Center *for an* Urban Future

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NEW TECH CITY

Riding a wave of start-ups, New York has emerged a national leader in fields that leverage the Internet and mobile technologies—a development that has provided a key economic boost and left the city well positioned for future tech growth

This report was written by Jonathan Bowles and David Giles and our NYC Digital Start-Up Index was created by Nicholas Chung and Eric Blair-Joannou. Additional research by Evan Lacher. Design by Ahmad Dowla.

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The Center for an Urban Future is an NYC-based policy institute dedicated to highlighting the critical opportunities and challenges facing New York and other cities, and providing fresh ideas and workable solutions to policymakers. The Center's primary focus is on growing and diversifying the local economy, expanding economic opportunity and targeting problems facing low-income and working-class neighborhoods. The Center does this through publishing fact-based research reports that are accessible to a wide audience and holding high-profile policy forums. For more information or to sign up for our monthly e-mail bulletin, visit www.nycfuture.org.

Cover design by Yen Ma

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NEW TECH CITY

EVER SINCE HIS INITIAL YEAR IN OFFICE, MAYOR Bloomberg has been sounding the alarm that New York City is overly dependent on Wall Street and needs to diversify its economy. But finding that new engine of job growth has proved difficult.

Until now.

In just a few short years, New York's tech sector has emerged as an increasingly powerful economic driver for the city. At a time when few other industries were growing in New York, more than a thousand new tech start-ups were formed in the city. This burst of tech company formation has created thousands of good paying jobs in the five boroughs, attracted large amounts of capital from outside the city, pumped new life in the city's entrepreneurial economy, and lured some of the world's smartest and most innovative people to New York at a time when the most competitive cities are the ones with the best human capital and greatest capacity for innovation.

The flood of digital start-ups in recent years has also transformed the city from a second-rate tech center to literally the nation's second leading hub for technology companies. And as this report shows, there is ample evidence that what's happening in New York's tech scene today is no flash in the pan. Though a number of the recent Internet start-ups will ultimately fail, New York appears to be building a sustainable tech sector—one that is benefiting from a much stronger local tech ecosystem than existed in the city's first wave of tech growth in the 1990s and taking advantage of several big technology trends that play to New York's natural strengths.

The latest in a long line of Center for an Urban Future reports focusing on opportunities to grow and diversify the city's economy, this study provides a comprehensive examination of New York's fast-growing tech sector, focusing on the companies in the city that are enabled by the rapid evolution of the Internet and mobile platforms. The report documents the size and scope of this sector, details the growth that has taken place in the past few years, assesses what factors have fostered this rapid expansion, analyzes which tech subsectors in New York are strongest and offer the most potential for future growth, identifies critical challenges that should be addressed if the city is to keep the momentum going. Based on an extensive data analysis and interviews with more than 50 start-up founders, veteran tech executives, investors, academics, local economic development officials and leaders from the city's business and real estate communities, the report also makes recommendations on what should be done to support the continued growth of this sector.

The report is accompanied by a New York City Digital Start-up Index, an analysis of tech businesses formed in the city since 2007 which have received some form of outside investment from angel investors, seed funders or venture capital firms. We also break down these businesses by subsector, level of funding, employment and geographic location within the five boroughs.

