the Challenge?

Jerry MacArthur Hultin
President,
Polytechnic Institute of
New York University

When the Levin Institute began this inquiry in 2008, I outlined three key opportunities to improve and diversify New York's economy through innovation: (1) marry ideas with risk-intelligent money; (2) increase the pool of entrepreneurial managers, and (3) push university research into the marketplace. On each of these points, the experts who participated in the Levin inquiry verified and amplified my recommendations with compelling arguments and incisive facts.

At the same time, Mayor Michael Bloomberg's Economic Development Corporation team convened a series of industry-specific roundtables for CEOs, academic leaders, and government officials; Cornell University President David Skorton meanwhile traveled the state to get input from industry and academia about collaboration for research and economic growth. Both efforts ratified my three points with first-hand evidence. Even more important, words were often turned into action as entrepreneurial boot camps, meet-ups, new business incubators, angel funds, venture funds, innovation clearinghouses, creativity forums, interdisciplinary research, and more sprung up across New York City and the state.

Yes, as you will read in these pages, we understand the problem. We recognize the opportunity. We are taking action. Indeed, we are headed in the right direction. But are we truly stepping up to the challenge? I am concerned that our actions reflect an under-estimation of the strength of our competitors and the high-quality and large-scale needed to create compelling innovation and economic growth in New York. Are we building a skyscraper or a five-story walkup?

Intertwining Ideas with Finance

One oft-cited barrier in New York to bridging the divide between scientific research and its commercialization has been the inability of innovators to encounter financiers in their everyday lives. This intertwining occurs more naturally in smaller communities where critical mass is achieved and risk-savvy investors can easily sample a range of opportunities, quickly weeding strong from weak, transformative from derivative.

During the last year, however, a number of public-private-university partnerships have developed smart, structured alternatives to the Sand Hill Road diner. For instance, Polytechnic has partnered with The New York City Economic Development Corporation (NYCEDC), the New York State Energy Research and Development Authority (NYSERDA), and Trinity Real Estate to create a new

incubator in Manhattan where 60 young companies are being hatched. At the same time, working with the New York City Investment Fund (NYCIF) and the New York State Foundation for Science, Technology and Innovation (NYSTAR), we mutually invested over \$2 million to create NYC Seed, a new angel fund for startups in the city. We received more than 800 applications to join the incubator or receive angel funds!

Yet, one only has to travel as far as Ohio to discover that young scientists, engineers, and entrepreneurs in the Buckeye State have had access for the past decade to \$1.4 billion of startup capital – and Ohio voters recently approved an additional \$700 million for the next four years. In New York, Governor Paterson’s emergency budget struck out a provision for a \$25 million innovation fund, which would have represented less than 4 percent of what Ohio voters overwhelmingly approved for their state.

Nurture Fresh Managerial Talent

During this last year, in partnership with NYSERDA and Trinity Real Estate, we started the New York City Accelerator for a Clean and Renewable Economy (NYC ACRE), a venture for creating fresh talent for a clean-tech economy. Through its support of new companies, novel new certificate programs in clean-energy, and its own social media network, NYC ACRE is beginning to build a community of clean-tech managers for businesses from small to multi-national enterprises.

But at the level of global competition, our response seems tepid. As president of a technology institute that consistently ranks among the top 10 for diversity, with its research and academic center in the borough known as “Home to Everyone from Everywhere,” I could not help but notice an important thread running throughout the Levin series: New York must do better in nurturing the entrepreneurial strengths of one of its biggest assets – its immigrants.

Universities as Magnets

Finally, our speakers have offered suggestions on steps that our New York universities must take to make themselves stand out as beacons of high-tech innovation, so that we become the magnets that attract serial innovators and prompt industry to turn to us as valued resources.

Our Institute’s affiliation and planned merger with New York University joins NYU’s mathematical, medical, chemical and physical scientists with our engineering expertise to

create a major new source of innovation and economic growth for New York City. The Report of the Task Force on Diversifying the New York State Economy through Industry-Higher Education Partnerships submitted by Cornell President Skorton last December spells out in exquisite detail the power of corporate and university collaborations. As you read these words, the leaders of all of the major universities and research-based corporations in the state are joining in a new pledge to increase their commitment to science and technology as a spur to innovation and economic growth.

Yet, consider our record over the last two years in convincing the federal government that our universities and corporations merit stimulus funding: The Smart Grid Consortium, of which our Institute was a charter member, did not win any funding for federal Smart Grid research. Similarly, the State of New York, while making the final round, ultimately lost out in the competition for federal “Race to the Top” funding that would have provided much-needed support for improved STEM (Science, Technology, Engineering and Mathematics) education for NY’s K-12 students, the feedstock for entrepreneurs in college and adult life.

We need to do a better job of creating exciting, productive university / corporate research collaboration so New York’s universities can demonstrate a true competitive edge in delivering innovation and economic growth for New Yorkers. Otherwise, we will continue to place well down the line in the receipt of the very helpful, if short-lived, federal stimulus funding and, equally important, we will fail to win the hearts of the investors who are critical for the long-term: the angel and venture fund investors from around the world who seek the best ideas, the best managers, and the best opportunities.

Meeting the Challenge

This exciting inquiry headed by the Levin Institute and the New York Academy of Sciences and supported by the Sloan Foundation marks important progress. First, it eloquently articulates the opportunities for innovation and economic growth in New York City and across the state. Second, by convening academic, government, and corporate leaders, it has introduced these leaders to new collaborative opportunities. With efforts like this and others, we are not only creating a blueprint for our future, we are laying the foundation for our growth. Our challenge? To build a “skyscraper” – and not a walkup – for innovation and economic growth for a city that is recognized around the world as the most exciting and compelling place to live, learn, invent, and invest.

Innovation in New York: Another Look



Irving Wladawsky Berger
Senior Fellow,
The Levin Institute
IBM Academy of Technology

Few will argue that the still ongoing financial crisis has been the dominant story for the past two years in New York City, the US and the world. For many, survival, not innovation, has been paramount in their minds. In April of 2008, the unemployment rate in New York City was only 4.4%. By early 2010, the NYC unemployment rate had climbed to 10.2%, higher than the 9.7% national unemployment rate. There were over four hundred thousand unemployed city residents, many of them as a result of the major layoffs in the financial industry caused by the crisis.

But, as is often the case, out of great pain comes great opportunity. Innovation is now even more important to New York. We need to help create all kinds of new, well paying jobs so the NY area can dig its way out of the crisis. But, the innovation environment now feels quite different from what it was just a very short two years ago. Let me discuss some of those key differences.

The Financial Crisis

While the New York area has long been one of the world's major financial centers, it was also preeminent in a number of other major areas, including health care, law, arts, entertainment, publishing and media. But then, over the past twenty years, financial services started to dominate the NY economy to an unprecedented degree. While the numbers employed in the industry grew modestly, their overall compensation went up significantly. For example, according to NY State Department of Labor statistics:

"In 2007, [Wall Street] was responsible for almost 30 percent of private sector wages in the City. Between 2003 and 2007, total wages paid on Wall Street more than doubled, increasing from \$35.8 billion to \$73.9 billion. Similarly, average salaries in the industry jumped more than 77 percent over the period to top \$400,000 in 2007; the rate of increase in average wage level was more than three times faster than growth in the rest of the City's private sector economy. During this period, Wall Street accounted for almost one-half of all private sector wage growth in the City as well as approximately 20 percent of the tax revenue for the state as a whole."

The concerns expressed in a NY Times article of November of 2006 seem prescient in retrospect: "The 280,000 workers in the finance industry collect more than half of all the wages paid in Manhattan, although they hold fewer than one of every six jobs in the borough. The pay gap between them and the 1.5 million other workers in Manhattan continues to widen, causing some economists to

worry about the city's growing dependence on their extraordinary incomes."

New York became almost like a monoculture financial economy, with all the risks that entails. It made the region particularly vulnerable to major changes in its dominant industry, as often happens with third world single crop economies, and indeed happened to New York once the financial crisis hit in full force. But beyond that, as we have seen with a number of countries that have become overly dependent on their petrodollars, the wealth in that dominant industry attracts too many talented people who could otherwise be creating new ideas, jobs and entrepreneurial companies in a variety of other areas throughout the economy. The huge growth of the financial industry in the New York area ended up stifling innovation in the rest of its economy, essentially soaking up most of the innovation oxygen in the air.

But, what about innovations in the finance industry? Didn't all the talent it attracted in the last couple of decades result in major innovations in finance? It all depends how you define innovation.

The Wikipedia definition states: "The goal of innovation is positive change, to make someone or something better...the change must increase value, customer value, or producer value...Innovation leading to increased productivity is a fundamental source of increasing wealth in an economy"

As we know, many of the best and brightest graduates of science, engineering and management schools joined Wall Street. Many became quants, and were very involved in creating many of the sophisticated but incomprehensible financial instruments that greatly contributed to the global meltdown, which, as we well know, caused huge financial losses and much pain for institutions and individuals around the world. It is hard to view such financial instruments as innovations in any meaningful sense of the world. The name Warren Buffet gave some of those instruments, financial weapons of mass destruction, may more accurately describe them.

There are huge opportunities for real financial services innovation as we continue to build out a truly global digital economy. Money itself is rapidly becoming digital, which will help bring many valuable and inexpensive financial services to billions in emerging economies who have heretofore not had access to the world's banking systems, as well as to significantly improve the productivity of the

global financial infrastructure. Paypal, a Silicon Valley company has been at the vanguard of such an evolution to digital payments. This is one of the many areas where you would expect New York to lead, given the talent and expertise available in the area. Perhaps it will do so now.

The re-emergence of entrepreneurial capitalism

Why does Silicon Valley give birth to innovative new companies like Paypal and Netflix in industries, - financial payments and media and entertainment respectively, - where the New York area has long been the overall leader? This is a question I have been asking myself for the last few years.

The answer, I think is clear. Silicon Valley, the MIT-Boston area, Israel, Singapore and other regions around the world have become highly entrepreneurial economies, continuously looking for innovative ideas and unrecognized problems to solve, so they can create new companies and bring their innovations to market. Those who successfully do so, both the founders of the companies as well as their VCs and investors who invest in them, are thus able to amass a great deal of wealth.

New York used to be such an entrepreneurial city in the decades before World War 2, when so many exciting new companies and whole industries were created - advertising, media, broadcast TV and so on. But, sometime around the 1950s, New York lost its entrepreneurial edge and started to become a center of corporate or managed capitalism, a headquarters city more interested in preserving and protecting its leadership positions than in bringing new ideas to market. This corporate culture, so focused on wealth accumulation for its own sake, led naturally to the financial engineering and casino capitalism of the recent past. While many individuals were able to amass huge personal fortunes, few companies were created in the process, at least compared to Silicon Valley and other centers of entrepreneurial innovation.

There is general agreement that the 20th century corporation is now going through dramatic changes, driven by a combination of advances in information technologies - especially the Internet - and the heightened competitive pressures brought about by globalization. Large companies that are able to successfully evolve into well managed, efficient globally integrated enterprises will do very well, both distributing innovative new ideas all over the world as well as tackling the very complex problems that are beyond the ability of small companies to address. I am personally associated with two such global companies, - IBM which

successfully transformed itself over the last decade, and Citigroup which is in the midst of its own transformation.

But, the real innovation action and job creation will increasingly rest with small, new entrepreneurial companies. It is hard to imagine any region being a global center of innovation without the strong entrepreneurial economy that will attract talented individuals, create lots of new jobs, and keep the region at the innovation edge.

New York could be very well positioned for this new wave of capitalism that would combine the innovative ideas of entrepreneurial companies with the resources and global reach of large companies. It has both a large talent base, continuing to attract smart people from all over the world who want to see how good they really are by making it in New York, as well as the necessary wealth needed to start and nurture new companies. But to do so, New York has to re-discover its dynamic, entrepreneurial, roots.

The growing importance of smart, digital cities

Advances in technology, as well as in the study of complex systems are now making it possible to improve our understanding of large urban environments, although we are still in the very early stages. There is growing interest in applying the new digital technologies and systems thinking emerging all around us to help us better understand and manage the major components of a city, as well as to begin to analyze, model and attempt to optimize the overall city as a holistic systems of systems.