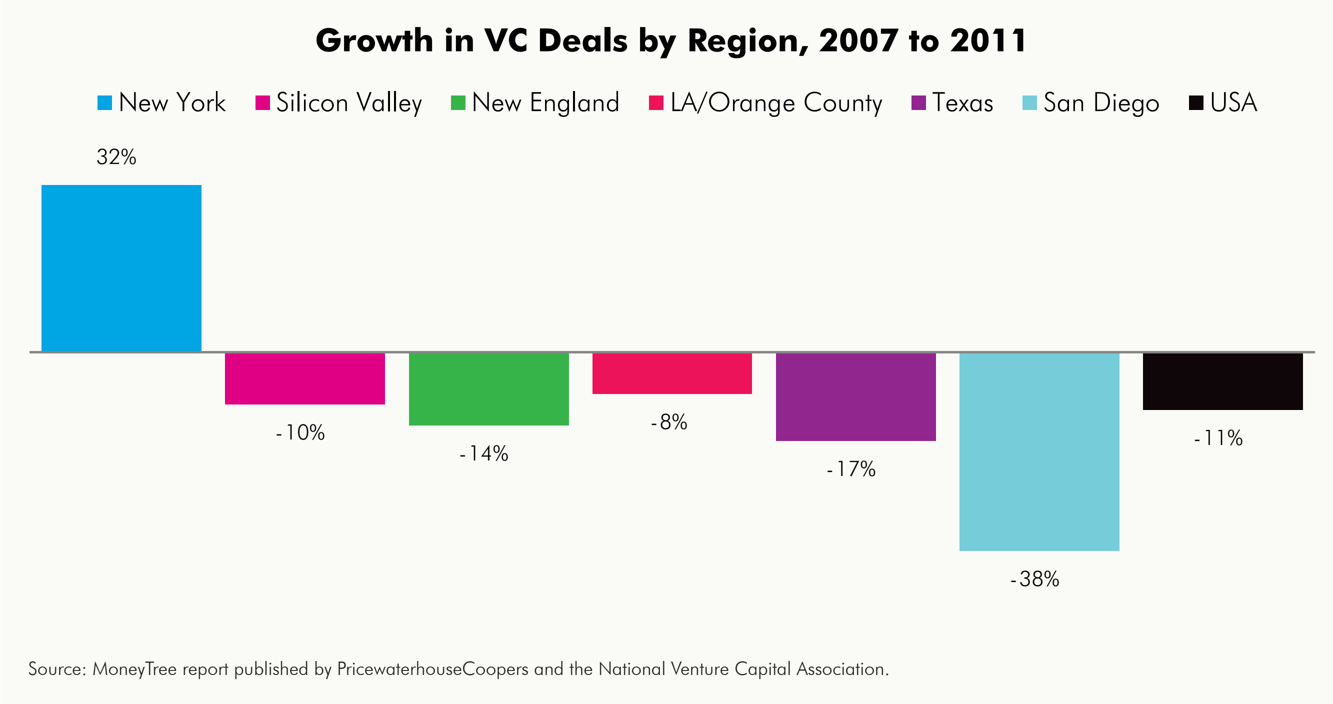
What's clear from our research is that New York City's tech sector has come a long way in the last few years. A decade after the bust of the dot com bubble left most serious venture capitalists and entrepreneurs highly skeptical that New York could ever become a major hub of tech activity, the city has produced a wave of wildly successful start-ups, attracted entrepreneurs that previously would have almost certainly bypassed New York for Boston and the West Coast, and positioned itself at the vanguard of the fast-growing digital media, Internet and social networking sectors.

As recently as five or six years ago, New York was very much considered an also-ran in the pantheon of tech hubs. Although there were pockets of excellence here, few of the nation's pre-eminent tech entrepreneurs or investors spoke about New York in the same breath as Silicon Valley or the Greater Boston area, the nation's two longstanding tech hotbeds. The city was not producing a steady stream of tech start-ups, there were huge gaps in the investment community and there was no meaningful tech ecosystem. "In 2004 or 2005, we were still very much a distant third in terms of dollars invested in the start-up economies," says Jim Robinson IV, a principal with RRE Ventures, the New York City-based venture capital firm. "Silicon Valley was obviously first, Boston the pretty clear second and New York was a distant third, a pretty big step down from number two. That was true in every measure: it was true in capital formation, in commitments, in bodies and in company launches."

"In 2006, I wouldn't have put New York anywhere on the map [of leading tech hubs]. Now it is literally number two."

"In 2006, I wouldn't have put New York anywhere on the map [of leading tech hubs]," adds Vivek Wadhwa, a national expert on tech entrepreneurship. "Now it is literally number two. If there is any second to Silicon Valley, it's now New York, not Boston." Even prominent Silicon Valley entrepreneurs like Paul Graham now acknowledge that New York has surpassed Boston.

It's not that tech start-ups magically appeared on the scene in New York in the past few years. The roots of today's tech boom were firmly plant-



ed in the early and mid-1990s, when the rise of dot com companies and digital media firms provided the first indication that New York could become a legitimate tech hub.

But in the last three to five years, New York has clearly taken things to a new level. Any way you measure it—companies, jobs, investment or community—New York has experienced stunning growth and appears well on its way to developing a sustainable digital economy.

Our digital start-up index identifies 486 tech start-ups formed in the city since 2007 that have received some investment from angels, VC firms or other private investors.

While this is itself a remarkable figure, it only scratches the surface of tech start-up activity in recent years. After all, we didn't count tech start-ups that didn't receive funding. Since new start-ups here seem to emerge every other day, it is difficult to get a complete picture of the number of tech firms based in New York today. Based on our data analysis and interviews with entrepreneurs and investors in the city, we estimate that well over 1,000 tech start-ups have been created in the past five years.

Even this is likely a gross undercount. Just look at the number of applications to TechStars New York, the start-up accelerator program that came to New York a little more than a year ago. According to David Tisch, managing director of the program, there were about 1,600 applicants to its most recent program, which started in March 2012. This is nearly triple the 600 applicants TechStars had for its initial New York program in January 2011 and significantly more than the 1,100 applications for its second class in July 2011.

And TechStars is just one of at least a dozen accelerator programs for tech start-ups in New York today. Prior to 2009, there were no accelerators in the city. At least two of these accelerators focus solely on start-ups in the relatively small but growing health tech field. StartUp Health, one of those programs, has received 600 applications to its health tech academy in the last nine months, according to co-founder Unity Stoakes, who says that roughly half of those are from the New York City area.

"It's not being hyperbolic to say that the early stage business formation in the tech sector in New York has exploded," says Thatcher Bell, a principal at Manhattan-based VC firm DFJ Gotham Ventures.

And while most of these early stage companies remain fairly small today, an increasing number of tech start-ups in New York have begun to achieve significant growth—including Foursquare, Gilt Groupe, Kickstarter, Tumblr, ZocDoc and Etsy. Of the tech start-ups founded in New York since 2007, 15 have raised more than $50 million in investments, 27 have investments of at least $25 million and 81 have raised at least $10 million.

All of this has led to a fairly dramatic increase in local employment, much of which occurred during a period when few other parts of the city's economy were adding jobs.

There has never been a widely accepted barometer for measuring employment in the city's tech sector, but no matter how you look at it, it's clear that New York has experienced considerable job growth in this area. Data we analyzed from the New York State Department of Labor shows that the number of information technology jobs in the five boroughs has risen from 33,000 in February 2003 to 52,900 in February 2012—a remarkable 60 percent increase. Even in the last two years, a period of sluggish growth in the city, this sector added 7,900 jobs—an 18 percent spike. Using a more expansive definition of the tech sector, data from the New York City Economic Development Corporation (EDC) reveals that there were 90,273 people working at 7,147 "high-tech" companies in 2010, a 30 percent gain in employment from 2005.

Of the seven leading technology regions in the U.S., New York was the only one to see an increase in the number of VC deals between 2007 and 2011.

Notably, this sector grew ten times faster than the overall change in city employment in the same period.

There are many other indications of New York's stunning gains in tech.

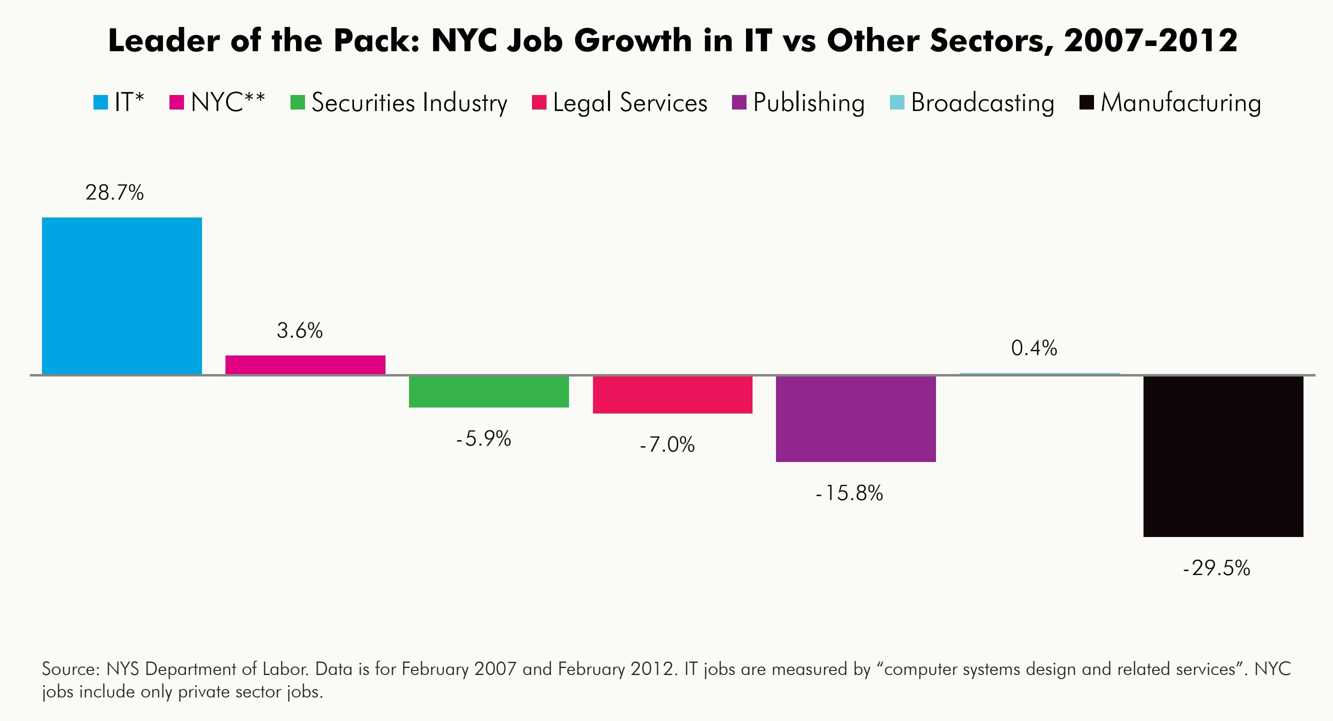
There are now more than 23,000 members of New York Tech Meetup, the membership organization for those involved in the city's tech community. This is double the number of members in December 2009 (11,500) and nearly triple the figure from October 2008 (7,500).