This will require massive innovation and will likely give rise to many new companies and jobs. New York, with its large wealth and talent base, is well positioned to assume a leading position in this new wave of innovation. Being a major urban environment itself, it is a natural center in which to study the problems of large cities, as well as being a test-bed for experimenting with exciting new solutions. Its tradition of welcoming people and ideas from all over the world, make New York a natural global center for research and education in urban environments. These and other major changes in the last two years, while painful in so many ways, could ultimately help improve the climate for innovation in the New York area. The opportunities are all there, but it will not be easy. There will be stiff competition from other cities and regions around the world. It will require close cooperation between the private and public sectors, as well as educational and research institutions. But if we are up to the challenge, we should be able to see New York emerge as one the premier world centers of innovation in the 21st century.

New York's Innovation Economy: Maintaining Momentum in Turbulent Times



James Singer
AT Kearney

New York State has always been the home of global thought leaders across a broad array of disciplines. But as we noted in our 2008 panel discussion, New York State has not been successful at nurturing a culture of innovation. Since that conversation, several major developments indicate that New York is becoming an important player in the emerging Innovation Economy. But our state's short-term fiscal challenges could spoil this vision if left unchecked.

New York is a world class hub of breathtaking scientific discovery. In New York City alone, 19 Nobel Laureates are currently pursuing their research. According to the Center for an Urban Future, New York City's colleges and universities spend \$3 billion annually on research and development – higher than any other U.S. metropolitan area, including such “usual suspects” as Boston and the San Francisco Bay Area. New York's research efforts have proven remarkably lucrative – Columbia and NYU rank as the top two U.S. universities in licensing revenue from their scientific discoveries – generating almost \$1 billion between them in 2007. But strong licensing revenue – while a good proxy for the commercial promise – also hints at one of the great weaknesses of New York State. For all its achievements in basic research, New York State has largely failed to cultivate the four other pillars of innovation: applied research, venture financing, early stage commercial development and large scale commercialization. Until recently, neither Columbia nor NYU were focused on engineering or applied sciences. Venture financing in New York is far scarcer than in other major innovation hubs, despite New York's status as the financial capital of the world. In addition to a lack of smart venture financing, would-be entrepreneurs in New York have often faced a shortage of lab space and other necessities. And finally, New York State has hardly proven to be a friendly place for large technology companies thinking of locating in the state; Connecticut's generous R&D tax credits and New Jersey's simple incentives for all large employers far exceed anything New York State currently offers.

There is reason to be hopeful that things are changing. In July 2008, New York University merged with Polytechnic University, a world class engineering institution in Brooklyn. The merger offers a unique opportunity for the school's basic research to be applied in-house – and be closer to the fruits of commercialization. NYU-Poly leaders have also joined with public and private investors to establish several business incubators throughout New York City. In the biosciences, the critical shortage of lab space has been

addressed through the construction of the Alexandria Center for Science and Technology at East River Science Park – set to open in 2010 with tenants ranging from biotech startups to the biologics division of Eli Lilly. The robust nanotechnology cluster in the Capital District continues to prosper, with the news of academic achievements at RPI and UAlbany's College of Nanoscale Science and Engineering competing for headlines with the Global Foundries investment in the world's largest chip fabrication facility. And finally, the state government has shown signs that it is making an effort to be more competitive at catalyzing the Innovation Economy; the governor's proposed Excelsior Jobs Program – if approved by the legislature – will offer R&D tax credits and a simplified package of incentives to those enterprises choosing to settle in New York State.

The state's current fiscal difficulties threaten to reverse its recent achievements which could have potentially troubling consequences across the Innovation Economy. With the wrong tax policies, one can easily envision a steady march of nanotechnologists from Albany to Austin, or bioengineers from Murray Hill to Chapel Hill. Let's hope all of us New Yorkers can manage through our current challenges to grab the colossal prize awaiting us in the Innovation Economy.

Overview

There is no doubt that New York City is innovative. World-class theater, entertainment, fashion, and art all testify to the creative fiber of New York. But when people think of innovation, they think of advanced technologies, and of places like Boston, Berkeley, and Silicon Valley. So why does New York not feature prominently on the map of science and technology innovation?

New York is already a capital of innovation, but nowhere near where it could be, given its strengths.

It is a global city, with a diverse blend of culture, vitality, and extraordinary talent. The city is a well-known international hub of finance, media, arts, and entertainment. But the wealth of science and technology talent and innovation is less apparent, at least in the form of a thriving technology economy. In June 2008, the Levin Institute and the New York Academy of Sciences cosponsored an event on Innovation in New York to discuss where New York stands relative to its competitors, and identify approaches that could capitalize on New York's strengths, shore up its weaknesses, and plant it firmly on the map as a capital of innovation. One conclusion reached by participants at that event was that the strong connection between the financial world/investors and high tech innovators that is found in Silicon Valley, and elsewhere, is lacking in New York. All agreed there is a pressing need to look deeper at certain aspects of innovation in the city, and to further explore New York's potential as a global leader in innovation.

The Alfred P. Sloan Foundation then funded an "Innovate New York" series of panel discussions. They were co-organized by the Levin Institute and the Academy to examine the role of innovation in such diverse areas as finance, media, services, life sciences, and arts & culture. Leaders in science, technology, finance, media, and business provided a cross-section of experiences and perspectives on the opportunities and challenges facing the city. Levin's president Garrick Utley moderated the sessions.

Is New York a Center of Innovation?

Speakers

Irving Wladawsky Berger
Senior Fellow, Levin Institute
IBM Academy of Technology

Jerry McArthur Hultin
Polytechnic Institute of NYU

James H. Singer
A.T. Kearney

Moderator

Garrick Utley
The Levin Institute

Held at the Levin Institute, June 10, 2008

The Knowledge Economy

In looking at the innovation quotient of New York, Levin President Garrick Utley challenged the panel to define innovation in one sentence. Innovation encompasses discovery, the improvement of products and life, and a risk-taking attitude, explained **James H. Singer**, partner and New York office leader at A.T. Kearney, and lead author of a recent report on economic growth and revitalization in New York State. When discussing innovation we need to consider "invention, innovation, and entrepreneurship" together, as all three activities are needed concurrently.

"In the past, we were only able to think of technology related to physical things," said **Irving Wladawsky-Berger**, chairman emeritus of the IBM Academy of Technology and visiting professor at MIT, "and what New York does is much more knowledge-based." Healthcare and finance, for example, are knowledge-based technologies. We have not traditionally thought of New York City as a center of technology-based innovation because it was not one in the industrial age, he said. But now in the knowledge age, New York is very much a technology center.

Jerry MacArthur Hultin, president of Polytechnic Institute of NYU, agreed that New York is in the process of moving out of the industrial age. Manufacturing has left the city, and we are in a new zone, a knowledge zone, that we haven't quite captured. "Structurally," Hultin said, "we are missing pieces. There has really been no job engine in this town for some time that matches manufacturing."

Hultin offered three changes that must occur to develop a sustainable model. First, he observed, the idea people and the money people coexist in New York, but do not mesh. We need a web of interaction that is not limited to formal settings. Second, we have the science, the ideas, and access to the money, but we need fresh managerial talent that wants to run entrepreneurial businesses. And third, New York's universities need to be branded as high-tech centers of innovation.

Singer also highlighted the wealth of knowledge in the city, noting that 128 Nobel laureates have lived or worked in New York, and 27% of adults in the state have a bachelor's degree or higher—one of the highest rates in the nation, and with a higher percentage of math, science, and engineering degrees than other states. But while 250,000 college degrees are awarded every year in New York, most graduates ultimately leave the state. "The innovation economy is growing," Singer explained, "and success is happening in clusters and spikes, but it

is not broad-based, and is not enough to sustain all the talent that is here."

New York State has viewed the business community as a source of revenue, rather than a partner for long-term prosperity.

Hultin pointed out that much of the technology developed at New York institutions is licensed to others outside of the city. Singer agreed that it is not just the talent that leaves, but the ideas as well. "New York State has historically viewed the business community as a source of revenue, rather than a partner for long-term prosperity," he said. The state has the second highest business costs in the nation, and is the most severe in terms of the regulatory environment for business. As a result, many of the great ideas that are born in New York institutions are eventually translated and developed outside the state.

In fact, until recently, many institutional technology transfer officers were compensated based on their licensing revenue, and not on how they developed products within the state. Over the last 25 years, the number one acquirer of patents and licenses from all of the institutions in the state of New York is the University of California system. "Clearly they have a different approach to that over there," said Singer. An effort must be made to lighten the burdens on the business environment in New York. In addition, government and business need to partner together, with government acting as a catalyst, Singer said, but innovation does not need government control or organization.

Location, location, location ... with some marketing and matchmaking

While the evidence shows that people, ideas, and companies tend to flow out of New York, Utley pointed out that IBM is thriving in the New York metropolitan area. "People like living in this area," Wladawsky-Berger said. IBM facilities are just north of New York City in Dutchess County, an area with gorgeous countryside, he said, "and on the other end you are in Manhattan, which many of us think is the center of the world." Hultin agreed, citing New York University President John Sexton's essay *Fire & Ice: The Knowledge Century and the Urban University*, that the "ICE," the intellectual, cultural, and educational aspects of the city, really give it a competitive advantage. But New York needs to maximize this attractiveness to be able to keep the talent that we have.

Wladawsky-Berger cited an essay by Paul Graham arguing that to create an innovation center like Silicon Valley you need to achieve "the right combination of rich people and nerds." "The business community in New York City, in general, doesn't believe in technology the way they do in the Boston area, or the San Francisco Bay area," Wladawsky-Berger said. The Churchill Club, for example, is a 5000-member, nonprofit business and technology forum in Silicon Valley that brings entrepreneurs, venture capitalists, and innovators together. But in New York, money and ideas do not seem to cross paths.

All the elements are here, but they are too dilute.

All the elements are here, Singer said, but they are too dilute. At the core of what makes a great city a great innovator is a cluster model of geography, he said. We need to get basic scientists, applied scientists, venture capitalists, and people who know how to commercialize business, all speaking the same language, socializing, going to school together, essentially "growing up" together. This is happening in pockets in New York, in places like Cold Spring Harbor and the Rockefeller University.

The new East River Science Park is an emerging cluster that will bring science and technology together and will also include service providers, intellectual property attorneys, and venture capitalists. Hultin pointed to the joint effort by the Office of the Mayor and the Partnership for New York City in establishing a venture capital fund of \$2 million housed at Polytechnic Institute of NYU. Another approach Hultin described is a "virtual incubator" where start-ups can join and have access to the community and to services on the Web, even if they choose not be in the physical space. This cuts down on cost, and increases the number of companies that can participate in the incubator.

"New York is already a capital of innovation, but nowhere near where it could be or should be in the world order given its strengths." Singer said. Hultin referred to the 14 grand engineering challenges of the 21st century identified by the National Academy of Engineering, and suggested New York have a competition to name the 10 most powerful innovations that could add a dynamic economy to New York City, capitalizing on the city's assets. Such a list could be used as a launching pad for discussions with researchers, government, and investors.

Bullish on New York

Utley closed the discussion by asking the three panelists to gaze into the future and share what they see for New York City in 2050 and beyond.

Singer stated that he is "very bullish on New York for the next hundred years." "There is a reason that many of us choose to live and work here," he said. "It's a great cultural city. Everyone thinks it is great for a different reason." Singer emphasized that New York has the right kind of environment for greatness, and, with the right catalysts, can be an innovation capital even if the financial industry goes away.

Innovation can be the engine that drives job growth.

Hultin agreed with the bullish forecast. "We've got it all here," he said, but "we are at a tipping point," and must address the need for job opportunities for the lower middle class. Innovation can be the engine that drives job growth, creating new companies that employ people to make things. Hultin also stressed the need to brand New York better, and bring the innovation community closer together, noting that universities have a role to play here. He also cautioned that there are a lot of people working very hard to match us at this, and China and India, for example, are going to give New York real competition.

"New York will continue to be a leading city in the world, if not the leading city in the world," said Wladawsky-Berger. New York will solve its problems, and can and will do something to bring technology and business much closer together. "New York has so many good things that attract so much great talent from across the U.S. and around the world."