Of the seven leading technology regions in the United States, New York was the only one to see an increase in the number of VC deals between 2007 and 2011, according to data from the MoneyTree report published by PricewaterhouseCoopers and the National Venture Capital Association. Amazingly, the number of deals shot up by 32 percent in New York during this period. In contrast, venture activity was down significantly in every other region, including Silicon Valley (-10 percent), New England (-14 percent), LA/Orange County (-8 percent), Texas (-17 percent) and San Diego (-38 percent). Nationally, there was an 11 percent decline in VC deals.

There were almost as many tech-related VC deals in New York City in 2011 (165) as in 2006 and 2007 combined (172), according to data from SeedTable. And the number of digital companies in New York that exited, or got acquired by other firms, was actually larger in 2011 (55) than in 2008 and 2009 combined (54).

Most of the nation's largest tech companies are now planting roots in New York, something that didn't seem likely five or six years ago but has lent legitimacy to the city's upstart tech industry. Google opened a major office in New York in 2006, and made a deeper commitment in 2010 when it purchased its office building, 111 Eighth Avenue, for $1.8 billion. But even more recently, Facebook has committed to building an engineering campus near Grand Central while Twitter, eBay, LinkedIn, and Yelp have all announced plans to develop major offices here.

Importantly, start-ups are also relocating here. We identified well over a dozen established tech start-ups that have moved to New York in re-



cent years from the San Francisco Bay Area, Boston and other locations. James Wahba, founder of Projective Space, says that "a good 30 percent" of the start-up founders working out of his coworking facilities moved to New York to create their company. And at least 28 New York-based tech start-ups were founded by students from Harvard Business School. This is noteworthy because even a few years ago, HBS graduates who moved to New York were mainly doing so to work on Wall Street. And those who were opting to go the entrepreneurial route were often doing so in Boston or on the West Coast. Now they are literally flocking to New York to become tech entrepreneurs. Indeed, in April, Boston-based venture capitalist Jeff Bussgang said that about a third of students surveyed in his Harvard Business School entrepreneurship class expect to relocate to the Big Apple.[1]

The flood of tech start-ups in New York is on display at the dozen or so incubators and coworking spaces that have opened in the city in the past few years. By our count, these shared spaces have already housed nearly 500 tech start-ups. General Assembly, perhaps the city's best known tech incubator, opened its New York campus in January 2011. A little more than a year later, GA has 350 members, representing upwards of 100 early stage start-ups. Already, 16 of its dedicated member start-ups have graduated from the space over the past year. GA also attracts 3,000 attendees each month for classes, events and other events. "People move to New York to take our classes," says Brad Hargreaves, one of GA's founders.

Five or six years ago, New York-based entrepreneurs routinely complained about the difficulty attracting financing, whether from venture capital firms or angel investors. Early stage financing was particularly lacking in the city. Indeed, in June 2008, Mayor Bloomberg noted that "many smaller start-up companies have difficulty accessing seed capital to get off the ground."