Innovation & Entrepreneurship

Speakers

Amar Bhidé
Columbia University

Jonathan Bowles
Center for an Urban Future

Matt Nimetz
General Atlantic

Vivek Wadhwa
Duke University and Harvard University

Moderator

Garrick Utley
President, The Levin Institute

Held at the Levin Institute, April 1, 2009

Highlights

- Private equity investments in new businesses will be one of the driving forces of the recovering economy.
- Nationwide, one quarter of all startup companies are founded by immigrants, the majority of whom are highly educated, with degrees in science, technology, engineering, or mathematics fields.
- The inadequacy of the visa and permanent residency programs results in thousands of immigrants being sent back to their home countries every month, including high tech entrepreneurs who could have started companies here.
- Immigrants are starting businesses at a much higher rate than native New Yorkers, but immigrant-founded businesses in New York are not progressing to the next levels of business success, as they are in other major cities.
- The implementation of technology is more important than the development of technology. The challenge for New York is not how to replicate Silicon Valley, but how take advantage of emerging new technology to improve the productivity of all entrepreneurs, native or immigrant.

New York is full of talented, ambitious, innovative entrepreneurs ready to put their ideas in motion. Who are they? Where do they come from? What challenges do they face? Where do they go when the challenges are too great? And most importantly, how can the city help them establish successful enterprises, and thereby grow as a global leader in innovation?

Investing in New York

Private equity will be one of the dynamic forces helping the economy grow again, said **Matt Nimetz** of General Atlantic, a global private equity firm with offices in New York City and worldwide. In assessing investment opportunities, value is most important, Nimetz said, and private equity investors are generally neutral to geography and industry. His firm looks for creativity and managerial skill as they try to identify the businesses of the future. Historically, businesses that private equity firms invest in are more productive, more successful, and provide more employment.

While the numbers of people directly employed in private equity firms are relatively few, the firms are large generators of economic activity. From 2000 through 2007, there were \$2.7 trillion in investments generated by

private equity around the world. General Atlantic invests \$1.5 billion per year, around half in the U.S., and half in developing world and emerging markets, including India, China, and Brazil. Looking to the future, Nimetz said that there are currently around \$1 trillion in commitments from investors to private equity firms worldwide. Every investment deal General Atlantic makes, even those outside the U.S., brings value to New York through employment and expenditures.

Should I stay or should I go?

Vivek Wadhwa of Harvard Law School and Duke University provided a global view of the talent in New York. Wadhwa and colleagues found that between 1995 and 2005, one quarter of all startup companies nationwide, and more than half the startups in Silicon Valley, were founded by immigrants (foreign nationals who are not U.S. citizens). They also found that one quarter of all patents filed in U.S. were filed by immigrants.

Why is there such a disproportionate representation of immigrants as founders of new companies? Wadhwa's research shows that these immigrants are highly educated, and that 75% have degrees in science, technology, engineering, or mathematics fields. But they often feel undervalued in their own countries, and come to the U.S. to be their own bosses and build wealth, entering with H-1B visas (work visas for those in "specialty occupations"). As a result of this influx, there are over 1 million skilled immigrants and their families in U.S. waiting for permanent residency or "green cards".

The U.S. grants a maximum 120,000 green cards per year to holders of H-1B visas, Wadhwa pointed out, and no one country may receive more than 7% of the total issued per year. Indian immigrants comprise 35%–40% of the pool of skilled workers and, given the statistics above, Wadhwa said it could be 30 years before an Indian immigrant arriving on a student visa eventually obtains permanent residency. Those on an H-1B visa are stuck in immigration limbo, essentially indentured to the company that employs them and sponsors their visa.

We are shipping off our economic stimulus, sending back tens of thousands who could have started companies.

Wadhwa predicts that the inadequacy of the visa and residency programs will result in a "massive reverse brain drain" of high tech talent. Interviews of 1200 returnees to India and China indicated that they are faring much better



Global Innovation & Entrepreneurship Session

back home than in the U.S. with regard to career progression and quality of life. Correspondingly, interviews of 1200 foreign students in U.S. indicated that greater numbers than ever before intend to return home after graduation. Historically, 85% of Indian, and 92% of Chinese doctoral students in engineering stayed in the U.S. for at least 5 years after graduation. Now, only 6% of Indian, 10% of Chinese, and 15% European students want to become permanent residents.

"We are losing an entire generation of skilled immigrants, and the next generation as well," Wadhwa concluded. While the U.S. is bailing out defunct companies, we are shipping off our real economic stimulus, sending back thousands of immigrants every month, many of whom could have started companies here.

Taking New York's entrepreneurs to the next level

Immigrants are starting businesses at a much higher rate than natives born in New York City.

Thirty-seven percent of New York City residents are foreign born, said **Jonathan Bowles** of the Center for an Urban Future, an independent think tank in New York City. While the city may not have the strongest technology sectors,

other sectors are quite strong, including transportation companies, food manufacturing, or daycare. Immigrants are starting these, and other businesses, at a much higher rate than native New Yorkers. A problem, however, is that immigrant-founded businesses are not progressing to the next level in New York as they are in other cities such as Los Angeles, where 22 of the 100 fastest growing firms were started by foreign born residents. Average receipts per firm are much lower in New York compared to the 10 to 15 top cities for Asian- and Hispanic-owned businesses. Bowles said there are too few immigrant vendors that grow to establish a store front, too few mom-and-pop restaurants and other business that open additional locations, and too few food manufacturers exporting to other communities.

This is both a policy and a cultural issue, Bowles said. Immigrants face a variety of challenges, including access to capital. There are very few microfinance programs in the U.S., and immigrants have generally not been incorporated into traditional economic development programs. In addition, they are generally not visible to angel investors, or the venture community. To ensure future economic growth, the city must more effectively tap this innovative and entrepreneurial population, and help those that start businesses to rise to the next level.

Development vs. Implementation

Successful innovation and entrepreneurship is not worth very much unless it is broad-based, and improves the productivity and incomes of most of the work force, said **Amar Bhidé** of Columbia University. The production of high tech products can only account for a small fraction of the total income of any particular place, and high tech development itself does not provide widespread prosperity, or widespread progress. The implementation of technology is far more important than the development of technology, he said. Cities like New York were so successful for so long, not because they produced many high tech products, but because big cities are where electricity was most effectively put into broad use.

Innovation is being conceived much too narrowly, Bhidé said. The challenge for New York is not how to replicate Silicon Valley, but how to weave emerging new technology, wherever it may come from, into improving the productivity of all entrepreneurs, native or immigrant.

The city's academic research institutions are top ranked according to variety of key metrics, but this academic success has not seeded a technology sector the way it

has in other cities. This is starting to change, Bowles said, but there is much work yet to be done to commercialize research in New York's academic institutions, and to encourage researchers to start businesses. Bhidé agreed that New York's academic institutions are among the finest, but expressed skepticism that academic institutions can have a meaningful impact on the economy of a state. Nimetz offered a different perspective, pointing out the potentially significant tertiary effect of institutions on the New York economy. For example, people from around the world come to Memorial Sloan-Kettering Cancer Center for treatment. They arrive with their families, who stay in hotels, dine in restaurants, perhaps attend the theater, adding dollars to the city's economy.

Growing in the shadow of the finance sector

People who invest are looking for the best deal, Nimetz said, and the success of some sectors dissuades businesses from coming to, or staying in New York. The financial sector is a major technology employer, and pays such high salaries, that it is hard for other businesses to compete for tech talent. In addition, rents in New York are very high, and affordable business space is limited. Nimetz added that at one time, there were many ethnically oriented banks. Consolidation of the financial community however, eliminated many of these institutions. He said though, that when people have good ideas, there is usually capital to be found, and many ethnic groups have networks of capital.

Finance is one of the great assets of New York, and we need to ensure that the city remains a global financial center. However the city is too dependent on Wall Street. New York needs to diversify, Bowles said, and needs to focus more on its natural assets, one of which is the growing immigrant population.



Vivek Wadhwa

Jonathan Bowles

Amar Bhidé

Innovation in the Media

Speakers

Betsy Morgan
The Huffington Post

Geoffrey Sands
McKinsey & Company

Tom Phillips
Google

Marc Frons
The New York Times Company

Moderator

Garrick Utley
President, The Levin Institute

Held at the Levin Institute, April 22, 2009



Geoffrey Sands

Betsy Morgan

Tom Phillips

Marc Frons

Highlights

- Advances in digital technology have changed the way the public obtains news and information.
- The media industry needs to be able to quickly adapt its business models to meet readers' needs and continue to deliver quality journalism.
- The best approach for strategic planning in the face of numerous unknowns is to develop a portfolio of initiatives. Prioritize efforts based on competition and the marketplace, and close down programs that are not working.
- Advertising revenue has long been the financial core of media. Print advertising is declining, while Web-based advertising is evolving. Support for programs such as investigative reporting may require more creative funding initiatives.
- Even in the digital age, face-to-face contact with clients and advertising agencies remains very important. Many media companies make deliberate strategic decisions to base their operations in New York to be in close proximity to partners and peers, perpetuating the city's position as a global media center.

Global meets digital

Individuals get news and information in dramatically different ways than in the past as a result of globalization and digitization. The media industry is facing new opportunities and challenges as standard business models and fundamental operating principles must be adapted to meet the needs of a digital-savvy society. As a historic media capital, what role will New York City play in the media industry of the future, and how will innovation in media impact the city?

Years ago, a company would set goals for where it wanted to be three to five years hence, and devise a strategy for how to get there. Now there is so much uncertainty that this deterministic approach is no longer viable. **Geoffrey Sands**, of management consulting firm McKinsey & Company, advises client companies that uncertain and turbulent times call for development of a broad portfolio of different initiatives. To enhance their chance of success, companies should embark on a variety of plans with different levels of risk and familiarity. Not every approach will succeed, and companies need to be able to recognize failing initiatives and shut them down.

Times of uncertainty always engender innovation.

Sands noted that while there are numerous possible business models, the forward-looking economics of those models don't look like anything businesses are accustomed to. But as long as a company is producing something of value, and it is differentiated enough from what is available for free, there will be people who are willing to pay for it. And if a medium can attract enough audience, there will be advertisers who want to associate with their content.

Times of uncertainty always engender innovation, and Sands sees innovation coming out of this recession, as has happened in recessions past. Advertising, for example, has always had a strong presence in New York, and tremendous innovation is currently taking place in digital marketing. There were also more documentary and independent films developed last year than in any year prior, and one third were developed in New York. Sands noted that younger people are very comfortable in the multimedia environment, often collaborating with people they have never met. Enrollment in journalism schools has been increasing (since before the recession). The urge to communicate is still there, but it is taking on new and different forms, for example, blogging.

Choosing New York over anywhere else

As an online newspaper, the *Huffington Post* could operate from anywhere, but CEO **Betsy Morgan** said that a deliberate decision was made to locate the newsroom in New York City. The news media in United States is New York-based, and the *Huffington Post* wanted to be near its partners and peers. Looking back over the past four years that *HuffPost* has been in operation, it was the right decision, Morgan said. As a media business, the *Huffington Post* is a mix of traditional editorial capabilities and smart, innovative technology. The editorial team (most of whom are under age 30, and many under age 25) makes the most of the incredible mobility that technology allows, working on laptops from remote locations. Following a classic monetization model, the Web site is display ad driven. *HuffPost's* core clients and agencies are based in New York or on the East Coast, and Morgan said that it is important to be in close proximity to them as well. Even in the digital age, media is in many ways a high-touch industry. Knowing clients personally and understanding what they need is incredibly important, and Morgan said it can be difficult to really connect solely by e-mail or phone.

The *Huffington Post* employs about 60 people, primarily editors, supported by technology and business staff. In

addition to the regular staff, there are around 3000 active bloggers logging 300 to 400 new online posts per day, and the community of readers provides over 1 million comments per month. From a budget perspective, Morgan said, *HuffPost* pays very competitive salaries for editors and technology staff as it has to compete for talent with other tech and media outlets, such as the *New York Times* and Google. Blogs are considered to be opinion, and *Huffington Post* does not pay bloggers. There are, however, non-financial benefits to bloggers from being associated with the *Huffington Post*, including exposure and notoriety.

Morgan concurred with Sands that planning is difficult, and said that the *Huffington Post's* head of operations keeps a running list of 100 or so projects. Initiatives move up and down in priority in reaction to what the competition is doing, and what is happening in the marketplace. Technical and editorial staffs need to be fast, agile, and able to reroute if an approach is not working (e.g. no audience, not making money).

In addition to breaking news and opinion, *HuffPost* is expanding in a new direction with the establishment of the *Huffington Post* Investigative Fund. In contrast to blogging, original investigative reporting requires research, and Morgan said that this independent fund will help to cover the costs of much-needed investigative journalism projects.