But today, the city is awash in capital for start-ups. "There was no structured institutional seed capital in the city pre-2008," says Owen Davis, managing director of NYCSeed, which was created in 2008 to provide seed-stage funding. "By 2010 there was more capital than ever for seed investing in the city."

Local angels and venture funds have greatly increased their level of funding for local start-ups. Robinson says that 70 to 75 percent of the investments made by RRE Ventures today are in New York, compared to under 50 percent in 2004 and 15 to 20 percent in the mid-1990s. The same has happened with New York Angels, the most prominent angel investment group in the city. "Several years ago we were doing probably 40 percent of our deals in New York," says David Rose, founder of New York Angels. "Now, I think it is closer to 70 or 80 percent."

While the availability of capital has been crucial to the growth of the city's tech economy, the strides New York has made in developing a tech "community" or ecosystem have arguably been even more important. Indeed, this was one of the critical missing pieces in New York during the go-go days of Silicon Alley in the late 1990s. "The New York New Media Association had 8,000 members at the height of the boom," says Rose, speaking of the major industry association for the city's dot com companies. "But the problem was that there was no ecosystem. It was like grass that was growing on concrete."

"Maybe Silicon Valley will continue to build the next chip sets, hardware, and certain types of apps, but the expertise we have in New York is well suited to the next generation of tech companies."

Even in the mid-2000s, New York still lacked a robust tech ecosystem. A 2007 article about the city's tech scene concluded that "finding tech culture in New York in 2006 took a little bit of digging."

That's all changed. There is a growing community of technologists in the city, in part because entrepreneurs, developers and engineers are moving here in droves. Amazingly, about half of Tumblr's 103 employees are "relos," according to David Karp, the company's founder. All of these techies are now finding a welcoming and supportive ecosystem at every turn. There are routinely more than a dozen tech-related meetups a day, in addition to hackathons, start-up weekends and tech-related events. Meanwhile, a growing number of organizations provide aspiring entrepreneurs with advice, connections and the opportunity to pitch ideas to investors. At the same time, the number of successful tech entrepreneurs in New York has multiplied in recent years, and many of them are making angel investments in other start-ups and serving as mentors.

"It's a very vibrant community that's growing and multiplying rapidly," says Divya Gugnani, the founder of fashion tech company Send the Trend. "What's so amazing is that there are networks of entrepreneurs in New York now. In 2008, I knew five entrepreneurs in New York that I could call and have a conversation with. Now, I can call 500 people in New York. Literally, from 2008 to 2012, that's how much my network has grown on the tech side, because there just so many more companies and so many more people starting businesses."

From an economic perspective, the best news for New York is that this does not appear to be a temporary blip. While it's likely that a good number of the recent start-up companies in New York will not succeed, virtually everyone interviewed for this report—including several people based outside the city—believes that New York is extremely well-positioned for even more tech sector growth in the future.

"New York is well suited to where tech is going," says Jalak Jobanputra, managing director for venture firm RTP Ventures. "Maybe Silicon Valley will continue to build the next chip sets, hardware, and certain types of apps, but the expertise we have in New York is well-suited to the next generation of tech companies."

The future is bright for New York in part because of the ecosystem that has developed here in recent years, which has left the city with much stronger foundation to build upon than was the case in the late 1990s. But more importantly, so many trends in the tech world today play to New York's strengths.

The early days of technology growth was driven by semiconductors and computer hardware, products that depended on a deep roster of engineering talent and required large amounts of physical space to develop—neither of which favored New York. In contrast, today's growth is being fueled by the Internet and smart phones, and the creation of new ways of taking advantage of these now widely used platforms to deliver content, sell products, deliver services, play games and simplify life for individuals and businesses. New York's rich pool of creative, marketing and business talent is well-suited for creating and running these new businesses, all of which can be built with comparatively few engineers. At the same time, today's technology revolution is much less about creating the infrastructure and plumbing for the Internet, but about applying technology to traditional industries like advertising, media, finance, fashion and health. New York is natural for this wave of technology growth because it is a market leader in most if not all of these sectors, and boasts an unmatched concentration of talent in each of these fields.

On top of these advantages, New York's start-up boom has benefited from a precipitous decline in the cost of developing an Internet business and the availability of new platforms where entrepreneurs who aren't coders can go to get a Website built for a small amount of money.