No 'Silicon Valley envy' here

With nearly 2000 staff, the New York office of Google is the second largest office out of 120 or so worldwide, after the corporate headquarters in Mountain View, California. **Tom Phillips** of Google explained that the New York office was established to serve as the core of the U.S. sales operation because, similar to *HuffPost*, Google determined that it needed to base its sales office in proximity to the advertising agencies. Interestingly, there are now more engineers than sales staff in New York, and the office houses Google's second largest engineering force (after California). The New York region is rich in technology talent and many Google-New York hires come from nearby tech companies such as Lucent, or from Wall Street, and often staff members are hired directly out of computer science graduate programs. The New York office includes 750 engineers who write code for Google's three main Web functions: search, advertising, and applications. Phillips said that the decision of Google and others to base sales operations in New York will help perpetuate the city's role as a center of media and advertising.



Changing Times

No matter what business model a media enterprise uses, the primary source of revenue for media is advertising. Print advertising is in steep decline, acknowledged **Marc Frons** of the New York Times Company. For online formats, advertising is holding up well, and while it is not growing as quickly as before the recession, it's not declining as print is. To ensure future viability, the *Times* is considering many different models and, Frons noted, the future of digital products looks promising. With 1200 to 1300 editorial staff, the Times has tremendous editorial capacity, and the mood, Frons said, is 'determined'. In a world where print newspaper is shrinking in terms of revenue, and readers habits are changing, the Times is striving to rapidly evolve. The mission of the Times is not only to develop original journalism, but also to be an effective curator of global news, helping people focus in on what is really important.

Regarding his colleagues on the panel, Frons noted that Google is good a partner to the New York Times for advertising and distribution. The *Times* is a consumer of Google tools and technology, the Google search engine powers part of search function on NYTimes.com, and the *Times* is a significant content contributor to Google. The

Huffington Post, he said, is a new model in journalism, but shares the same core values with the *Times*, seeking to aggregate and package news and information that engages the community.

Consumers go digital

The Internet has changed consumer behavior, whether they are consuming news and information, or commercial products. Morgan noted that when people want to learn more about a news item, they use Google as a starting point, rather than going directly to the Web sites for news outlets such as CNN, the Huffington Post, or the New York Times. They are agnostic about the source and rely on Google to link them to relevant news results. They also expect motion pictures along with text and print.

As noted above, advertising is the main source of revenue for the media. Over the last 80 years or so, Phillips said, the only way to learn about what products to buy was to consume media such as newspapers, television, or radio, where commercial information (in the form of advertising) was delivered alongside news or entertainment. New technology has removed those barriers and consumers can bypass media channels and go straight to information about what to buy.

The bottom line for New York

So much media content originates in New York, Morgan said, and much of the country's media leadership is based in the city. There is a great appreciation for good journalism and for creating professional content. Sands noted that high population density makes it more attractive for technology companies to invest in the city, than in more sparsely populated areas. New York is a very vibrant, creative community, the source of numerous cultural media phenomena such as *Sesame Street* or *Saturday Night Live*, and it is hard to imagine that New York would not continue to generate creative, innovative ideas.

Innovation in the Life Sciences

Speakers

Jonathan Bowles
Center for an Urban Future

René Bastón
New York Academy of Sciences

Ken Davis
Mount Sinai Medical Center

Donna Rounds
Hospital for Special Surgery

Moderator

Garrick Utley
The Levin Institute

Held at the Levin Institute, October 27, 2009

Highlights

- A cohesive biotechnology community has yet to emerge in New York City to the extent that it has in other high-tech regions, where life scientists, entrepreneurs, venture capitalists and investors, and attorneys with biotechnology expertise form a functional network.
- The number of venture capital firms in the city is limited, and only a very small portion of venture capital funding is invested in biotechnology.
- Most university- and medical school-based researchers are not in the position to carry development of their patented molecules through to a point where a pharmaceutical company would be willing to take the risk of licensing the technology.
- More programs to provide "gap funds" could help researchers in New York City advance their discoveries to the point of a licensing agreement or establishment of a startup company.
- "Proof of concept incubators" such as the East River Science Park can provide physical space for companies to grow, foster interaction between the science and business communities within the campus, and facilitate access to resources at New York's top research institutions nearby.

Expanding the life sciences community beyond the laboratory

New York City's scientific research institutions and universities offer prime opportunity for economic growth. Columbia University, New York University, the Rockefeller University, and Memorial Sloan-Kettering Cancer Center are just a few examples of the world-renowned research institutions that are based there. But despite the large number of life scientists working in the city, the biotechnology sector is still relatively weak. According to a recent report on life sciences and innovation in New York by **Jonathan Bowles** and the Center for an Urban Future, universities and research institutions have long been very important to the city's economy, and have created many jobs. However, the startup ventures and growth companies associated with these institutions have not yet reached the level of economic impact seen in other high-tech regions such as Boston, Silicon Valley, or San Diego.

New York City's scientific research institutions and universities offer prime opportunity for economic growth.

Bowles cited several findings from the report as to why

New York still lags behind. One concern is the lack of a major engineering school. Only one of the city's engineering schools, Columbia University, is listed among the top 100 by research and development expenditures (ranking at number 50). Another finding is that, historically, university leaders have not been as entrepreneurial as those in the other regions, although Bowles noted that this is beginning to change.

A key finding of the report is that there is not yet a real sense of community in the biotechnology, or science and technology development sectors in New York. Other technology centers around the country have solid networks of scientists, entrepreneurs, corporate and angel investors, venture capitalists, and attorneys with biotechnology expertise.

The community aspect is extremely important, **René Bastón** of the New York Academy of Sciences agreed. The Academy has long focused on building communities of scientists, and fostering communication across disciplines, institutions, and national boundaries. What is missing, said Bastón, is the connection between the sciences, and business and finance.

Spanning the academic money gap: License or start-up? Royalties or stock?

The divide between the science and business communities presents a financial barrier for research institutions. In the chain from patent to product, a critical missing link is money for early development, said **Ken Davis** of the Mount Sinai Medical Center. He described how, in the mid-1980s, he was unexpectedly approached by a pharmaceutical company interested in his basic research on Alzheimer's disease. That would be a very rare occurrence today, he noted. The pharmaceutical industry has changed dramatically over the past 20 years, and companies have become much more risk-averse.

In biomedical research centers city-wide, there is an extraordinary amount of intellectual property, but moving the technology from patents on paper to the formation of a company, or to a licensing agreement with a pharmaceutical or biotechnology company, is challenging. Generally, the patented molecules are still very early in the development process, and companies are less willing to invest in relative unknowns. Unfortunately, most university- and medical school-based researchers are not in the position to carry development of their patented molecules through to a point where a company would be interested (e.g. by further study of pharmacokinetics or toxicity, possibly resulting in phase I clinical trials).



Garrick Utley
President,
Levin Institute

Academic institutions often face difficult choices in technology transfer.

In cases where a product or technology does reach the stage where there is commercial interest, CEOs of academic institutions often face a difficult choice regarding the path of development—licensing the intellectual property and collecting royalties that can fund further research, or taking the risk of starting a company in the hope of reaping the rewards. Davis noted that there is no government support available to help medical institutes facilitate technology transfer or corporate formation. He explained that hospitals cross-subsidize the associated medical schools, and with profit margins eroding and budgets being cut, there is no pool of money to dedicate to corporate formation.

There is also the challenge of balancing the dual roles of a research university. Clearly, as a member of the local community, the institution has a responsibility to contribute to development in the local region. But there is also the responsibility to ensure that discoveries are made available to society. A product that is never developed as a result of a failed startup company might have been viable if it had instead been licensed to an established company with the resources to bring it to market.

This is not strictly an institutional decision, and principal investigators differ in their preferences for entering into licensing agreements versus starting a company. Some researchers would rather receive the milestone payments associated with licensing agreements, and don't have the time or expertise to manage a start-up company, or are concerned about the high risk of failure. Others are very entrepreneurial, and are willing to risk time and effort for potential significant returns if the company is successful.

Life sciences as a business venture

New York is often thought of as the capital of money, and for research institutions looking for investors to help fund early stage development, it would seem that being based in New York City would offer an advantage. Surprisingly, Bowles said, the city does not have many venture capital firms. In 2007, of the 55 most active venture firms in United States, only 2 were located in New York City, compared to 27 in Silicon Valley, and 11 in Boston. And those venture capital firms that are in the city are not necessarily investing in biotechnology. In the fourth quarter of 2008 and the first quarter of 2009, there was only one venture capital investment in biotechnology in New York City, paling in comparison to 13 biotechnology firms receiving venture

capital funds across the rest of the New York metropolitan area, 41 in Silicon Valley, 33 in Boston, and 17 in San Diego.

One issue is that biotechnology is a complicated area to invest in, and in New York there is an abundance of other investment opportunities that are easier for investors to grasp, and offer a quicker path to return on investment. Davis said that of the 65 trustees of Mt. Sinai Medical Center, half come from the financial sector, but only 2 have marginal knowledge about biotechnology, and none is involved in venture capital for biotechnology. Bowles and **Donna Rounds** of the Hospital for Special Surgery both stressed that venture firms often prefer to invest in companies that are nearby, and this lack of local venture capital firms that are interested in and knowledgeable about biotechnology is a significant gap.

Bastón agreed, and said that the city needs to encourage more venture capital firms to set up shop in New York, and to more readily consider early investment opportunities. Biotechnology seems to get lost in the shuffle, he said, with the majority of investor money in the city going toward areas such as finance and media. The city also needs to attract and maintain the interest of serial entrepreneurs, and offer training and information resources for young entrepreneurs.

Enticing investors, fostering community

One approach to help foster growth of the biotechnology sector in New York is to decrease the relative risk for investors. Davis described a proposal he and his colleagues developed for a 10-year, \$10 million per year state-funded initiative to help span the development gap. According to the proposal, a consortium of medical school and outside consultants would review and select promising intellectual property and lead compounds discovered at New York research institutions. It would then facilitate further development, perhaps through phase I clinical trials. Although the proposal was tabled after a change in governorship, the overall concept is promising, and could promote the development of intellectual property from New York's research institutions while making it less risky for big pharmaceutical companies and others to make investments. Davis said, however, that at this time there is no state money for such an initiative.

"Gap funds" help support researchers developing licensing agreements or establishing start-ups.

Rounds noted that a number of institutions have started their own "gap funds," established to support researchers in the process of developing a licensing agreement or establishing

a start-up company. A participant mentioned the BioAccelerate NYC Prize as an example of one such program available to New York City-based researchers.

Another common financial challenge for institutions choosing to form a company is renting laboratory space. While the biotechnology sector in New York has made significant progress over the past 10 years in the area of real estate, Rounds said that laboratory space in New York City can be more expensive than comparable space nearby, adding to the overall cost of doing business in the city. So while a company may start in New York because the founders want to be in the city, as the company grows and hires more employees, it may move to Westchester, Long Island, or Princeton, for example. Tax credits are available, but could be more beneficial, she said.

An initiative aimed at bringing science and business together is the nearly completed East River Science Park, which is the result of a major investment by the city and a commitment by corporate investors to help entrepreneurs succeed in the New York. The new state-of-the-art research and development campus is easily accessible and provides physical space for both start-up and established biotechnology companies. Having many ventures in one place fosters networking and communication within the campus, and with the surrounding universities and research institutes. The rent is still relatively high, however, compared to space outside the city, and young companies in particular may find the cost prohibitive.

Filling the pipeline

Bowles concluded that while the availability of dedicated space such as the East River Science Park is important, what is really needed is a steady pipeline of new startups and firms with growth potential to fill it. He urged the leadership of research institutions to foster entrepreneurship, rather than focusing primarily on royalties.

New York City has abundant scientific talent, and discoveries are always emerging from the world-class research being done here. The participants agreed that there is no need to import industry and businesses from elsewhere to grow the city's economy. Instead, New York City needs to better harness its existing biotechnology assets and help facilitate development locally. In particular, it must address missing links in the chain from patent to product, including limited local investment in early phase molecules. Leadership at the institutional, city, and state levels will also be important to bring more focus on biotechnology and life sciences in the city.



Jonathan Bowles

Ken Davis

Donna Rounds

René Bastón

Robust proof of concept incubators, such as the East River Science Park and other programs to help researchers bridge the gap between academic research and startup ventures, are steps in the right direction. But for New York to succeed in the biotechnology sphere, scientists choosing to become entrepreneurs will ultimately need support, including help in building relationships with the New York-based business and financial communities.

Innovation in Public Services

Speakers

Amanda Parsons

New York City Department of Health and Mental Hygiene

Joseph Morrisroe

New York City Department of Technology
and Telecommunications

Anne Altman

IBM

Moderator

Garrick Utley

The Levin Institute

Held at the Levin Institute, January 7, 2010



Anne Altman
IBM

Highlights

- Governments are stretched to provide services, especially in the current economic environment, and cities need to find different and better ways to meet the needs of their citizens.
- The Primary Care Information Project was established by the NYC Department of Health and Mental Hygiene to increase adoption of Electronic Health Records (EHR) by the city's health care providers. Use of EHR can enhance quality of care at the individual patient level, and provide useful feedback to the provider on overall practice performance.
- As the City's one-stop information resource, the 311 system (available now by phone and online) enables citizens to have a customized relationship with the City and its services. Customers can find what they need, when they need it, in a format that is useful to them.
- Advanced technology and instrumentation can help cities manage aging infrastructure more effectively, rather than rebuilding.
- New York City's government, institutions, entrepreneurs, and end users are all sources of innovative ideas for the city's public services. New York's public sector has also made advances in service by adapting and implementing best practices from other cities and from the private sector.

Public services impact the lives of all residents of the city. How can innovation be harnessed to enhance the delivery and quality of public services in New York, while still keeping the City's bottom line in check? Can innovation help the City manage its aging infrastructure better? And how does New York City compare to other global cities with respect to its direct relationship with its citizens?

Covering new ground for a city health department: electronic health records

One area in which New York City is moving to the forefront is in the adoption of Electronic Health Records (EHRs). Collating patient medical information into an electronic health record, rather than the classic paper chart, helps ensure that an individual's data is complete, up-to-date, and easily accessible to the provider, enhancing quality of care and coordination of services, and helping to reduce errors. While EHR have existed for over 30 years, in New York City in 2005 the EHR adoption rate was only about 6%. To address this issue, the NYC Department of Health and Mental Hygiene (DOHMH) established the Primary Care Information Project, run by DOHMH Assistant Commissioner **Amanda Parsons**. The initiative's goal is to catalyze the adoption of EHR by city

health providers, with an initial focus on enhancing the quality of care of the medically underserved. Funding was provided by the Mayor's office to purchase EHR technology on behalf of primary care doctors and, over the past two years, the adoption rate has increased to about 20%, with 1700 primary care providers now EHR-enabled.

This is a novel area of focus for a department of health, Parsons noted, adding that no other major U.S. city is yet addressing EHR. The DOHMH hopes to complete the project in 3 to 4 years, and is also looking to the private sector for participation and additional funding. The City's general strategy, Parsons said, is to take the initial actions to address issues and needs that are identified, and catalyze follow-up action by others.

Noting the significant privacy concern for patients, Parsons was quick to point out that the DOHMH has no interest in seeing individual patient data. The City installed the EHR technology, but individual health data is managed and owned by the providers. However the City does review aggregate data on a provider's care for their patients (for example, the DOHMH could see that a particular provider has 90% of their patients with high blood pressure under control, but the City cannot see which patients those are). This feature adds value by helping providers see how they are performing. Parsons noted that there are certainly others, such as health plans, who would like access to that data, but performance data is only shared with the provider. A provider can choose to share it, but the City needs a provider's approval before sharing any data with an outside party. At this time there is no real incentive for providers to share performance information, but that could change if, for example, patients were to choose their providers based on quality scores.

Customized information at your fingertips

Previously, when residents needed information about a City service, they had to troll the "blue pages" in the phone book to find which office to call. Now all any New Yorker needs is 311, the front door to City services, information, and assistance. **Joseph Morrisroe**, of the NYC Department of Technology and Telecommunications, said that 311 strives to connect 80% of customer calls to one of the 200 to 250 operators within 30 seconds or less, and for 2009, the actual rate was 84% for 18.7 million calls. Before 311 was launched there were over 40 different City call centers. Now only a handful of City agencies still have a separate call center, and they will be incorporated into 311 in the next 18 months, Morrisroe said. City residents can submit a complaint or request via an iPhone application.

While 311 has been predominantly a call center, Mayor Bloomberg's vision is that it will eventually deliver services to the city. Currently there is a one-to-one relationship; one representative providing answers that satisfy one caller's needs. From a financial standpoint it is more efficient to have a one-to-many system, where one piece of information can serve many different people. As such, over the last 18 months all of the information available through the 311 call center has been made available online as well. The City is also evaluating social media as a mechanism to push information out. It has over 2500 different Twitter followers, who in turn forward the information to others in their social networks. City residents can also submit a complaint or request via an iPhone application, and include a picture or video.

On the input side, the data 311 captures helps determine what the City is doing well and where improvements are needed. Morrisroe pointed out that the data is incident-based, not individual-based, preserving resident privacy. From a transparency perspective, the City wants to make this data publicly available. To this end, in October of 2009 the City released almost 200 data sets as part of a city-wide contest called BigApps. Entrepreneurs, programmers, students, and other interested residents all submitted ideas for applications ("apps") using the data. A fascinating array of ideas was submitted, Morrisroe said, such as apps for library hours, dog parks, or building locations. There are occasionally unintended uses of the data, Morrisroe said, such as an app mapping the location of broken city parking meters (something of interest to many people as broken meters result in free parking).

Ultimately, 311 will allow the customer/citizen/business to have a direct, customized relationship with the City for whatever information and services they need.

Local public services in the capital of the world

New Yorkers consider their home to be the capital of the world, but how does the city compare to other major cities as a public service provider? **Anne Altman** of IBM said that while there is tremendous innovation in New York City, there is lot more than can be done. Cities will be winners or losers based on the economic platform they create for people to live in, and the services that they provide, she said. Technology is a catalyst for change, and innovation can achieve outcomes for citizens, patients, students, and others, in ways that were never before possible.

Technology is a lever, a catalyst for change.



Amanda Parsons

Joe Morrisroe

Anne Altman

The common narrative that runs through all cities, Altman said, is the stress the expanding population places on the infrastructure, which is compounded by budgetary constraints. So where does a city start? Washington, DC, is starting with transportation, installing solar-powered intelligent parking meters that will accept credit card payment as well as coins. Use of coins is expected to decrease, thereby reducing the number of City staff needed to empty coins from meters. Alameda County, CA, is starting with the social services department by implementing a single record system that can communicate across agencies, allowing case workers to spend more time with clients and less time tracking papers. Progress has been made in faster identification of children in need or at risk, improving outcomes.

IBM is engaged in projects around the world dealing with both physical infrastructure and services delivered to the citizen. One project, for example, involves drainage. Rainwater in New York and many other cities, flows into the same pipes as treated sewage. When there is an exceptionally heavy downpour, back up into the streets can occur. Using advanced technology and instrumentation, flow rates can be predicted based on weather forecasts, and sensors can detect and redirect increased flow. This is an example of managing the existing infrastructure more effectively with technology, rather than rebuilding it. Other projects are focused on transportation, implementing road charging in ways that reduces cars during peak hours, reduces emission, and most importantly, changes behavior, increasing the number of people that use public transportation as their first choice for transport.

Altman also noted that the volume of data available, and automation in data handling, are providing opportunities for analysis that were not possible before. Governments are seeking to be more transparent, making data available to provide insight across what were previously "silos" of information. 311, for example, has changed the dynamic for how people choose to live in the city. Individuals can search the system for information on the safest neighborhood, with the type schools they want, and the medical support that they need. Another similar example Altman cited is Kent County in the UK, which has created a citizen portal that links to six different service agencies, so that citizens can determine where they want to live in the city.

Around the globe, Altman observed, the economic crisis has driven everyone to acknowledge the need to change the way things are done, and the need to work collaboratively.

What is innovation and where does it come from?

Innovation in the private sector is expected, but the public sector is not generally thought of as innovative. A large part of innovation in the public sector is due to necessity, Morrisroe said. The old ways of building and supporting infrastructure are no longer sustainable. Governments are stretched to provide services, and cities must find different and better ways to meet the needs of their citizens. Water meter readings in New York, for example, will soon be automated, using wireless technology that enhances accuracy and eliminates the need for meter readers. A bonus for New York City is that Mayor Bloomberg is a technology-driven, customer-centered thinker, Morrisroe said. The Mayor has brought his business background to bear within the City government.

People need tools to digest the cacophony of information, to be able to access it, and make use of it in a personalized way.

Parsons added that innovation comes both from the top down (from the government and leading institutions) and the bottom up (from end-users and entrepreneurs). Innovation is often thought of as creating something new, she said, but innovation is also improving existing services and structures so people can live smarter. People need tools to digest the cacophony of information, to be able to access it, and make use of it in a personalized way.

Another reason New York City is successful, Morrisroe said, is because it is not of the mindset that "it needs to be invented here". New York has always been a melting pot of immigrants and the same holds true for innovation and ideas. The City doesn't need to outsource, but rather can import best practices that exist elsewhere. Parsons concurred, noting that the NYC Department of Health has been very innovative in bringing private sector successes to bear in the public sector. For example, the City now sends teams of professionals to doctors' offices to talk about public health, an approach adapted from the pharmaceutical industry's marketing practice of "detailing."

The changing workforce is also a source of innovation. College graduates are very technology savvy, and the internet has fundamentally changed the way and the speed with which people can learn new skills. All of the speakers concurred that the city continues to have some of the greatest institutions of higher learning in the world, and a very talented, capable, and enthusiastic workforce. Providing New Yorkers with opportunities to grow and learn is how the city will stay on the innovative forefront.

Innovation in Arts and Culture

Speakers

Kate D. Levin

New York City Department of Cultural Affairs

Reynold Levy

Lincoln Center for the Performing Arts

Tom Finkelpearl

Queens Museum of Art

Moderator

Garrick Utley

The Levin Institute

Held at the Levin Institute, February 24, 2010

Reported by Leslie Knowlton



Reynold Levy

Kate Levin

Tom Finkelpearl

- **Highlights**

New York City's long-held position as a capital of the arts stems back to its creation of the Museum of Natural History in 1869.

- Reflecting the City's ongoing commitment to culture, its Department of Cultural Affairs is the largest single arts funder in the United States, funding 33 major cultural institutions occupying City-owned buildings, and about 900 non-profit groups.

- The culture sector is vital to the economic future of New York City; more than 45% of tourists coming to the city do so for that purpose. In addition to its internationally known world-class institutions, the sector includes a robust small-business community that needs to be protected.

- While today's economy is indeed a challenge for arts and culture, the non-profit world is experienced at living on the edge and innovating accordingly.

- In the face of new challenges, New York City's cultural institutions are finding novel ways to increase revenues, attract new audiences, and improve quality.

A city that supports its arts

With deep cultural roots stemming back to the nineteenth century, New York City is undeniably one of the world's top cultural leaders. What are the innovative steps needed to keep New York City alive and maintain it as the vibrant capital of creativity in the nation and the world? What is needed to strengthen this leadership position, especially given today's challenging fiscal climate and ever-changing demographics?

"You can't talk about innovation unless you talk about the steady state off which you are trying to innovate," said **Kate D. Levin** of the New York City Department of Cultural Affairs (DCA), the largest single arts funder in the United States. DCA gives operational support for major cultural institutions occupying City-owned buildings. Said Levin: "Back in 1869, some citizens came to the government of New York and said 'build us a building and we will create a collection,' and that turned into the Museum of Natural History." Now DCA's portfolio of institutions on City-owned property (CIGs) contains 33 institutions, including the Metropolitan Museum of Art, Queens Museum of Art, portions of Lincoln Center, Carnegie Hall, and the Brooklyn Academy of Music.

DCA also funds about 900 non-profit organizations in exchange for their providing free or low-cost cultural services. DCA also funds capital projects ranging from new facilities to equipment purchases in City-owned and non-City-owned cultural facilities. "We believe that kind of infrastructure is essential, and it's hard to attract private funding for those kinds of projects," Levin said.

In addition to funding programs, DCA runs Materials for the Arts, a program that collects reusable items and distributes them free to non-profit arts organizations, public schools, and a variety of social, health, and community service agencies. DCA also commissions public art through its Percent for Art Program, and performs a number of advocacy functions.

The economic value of the arts

While today's economy is a major challenge to the arts, the sector has always experienced fiscal pressure. "The sky is always falling on non-profit culture," said Levin. "It's sort of the world of Chicken Little because it's absolutely on the edge of trying to make things happen that don't necessarily quantify or fit any particular standard kind of role in the larger ecology of a society."

Levin said government generally views its job as provision of standardized services at standardized rates. Everybody wants their garbage picked up the same time every single week. But culture is valuable precisely to the degree that it's not standardized. "If every ballet company danced the same thing the same way, they wouldn't be making the contribution that we believe culture makes to our society and our civilizations," said Levin.

What can be somewhat quantified is culture's economic value to the City. "Over 45% of all tourists who come to New York City come at some level for culture," reported Levin. The top five cultural institutions have far more annual visitors than the top professional sport teams, and the creative sector employs almost three times more people than the legal sector.

Over 45% of all tourists who come to New York City come here at some level for culture.

Another important fact is that 50% of organizations applying to DCA have annual operating budgets of less than \$250,000, making it an enormously robust small-business sector. "Culture isn't some kind of ancillary add-on; it's essential to this city's survival," Levin said.

Pressure pushes innovation. "This sector is constantly on the edge of looking for new ways to attract audiences and make art," said Levin. "The whole sector is based on a passionate commitment and keeping it alive is extraordinarily important."

Fiscal innovation at Lincoln Center

Reynold Levy of the Lincoln Center for the Performing Arts noted that Lincoln Center has 12 world-class institutions, including the Juilliard School, Lincoln Center Theater, Metropolitan Opera, and New York City Ballet.

New York City is precisely the kind of supportive environment needed for the arts, evidenced by the \$1-billion-plus renovation now occurring at Lincoln Center, he said. Still, expenses have far outpaced growth in ticket revenues and efficiency. In fact, said Levy, at least half the Lincoln Center institutions now run significant deficits, eating into endowment.

Trying to economize by cutting quality is not a solution. "You cannot play Beethoven faster," Levy said. "You can't cut a tenth of the rehearsal time. Much to the dismay of my CFO, that trumpeter who only plays three measures has to be in that orchestra."

You can't maintain quality by playing Beethoven faster.

That's why Lincoln Center sought and continues to seek new business means. One strategy was better utilizing its vast facilities that include 20 auditoria seating about 22,500 people. That led to Fashion Week's plan to move from Bryant Park to Damrosch Park at Lincoln Center this year. In another creative collaboration, Channel 13 will open a glass-walled studio at the base of the newly expanded building housing Alice Tully Hall and the Juilliard School. Lincoln Center and John Wiley & Sons, Inc. formed a new multi-year partnership to publish co-branded books. And further revenues come from center charges from the ticket call-in center, expanded to include non-profits outside Lincoln Center. "They don't want their patrons going to Ticketron, where they get ripped off by excess charges and where operators don't know their spaces," Levy said.

Keeping it fresh

Levy said it's important to try new things to ensure culture's survival and growth. One innovation was to identify the Park Avenue Armory as a great space not only for exhibitions but also for performing arts. In 2008, the Lincoln Center Festival presented the epic chamber opera "Die Soldaten" at the Armory, where the audience chamber literally moved on



Innovation in Arts and Culture Session

tracks from Park Avenue to Lexington Avenue and back nine times. Last summer, the venue housed the Festival's productions of Ariane Mnouchkine's "Éphémères" and Declan Donnellan's "Boris Godunov." After attending a performance at the Armory, Michael Boyd of The Royal Shakespeare Company decided to bring his troupe there for a six-week, five-play residency next year.

Governance is extremely important in innovation in arts institutions. "Lincoln Center decided it was really important to develop succession time moving from chair to chair," Levy said. "So we developed a series of vice chairs who we thought were potential successors." Also, chairs are designated at least a year before beginning operational responsibilities. Peter Gelb was appointed to head the Met 1.5 years in advance, giving him critical and valuable time to plan, meet board members, travel the world, and think about his initial seasons, said Levy. "So we think about innovation broadly in relationship to the content of the art, but also in relationship to the governance around it."

Innovation in response to poverty and diversity

More than a third of people living in New York City are foreign born. More than half of those households are in Queens, where 138 different languages are spoken. Finding innovative ways to attract the nation's most ethnically diverse population has been the mission of Tom Finkelpearl of the Queens Museum of Art, where attendance has increased and a large expansion is planned.

"If I were in another city, I might be trying to be the Whitney Museum, but we have to do something different here," he said. "We've decided to go as far in depth as possible to understand the audiences around us and engage those audiences."

Finkelpearl, who frowns on elitism and refers to himself as a populist, reported that his institution employs two full-time community advisors to engage immigrant communities, much of which does not speak English. Programs included a Photoshop course taught in Mandarin and sound design taught in Spanish. The organization is now launching an art therapy program for non-English-speaking immigrant families with autistic children. "We're the first museum in the country to do this," Finkelpearl said. "Because it's so unique, we reach corners of the funding spectrum that no one else has."

The Queens Museum is in Corona, a highly distressed low-income community that is not even availing itself of public services such as unemployment and Medicaid, said

Finkelpearl. The museum uses social services as a model for what it offers. "Everything we do is free. Our community can't afford to pay to come to a museum, and one reason our attendance is up is that our economy is so bad." The museum is also creating a studio program to bring Manhattan artists to Corona rather than to Berlin or Paris, places where they would have their same social milieu. "We're looking at all kinds of economic transformations," Finkelpearl said, including downsizing staff. "How do we go forward in this economic climate, with the decrease in funding from all sources and really radical and incredible increase in attendance?"

Lowering barriers to accessibility

Great art is utterly necessary but not sufficient to draw audiences and contributions.

Long seen as an elite institution, Lincoln Center has also taken steps to lower barriers to accessibility and attract new audiences in new ways. "All Lincoln Center constituents agree that in the 21st century, great art on stage is utterly necessary but not sufficient to draw the kinds of audiences and contributions that first-class institutions require," said Levy.

As part of the renovation now 85% complete, Lincoln Center converted a once-dark space into the David Rubenstein Atrium, a facility that sells day-of discount tickets, offers free performances, provides free Wi-Fi access, and creates an environment with seating and food where people can just hang out and relax. "We are creating an enormous amount of free programming and discount programming to get people to appreciate, understand, and enjoy the arts," Levy said.

New technologies assist innovation

Reliance on subscriptions has been replaced in many cases by more costly single-ticket sales, said Levin. Many cultural institutions are embracing sites like Facebook and YouTube to increase sales and attract new audiences. "Lots of small theaters—and there are 375 non-profit theaters in New York City—have Facebook pages, which turn out to be a very efficient way to sell same-day tickets."

Fears that putting performances on TV or YouTube would make people less likely to see live events have proven unfounded. Instead, such moves create an even more robust audience, said Levin. "You whet people's appetite for the real thing by giving them facsimile portions of it, so more and more institutions are leaving the building as it were to find an audience." Levy agreed, noting that last year, a million

people saw the Metropolitan Opera in movie theaters around the world, and "Live From Lincoln Center" has a television audience as large as "Sex in the City."

"We're not going to die," said Finkelpearl. "We're very limber and nimble on our feet."

Resources for Innovate New York

Websites

BioAccelerate NYC Prize

www.bioacceleratenyc.org

A citywide competition providing funding for biomedical translational research, helping to span the gap between traditional academic and NIH research funding, and investment by the commercial sector.

East River Science Park

www.nycbiotech.org/east_river.html

A new state-of-the-art research and development campus, part of the New York City Bioscience Initiative. Opened late 2009.

New York Academy of Sciences Innovation & Economic Development Programs

www.nyas.org/whatwedo/innovation/main.aspx

The Academy's Innovation & Economic Development programs involve four key activities: Regional Economic Development, Science Meets Business, Convening and Publishing, and Science Alliance.

New York State Energy Research and Development Authority

www.nyserda.org

NYSERDA strives to facilitate change through the widespread development and use of innovative technologies to improve the State's energy, economic, and environmental well-being.

Kent County Council Pic and Mix

www.picandmix.org.uk

Currently in the pilot phase, Pic and Mix is a citizen portal that aims to increase public access to datasets relevant to Kent County in the UK.

NYC 311

www.ci.nyc.ny.us/apps/311/homepage.htm

New York City's resource for consolidated government information and non-emergency services for residents, business owners, and visitors. Information is available by dialing 311 or online.

NYC Big Apps

www.nycbigapps.com

A city-wide competition held in late 2009 to develop useful, inventive, appealing, effective, and commercially viable applications for delivering information from the City of New York's NYC.gov Data Mine to interested users.

Primary Care Information Project (PCIP)

www.nyc.gov/html/doh/html/pcip/pcip.shtml

A project of the New York City Department of Health and Mental Hygiene, the PCIP seeks to improve population health through health information technology and data exchange. A primary focus of the project is the adoption and use of Electronic Health Records (EHRs) among primary care providers in New York City's underserved communities.

Reports & Articles

Delivering on the Promise of New York State: A Strategy for Economic Growth & Revitalization

Prepared by AT Kearney for Empire State Development

www.nycp.org/publications/2007_0717_ATKearney_report.pdf

Altman AK, 2009

Together, we're building a smarter planet: IBM Public Sector Top Innovators Report

IBM Corporation (PDF, 2.04 MB)

www-01.ibm.com/industries/government/ieg/pdf/2010_top_innovators_report.pdf

Building New York City's Innovation Economy

www.nycfutures.org/images_pdfs/pdfs/BuildingNYCsInnovationEconomy.pdf

A September 2009 report by the Center for an Urban Future reviews the city's science and technology assets and its level of success at commercializing these assets. The report is accompanied by an Innovation Index of charts and graphs that compare New York to other cities and regions.

Books and Articles

Bhide A, 2008

The Venturesome Economy: How Innovation Sustains Prosperity in a More Connected World

Princeton University Press, Princeton, NJ

Center for an Urban Future. 2007. A World of Opportunity. (February; PDF, 727 KB) A report on the role of immigrant entrepreneurs in America's economic future.

Wadhwa V, Saxenian A, Rissing B, Gereffi G, 2007.

America's New Immigrant Entrepreneurs: Part I. (January 4). Duke Science, Technology & Innovation Paper No. 23.

Of all engineering and technology companies established in the U.S. between 1995 and 2005, 25% had at least one immigrant key founder.

Wadhwa V, Saxenian A, Rissing B, Gereffi G, 2007.

Education, Entrepreneurship and Immigration: America's New Immigrant Entrepreneurs, Part II (June 11)

Ninety-six percent of all immigrant engineering and technology entrepreneurs in this study held bachelor's degrees, and 74 percent held master's or PhD degrees. Seventy-five percent held degrees in science, technology, engineering, and mathematics-related fields.

Wadhwa V, Rissing B, Jasso, G, et al, 2007.

Intellectual Property, the Immigration Backlog, and a Reverse Brain-Drain: America's New Immigrant Entrepreneurs, Part III (August 22)

The number of visas allotted annually for skilled workers is inadequate, creating the potential for a reverse brain-drain from the United States to the skilled workers' home countries.

Wadhwa V, Saxenian A, Freeman RB, Gereffi G, 2009.

America's Loss is the World's Gain: America's New Immigrant Entrepreneurs, Part IV (March 2)

Research shows that U.S. immigrants are finding brighter career prospects and a better quality of life upon returning to their homelands.

Wadhwa V, Saxenian A, Salkever A, Freeman RB, 2009.

Losing the World's Best and Brightest: America's New Immigrant Entrepreneurs, Part V (March 19)

Survey results indicate that more foreign national students in the U.S. than ever before plan to return to their native countries upon graduation.

Speaker Biographies

Anne Altman

IBM

Anne Altman was appointed General Manager, IBM Global Public Sector, in August 2009. She is responsible for the strategy, direction, development of solutions, and sales for the public sector worldwide, including government, education, health care, life sciences and pharmaceutical industries. The Global Public Sector is playing a key role in IBM's smarter planet strategy and global economic stimulus initiatives and was singled out recently in a front-page Wall Street Journal article as IBM's strongest business in 2009.

Since joining IBM in 1981 as a systems engineer supporting the Federal Bureau of Investigation, Altman has held a series of increasingly responsible positions in software, global hardware and software sales, operations, technology development, marketing, and consulting. Known as a transformational leader and strategist, she became the managing director of IBM's Federal Group in January, 2000. She led a major effort to invest resources and align IBM's broad range of capabilities in technology, research, services, security, and consulting to better serve the growing information technology needs of U.S. government agencies.

From 2007 to August, 2009, Altman was the general manager of the IBM System z platform in IBM's Systems and Technology Group, responsible for one of the most important and critical systems in the evolution of information technology in the world today—from the "greening" of IT infrastructures to "cloud computing" which is transforming how governments, financial institutions, educational enterprises, healthcare groups, and other organizations are serving clients. In addition to her role as GM of the Global Public Sector, Altman is also a member of IBM's Performance Team and IBM's Integration and Values Team.

René Bastón

The New York Academy of Sciences

As chief business officer at the New York Academy of Sciences, Bastón leads all aspects of business strategy and business development and has created alliances in the U.S. and internationally with leading universities, governments, and multinational corporations, financial firms and NGO's in pharmaceuticals, biotech, clean technologies, real estate, IT, electronics, consumer goods and other areas. He also initiated and leads the Academy's Science Meets Business initiative and created and co-leads its Science & Technology Innovation and Economic Development advisory practice which currently focuses on biomedicine and clean

technologies. Advisory engagements have included extensive work for governments in assessing regional R&D activities and recommending investment opportunities and public/private partnership and innovation models. In Mexico City, for example, the Academy's work has resulted in the development of a series of innovative "Knowledge Cities" for which the Academy has also been engaged; and for NY State was incorporated by the Governor's Renewable Energy Task Force into the Governor's Energy Plan. Advisory engagements are also underway in India and other regions in Latin America.

Previously, Bastón was an associate director at Columbia University's Science & Technology Ventures, where he was responsible for identifying promising emerging technologies, protecting the intellectual property, and negotiating licenses and research collaborations with established or startup companies in the areas of biotechnology, biomedical informatics, medical devices, and nanobiotechnology.

He was also the co-founder, vice president of business development, and acting CTO of Medihub, a New York based provider of software and consulting services to the medical industry. He founded Medihub after spending several years in the technology enablement and business transformation divisions of Ernst & Young's Healthcare Consulting Group where he was one of the founding members of the E&Y e-Health Incubator Team.

Before making the transition to industry, Bastón received a graduate degree from the Biomedical Informatics Program at Columbia University, where he performed research on the application and development of controlled medical terminologies. He also spent several years performing neurobiology research in the laboratory of Nobel Laureate Eric Kandel at the Columbia University Center for Neurobiology and Behavior.

Amar Bhidé, DBA *Columbia University*

Amar Bhidé is the author of *The Venturesome Economy: How Innovation Sustains Prosperity in a More Connected World*, (Princeton University Press, 2008) and *The Origin and Evolution of New Businesses* (Oxford, 2000), Bhidé been studying entrepreneurship for about twenty years.

Bhidé is a member of the Center on Capitalism and Society and spearheaded the launch of its eponymous journal, *Capitalism and Society* (published by the Berkeley Electronic Press), which he now edits (with Edmund Phelps). He is also

a member of the Council on Foreign Relations and a Fellow of the Royal Society of Arts (RSA).

Bhidé served on the faculties of Harvard Business School (from 1988 to 2000) and the University of Chicago's Graduate School of Business. A former senior engagement manager at McKinsey & Company and vice president at E.F. Hutton, Bhidé served on the staff of the Brady Commission which investigated the stock market crash. Bhidé earned a DBA (1988) and an MBA with high distinction as a Baker Scholar (1979) from Harvard. He received a B.Tech from the Indian Institute of Technology in 1977.

Bhidé has several publications in the areas of entrepreneurship, strategy, financial markets and firm governance. His eight Harvard Business Review articles include "Efficient Markets, Deficient Governance," "How entrepreneurs craft strategies that work," "Bootstrap Finance: the Art of Start-ups," and "Hustle as Strategy." His work on financial markets and governance includes "The Hidden Costs of Stock Market Liquidity" in the *Journal of Financial Economics* and articles in the *Journal of Applied Corporate Finance*. Other publications include *Of Politics and Economic Reality* (Basic Books: 1984) and numerous articles in the *Wall Street Journal*, *The New York Times*, and *The LA Times*.

Jonathan Bowles *Center for Urban Future*

Jonathan Bowles is director of the Center for an Urban Future, an independent think tank in New York City that publishes studies about economic and workforce development issues affecting New York and other cities. During his nine years at the Center, he has written extensively about key economic trends facing New York and its five boroughs, the importance of diversifying New York's economy, the value of small businesses to cities and the economic challenges facing the middle class, the working poor and those on the city's margins.

The reports and commentaries he has authored, from a widely acclaimed 2007 study about the impact immigrant entrepreneurs are having on cities' economies to a report about what Staten Island should do to grow and diversify its economy, have been covered in publications ranging from *USA Today* to *The Economist*. In November 2008, the *New York Times'* City Room blog featured him in their "Ask the Expert" column, in which he fielded questions from readers for one week about the challenges facing immigrant entrepreneurs.

In 2008 he also served on Manhattan Borough President Scott Stringer's Small Business Task Force to examine the threats facing mom and pop retailers in the borough. In 2006, *City Hall News* named him one of 35 "Rising Stars" Under 40. In 2005, *Time Out New York* named him "New York's Finest Troublemaker." Before joining the Center, he worked as research director for former New York State Senator Franz Leichter and spent time as a freelance journalist.

Kenneth L. Davis, MD

Mount Sinai Medical Center

Kenneth Davis, internationally renowned for his pioneering research on psychiatric disorders, was appointed president and CEO of The Mount Sinai Medical Center in 2003. His achievements as an educator, clinician, and administrator have earned him a prominent place among the national leaders of academic medicine. Prior to being appointed dean in 2003, Davis served as chairman of the Mount Sinai Department of Psychiatry. During his fifteen year tenure in that position, he led the Department through a period of phenomenal growth. He was the first director of the Schizophrenia Biological Research Center at the Bronx Veteran's Affairs Medical Center, an affiliate of Mount Sinai; he directed Mount Sinai's NIH funded Alzheimer's Disease Research Center; and he currently serves as director of the Silvio O. Conte Center on the Neuroscience of Mental Disorder.

Davis did his undergraduate work at Yale College where he graduated *magna cum laude* and earned his MD from Mount Sinai and received the Harold Elster Memorial Award for highest academic achievement. He completed graduate medical education at Stanford University Medical Center. In 1979, Davis returned to NY and joined the faculty at Mount Sinai, becoming chief of psychiatry at the Bronx Veterans Administration Medical Center. In 1987 he was appointed Chairman of Psychiatry, Mount Sinai School of Medicine and he remained in that position until 2003.

Tom Finkelpearl

Queens Museum of Art

Since 2002, Tom Finkelpearl has served as the executive director of the Queens Museum of Art where he is working on an expansion that will double the size of the museum. The Queens Museum is situated in America's most diverse county, and it seeks to serve as a cultural crossroads through art programs, community organizing, and educational outreach.

Finkelpearl worked for 12 years during two periods at P.S.1 Contemporary Art Center, first as a curator organizing 15 exhibitions in the 1980's, returning in 1999 as deputy director and helping to organize its merger with the Museum of Modern Art. Between his stints at P.S.1, he worked for six years (1990–96) as director of New York City's Percent for Art Program where he oversaw 130 public art projects and as executive director of program at Skowhegan School of Painting and Sculpture, a residency program in Maine for advanced visual artists (1996–1999). Based on his public art experience and further research, he published a book, *Dialogues in Public Art* (MIT Press, 2000). He is working on a new book on art and social cooperation. He received a BA from Princeton University (1979) and an MFA from Hunter College (1983).

Marc Frons

The New York Times

Marc Frons joined the *New York Times* in 2006. As chief technology officer, he oversees technology and product development at NYTimes.com while continuing to be involved in broader digital strategy initiatives at the company. Before he joined the *Times*, Frons was the chief technology officer for the *Wall Street Journal Online* and other Dow Jones consumer Web sites.

Frons started his career as a journalist. He was a reporter and editor at *Newsweek* and a senior editor at *BusinessWeek* before leaving there in 1995 to start the financial Web site *SmartMoney.com*, where he held the unusual title of editor and chief technology officer. The site was the recipient of a National Magazine Award for interactive design in 2001. His earliest professional journalism appeared in the *New York Times* in the 1970s when he was a campus correspondent for the newspaper at Brooklyn College and a stringer for the *Times* when he worked for a few months at a small paper in Rock Springs, Wyoming.

Jerry MacArthur Hultin, JD

Polytechnic Institute of NYU

Jerry M. Hultin is president of Polytechnic Institute of New York University. In this capacity he heads one of the nation's oldest private science and engineering schools. An innovative resource for science, engineering and technology management, Polytechnic Institute has produced a notable list of corporate, academic, research and engineering leaders – including three Nobel laureates – since it was founded in 1854.

During his first three years as President of Polytechnic, Mr. Hultin led a university-wide initiative of redefining Polytechnic's role for the 21st Century. The resulting strategic plan was approved by Poly's Board of Trustees in May 2007 and focuses the Institute on introducing invention, innovation, and entrepreneurship – known as i2e – into all of its academic, research, and technology commercialization programs.

For instance, in order to increase entrepreneurial opportunity at Poly and throughout NYC, Polytechnic recently joined with the NYC Investment Fund and the New York State Technology and Research Authority in funding a new \$2 million venture capital fund, NYCSeed, located at Polytechnic and specifically designed to support innovative new ideas for information technology and Web 2.0 products and services.

On July 1, 2008, under Mr. Hultin's leadership and with the support of Poly's Board, faculty, and students, Polytechnic became an affiliate of New York University, one of the leading comprehensive research universities in the nation. This strategic new alliance adds Polytechnic's prowess in technology and engineering to NYU's comprehensive educational and research strengths and provides Polytechnic with substantial new resources and opportunities for education, research, and technology commercialization in NYC and around the world.

Before joining Polytechnic University, Mr. Hultin was Dean of the Wesley J. Howe School of Technology Management and Professor of Management at Stevens Institute of Technology in Hoboken, N.J. At Stevens, Hultin expanded the Howe School's graduate programs in technology management and presided over a major increase in research funding.

From 1997 to 2000 Mr. Hultin served as Under Secretary of the Navy, the Department's number two civilian leader. In this position, he led numerous programs that supported innovation in strategic vision, war fighting and business operations to meet the evolving needs of the Navy and Marine Corps in the 21st Century.

A 1964 graduate of Ohio State University, where he also received his commission as a naval officer, he then served in the Vietnam War. Graduating from Yale University Law School in 1972, Mr. Hultin spent more than 25 years in the private sector in Ohio and Washington, D.C. His work included the practice of law, management of small businesses, and business consulting in areas including technology, defense, health care, finance and the environment.

Kate D. Levin

New York City Department of Cultural Affairs

Kate D. Levin is the commissioner of the New York City Department of Cultural Affairs (DCA). In this role, she directs cultural policy for New York City, supporting and strengthening the City's cultural life through public funding for nonprofit cultural organizations throughout the five boroughs.

Prior to her appointment, Levin was an assistant professor of English and theater at the City College of New York/CUNY and associate director of the Simon H. Rifkind Center for Humanities and the Arts at CCNY. Levin has served as director of corporate relations and director of special projects at the Brooklyn Academy of Music (BAM), and has worked as a consultant for several cultural organizations.

Reynold Levy, JD, PhD

Lincoln Center for the Performing Arts, Inc.

Reynold Levy has been the president of Lincoln Center for the Performing Arts since March 1, 2002. Levy's leadership at Lincoln Center continues a distinguished career of public service. He has been president of the International Rescue Committee (1997–2002), the senior officer of AT&T in charge of government relations (1994–1996), president of the AT&T Foundation (1984–1996), executive director of the 92nd Street Y (1977–1984), and staff director of the Task Force on the New York City Fiscal Crisis.

A graduate of Hobart College, Levy holds a law degree from Columbia University and a PhD in government and foreign affairs from the University of Virginia. He has served as a consultant, volunteer, and board member of numerous nonprofit and profit organizations. Levy has published three books, "Give and Take: A Candid Account of Corporate Philanthropy" (1999, Harvard Business School Press), "Nearing the Crossroads: Contending Approaches to American Foreign Policy" (1975, Free Press of MacMillan) and, most recently, "Yours for the Asking: An Indispensable Guide to Fundraising and Management" (2008, John Wiley and Sons). He has written extensively and spoken widely about philanthropy, the performing arts, humanitarian causes and issues, and the leadership and management of nonprofit institutions. Levy has taught as a senior lecturer at the Harvard Business School, and has also taught law, political science, and nonprofit administration at Columbia and New York Universities and at the City University of New York.

Betsy Morgan

The Huffington Post

Betsy Morgan is CEO of the *Huffington Post*, a news and opinion website, which in three years has become an influential media brand, "The Internet Newspaper". The site offers coverage of politics, media, business, entertainment and living, and is a top destination for news, blogs, video and original content. *The Huffington Post* ("HuffPost") has more than 10 million unique users each month and is the most-linked-to blog on the Internet, per Technorati. Before joining *HuffPost*, Morgan was general manager of CBSNews.com, the network's 24-hour news service, and was a senior vice president at CBS News, where she was in charge of business development, digital media and new television ventures. She has also worked for News Corporation's American Sky Broadcasting and in investment banking. Morgan is a graduate of Colby College and the Harvard Business School.

(Editor's Note: Since the meeting, Betsy Morgan has left the Huffington Post)

Joe Morrisroe

NYC Department of Technology and Telecommunications

Joe Morrisroe leads the largest municipal customer service delivery operation in the nation. As Executive Director for New York City's two primary customer-facing channels—the 311 customer service center and NYC.gov the City's website—Morrisroe is responsible for ensuring 8.3 million residents and thousands of businesses, as well as millions more commuters and visitors have easy and direct access to services, information, and assistance provided by the City.

A veteran of the consumer marketing and contact center operations industry, Morrisroe has led efforts to expand service delivery while enhancing the overall customer experience in both channels since joining the City's Department of Information Technology and Telecommunications (DoITT) in June, 2006. He leads an organization of over 500 employees comprised of senior level directors, project managers, trainers, and analysts; as well as front-line customer service personnel. Together all deliver on the promise of "customer service is public service in action".

Morrisroe has a proven record of leading organizations in delivery of outstanding customer service combined with achieving employee satisfaction in both traditional corporate as well as start-up environments. He spent 17 years at AT&T moving from entry-level service rep to ultimately

vice president for Customer Operations in the Wireless division; spent two years building contact centers for a private communication services start-up in New York City and Santo Domingo, RD; and prior to joining the City of New York successfully lead acquisition and retention programs for the New York Times Company. With experience earned on the front-lines through executive levels, Morrisroe combines a clear understanding of customer needs with an ability to build employee programs and leverage technology and tools to deliver outstanding quality service.

Amanda Parsons, MD

NYC Department of Health Primary Care Information Project (PCIP)

Amanda Parsons oversees all Primary Care Information Project (PCIP) activities at the NYC Department of Health. This includes making sure the physicians are well-prepared for success with an EHR, working with vendors to develop and improve the technology, and advocating for policies that reward quality healthcare. Parsons set ambitious goals for the project under her leadership, including not just expanding health IT across New York City, but also ensuring that physicians use the systems to improve health outcomes in key public health areas.

In her previous position as PCIP Director of Medical Quality she was responsible for creating and leading the Quality Improvement, Billing Consulting and EMR Consulting teams deployed to PCIP's small practice physicians.

Prior to joining PCIP, Parsons spent 4 years at McKinsey & Company, ultimately as an engagement manager serving clients in the Pharmaceutical & Medical Products and Global Public Health sectors. She serves on the board of directors of VIP Community Service in the Bronx, and is on the advisory board of the Touch Foundation.

Tom Phillips

Google

Tom Phillips is Google's director of search and analytics. He was the founding publisher of *Spy Magazine*, and a founding member of the original management team at *Starwave*. After the acquisition of *Starwave* by Disney, Phillips served simultaneously as the president of ABC News Internet Ventures and ESPN Internet Ventures, joint endeavors between Disney and *Starwave*. In 1998, Phillips was hired as the CEO of *Deja.com*, and sold the company's core assets to Google. In 2006, he took a position with Google, as director of print advertising, running

advertisements for Google clients in newspapers and other print publications. He was subsequently put in charge of the acquisition process in Google's purchase of DoubleClick.

Phillips received his Bachelor's Degree from Harvard University in 1977 and his MBA from Stanford University in 1981.

[Editor's note: Since the meeting, Phillips has left Google.]

Matt Nimetz, JD
General Atlantic

Matt Nimetz is the chief operating officer of General Atlantic, a leading global growth equity firm. Prior to joining General Atlantic in January 2000, Nimetz was a partner (and former chair) of the law firm of Paul, Weiss, Rifkind, Wharton & Garrison in New York City, where he concentrated on corporate and international law from December 1980 through January 2000. He previously practiced law as an associate, and partner, of Simpson Thacher & Bartlett between 1969 and 1977.

Nimetz served as under secretary of state for security assistance, science and technology from February through December 1980 and as counselor of the Department of State (1977–1980). In those capacities, he supervised United States security assistance programs and the Department's international scientific and technological programs, including scientific and technical cooperation, nuclear nonproliferation issues, and international environmental and communications policies of the U.S. Government. He also supervised, among other things, U.S. policy on the Eastern Mediterranean (Greece, Turkey, Cyprus) and relationships with Eastern European countries.

From March 1994 through September 1995, Nimetz served as President Clinton's special envoy in the mediation of a dispute between Greece and the Former Yugoslav Republic of Macedonia. In 1999 he was appointed the special representative of the secretary general of the United Nations in connection with the continuing negotiations between those two parties and continues to serve in that capacity.

Nimetz received degrees from Williams College and the Harvard Law School where he was president of the Harvard Law Review. He also has an MA from Balliol College, Oxford University, where he was a Rhodes Scholar.

Donna Rounds, PhD
Hospital for Special Surgery (HSS)

Donna Rounds joined the Hospital for Special Surgery (HSS) in February 2008 to lead their efforts in developing and commercializing orthopedic and rheumatology technologies. Prior to joining HSS, she spent five years at Columbia University's Science and Technology Ventures developing and commercializing healthcare related technologies, as well as championing start-up companies for her portfolio of scientists.

Before Science and Technology Ventures, she was a business development executive at British Technology Group, BTG, plc, where she sourced, assessed, and acquired early stage life and physical science technologies. She began her career in developing technology assets as one of the founders of Physiome Sciences, Inc. a biotechnology company that developed computational models of cells, tissues and organs. She holds a PhD from Yale University in Molecular Biophysics and Biochemistry and an undergraduate degree from the University of California at Berkeley.

Geoffrey Sands
McKinsey and Company

Geoffrey Sands is a director of McKinsey & Company and heads its Global Media, Entertainment, and Information Practice in North America. He has over 20 years of experience working with many of the leading marketing, media and entertainment companies. His clients span a wide range of businesses that include: newspaper, magazine and book publishing; broadcast and cable television; internet service providers; recorded music; filmed entertainment; professional publishing; business information services; education; marketing services; video games; consumer electronics; and sports.

He serves on the Board of Directors of the Sundance Institute, the Public Broadcasting Service (PBS), Thirteen.org and the Paley Center For Media. He is industry advisor to the World Economic Forum's Media & Entertainment Governors' Meetings. Sands received his BA and MBA from Yale University.

James H. Singer
A.T. Kearney

James Singer is a partner at A.T. Kearney, the global management consulting firm. He is also the head of the firm's New York Office, the director of North American

marketing, and member of the CEO's global branding committee. In 2007, Singer led A.T. Kearney's project for the State of New York to develop a long-term economic growth strategy for the State. Singer is a long-time member of the Partnership for New York City, where he was awarded a 2007-2008 David Rockefeller Fellowship for his accomplishments in advancing public-private partnerships in the city.

Prior to joining A.T. Kearney, Singer was a manager of business development for a biodegradable polymer unit of the Warner Lambert Company. Previously, he was a research chemist and assistant to Nobel laureate Bruce Merrifield at the Rockefeller University in New York City. Singer received an MBA from the Amos Tuck School of Business at Dartmouth College.

Garrick Utley (moderator)

The Neil D. Levin Graduate Institute of International Relations and Commerce

Garrick Utley is the president of the Levin Graduate Institute of International Relations and Commerce of the State University of New York. For 40 years, Utley worked as a broadcast journalist on NBC, ABC, CNN, as well as public radio and public television. With a primary focus on international affairs he has reported from more than 75 countries.

Utley has received several of broadcast journalism's most respected honors, including the Overseas Press Club's Edward R. Murrow Award, and the George Foster Peabody Award. He is the author of the book *You Should Have Been Here Yesterday*, (PublicAffairs, 2000), a narrative of the growth of television news in the United States.

Vivek Wadhwa, MBA

Harvard Law School/Duke University

Vivek Wadhwa is a fellow with the Labor and Worklife Program at Harvard Law School and executive in residence/adjunct professor at the Pratt School of Engineering at Duke University. He helps students better prepare for the real world and leads groundbreaking research into globalization and the U.S. competitive advantage. He is also an advisor to several start-up companies and a regular columnist for BusinessWeek.com.

Wadhwa has long been a pioneer of change and innovation in the technology industry, and has founded 2 software companies. He started his career as a software developer

and gained a deep understanding of the challenges in building computer systems. His quest to help solve some of IT's most daunting problems began at New York based investment banking powerhouse CS First Boston, where he was Vice President of Information Services. There he spearheaded the development of technology for creating computer systems which was so successful that CSFB decided to spin off this business unit into its own company, Seer Technologies. As Executive Vice President and Chief Technology Officer, Wadhwa helped grow the nascent startup into a \$118 million publicly traded company.

With the explosion of the Internet, Wadhwa saw an even greater opportunity to help businesses adapt to new and fast changing technologies, and started Relativity Technologies. As a result of his vision, Wadhwa was named a "Leader of Tomorrow" by Forbes.com. Relativity was named as one of the 25 "coolest" companies in the world by *Fortune Magazine*.

Wadhwa holds an MBA from New York University and a BA in computing studies from the Canberra University in Australia. He is founding president of the Carolinas chapter of The IndUS Entrepreneurs (TIE), a non-profit global network intended to foster entrepreneurship. He has been featured in thousands of articles in worldwide publications including *The Wall Street Journal*, *Forbes Magazine*, *Washington Post*, *New York Times*, *U.S. News and World Report* and *Science Magazine*. He has also made many appearances on U.S. and international TV stations including CNN, ABC, NBC, CNBC and the BBC.

Irving Wladawsky-Berger, PhD

*IBM Academy of Technology
Massachusetts Institute of Technology*

Dr. Irving Wladawsky-Berger retired from IBM in May of 2007 after a 37 year career with the company, where his primary focus was on innovation and technical strategy. He was responsible for identifying emerging technologies and marketplace developments critical to the future of the IT industry, and organizing appropriate activities in and outside IBM in order to capitalize on them. He led a number of IBM's companywide initiatives including the Internet and e-business, supercomputing, Linux, and Grid computing. He continues to consult for IBM on major new market strategies like Cloud Computing and Smart Planet.

In March of 2008, Dr. Wladawsky-Berger joined Citigroup as Strategic Advisor, helping with innovation and technology initiatives across the company. He is helping to formulate Citigroup initiatives related the future of global banking,

including mobile banking, Internet-based financial services, and financial systems modeling and analysis. He is Visiting Lecturer at MIT's Sloan School of Management and Engineering Systems Division, Adjunct Professor in the Innovation and Entrepreneurship Group at the Imperial College Business School, and Senior Fellow at the Levin Institute of the State University of New York. He is a member of the InnoCentive Advisory Board, the Spencer Trask Collaborative Innovations Board, the Visiting Committee for the Physical Sciences Division at the University of Chicago and the Board of Visitors for the Institute for Computational Engineering and Sciences at the University of Texas at Austin.

He was co-chair of the President's Information Technology Advisory Committee, as well as a founding member of the Computer Sciences and Telecommunications Board of the National Research Council. He is a former member of the University of Chicago Board of Governors for Argonne National Laboratories, of the Board of Overseers for Fermilab and of BP's Technology Advisory Council. He is a Fellow of the American Academy of Arts and Sciences. A native of Cuba, he was named the 2001 Hispanic Engineer of the Year. Dr. Wladawsky-Berger received an M.S. and a Ph. D. in physics from the University of Chicago.

Writers

Theresa M. Wizemann

Theresa M. Wizemann is a science writer based in Doylestown, PA. Her writing focuses on biomedical science, health, and technology, including public policy, regulatory policy, biotechnology, and pharmaceutical research. Wizemann holds a PhD in microbiology and molecular genetics, awarded jointly from Rutgers University and the University of Medicine and Dentistry of New Jersey.

Leslie Knowlton

Leslie Knowlton is a freelance writer based in New York City and on Deer Isle, Maine. With a master's degree in psychology, she spent more than a decade as a correspondent for the Los Angeles Times and a medical writer and contributing editor for the Psychiatric Times.

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