Our research suggests that there is considerable room for additional growth in the years ahead. On one level, individual consumers and businesses are still in the earliest stages of using and adopting the innovative Internet and mobile technologies being created in New York and elsewhere. Most analysts expect that demand will only increase, especially as the use of smart phones explodes in the coming years. Some technology sub-sectors that are strong here, like financial technology and social media, still have a lot of growth ahead of them. Meanwhile, other traditional industries like health care and energy have only begun to be disrupted by technology. Many of those interviewed for this report believe that health tech could be next to take off, and New York is already positioning itself as one of the two or three leading regions in this field. Others say that media applications using video have real potential for growth here.

With every successive generation, the city is building up more of a critical mass of experienced technology entrepreneurs and talent, more mentors and more capital.

Moreover, the proliferation of successful tech start-ups, the emergence of serial entrepreneurs and creation of a sustainable ecosystem in New York is likely to feed on itself in the coming years, just as Silicon Valley evolved and grew over decades—not years—when successful tech entrepreneurs started second and third companies, became angel investors in other start-ups and even started VC firms. With every successive generation, the city is building up more of a critical mass of experienced technology entrepreneurs and talent, more mentors and more capital. And with each success, the city is building buzz and creating an impression among investors, entrepreneurs and engineers based elsewhere that this is one of the leading places to build a tech company.

While there is clear cause for optimism, there is also a lot that New York's tech sector hasn't yet achieved. None of the major tech IPOs in the last couple of years—including Facebook, LinkedIn, Groupon and Angie's List—involved New York companies. Even the Boston region has about 30 tech companies with billion dollar market capitalizations, while New York has just a few.

In addition, some of the highest flying tech companies in the city have recently hit some rough patches. Gilt Groupe, arguably the largest Internet start-up in the city with about 900 employees, trimmed 10 percent of its staff earlier this year. SecondMarket, the online private equity market, recently announced it would lay off 15 of its 130 jobs. Lot18, the high-flying online wine and gourmet food seller, cut its workforce by 15 percent in January after growing from six employees to 90 in about a year.[2] Flash sales aggregator MyNines shut down last year.

There are also a number of challenges that could inhibit this sector's future growth. Chief among them is a shortage of talent: every entrepreneur we spoke to for this report says that hiring the engineers they need is exceedingly difficult. Though far more engineers are moving to New York today than even a few years ago, it is still not enough to meet the demand as so many tech start-ups here look to add employees and large companies like Facebook and Twitter plan to greatly expand their engineering presence in the city. Connected to this is the difficulty that individuals from abroad with tech expertise have in getting the visas needed to move to the U.S. or to stay here after attending college in this country. No other city is as well positioned as New York to attract engineers or entrepreneurs from abroad, but the nation's backwards immigration and visa policies are greatly hampering New York's tech sector and making the companies that are here spend too much of their time and energy on immigration lawyers and filling out visa applications.

Though entrepreneurs in most parts of the city can access a fast broadband connection today, many of those we interviewed said that New York's telecom infrastructure is well behind where it should be for a city vying to be one of the nation's two leading technology hubs. Some start-ups that have looked for affordable space in former industrial districts outside of Manhattan have had to abandon those plans after discovering that high-speed Internet connections weren't possible.

While real estate is not generally a problem today, especially given the number of incubators and accelerators offering inexpensive space, that could change quickly. Much of the tech sector's growth has occurred in the last few years when the rest of city's economy was barely growing; when other sectors start clicking again, space may become much harder to come by, especially for firms that are graduating from incubators. This was a major problem at the height of the last tech boom in New York City.

The good news is that Mayor Bloomberg has championed the city's tech sector at every turn and his administration has launched an array of ambitious programs and policies to support its growth, from the creation of a new applied sciences campus on Roosevelt Island and the development of several incubators to the hiring of a chief digital officer.

There is still much work to be done to ensure that the tech sector continues on the upward trajectory of the past few years. But this report concludes that there is ample reason to be bullish about New York.

Even tech experts from the West Coast are optimistic about what's happening here. "It's a very opportune moment for New York," says Anna Lee Saxenian, dean of U.C. Berkeley's School of Information and the author of the definitive book about the development of tech clusters and the what led to Silicon Valley long-term success. "New York is extremely well positioned. The web has really opened up the door."

KEY FINDINGS

In the past few years, there has been an explosion of tech start-ups in New York City, most of which are companies that leverage the Internet and mobile technologies.

- We identified 486 digital start-ups formed in the city since 2007 that have received angel, seed or VC funding.
- Overall, there are well over 1,000 Web-based technology start-ups in the city, most of which have not secured investment capital.
- As one indication of the growth in early stage companies, roughly 1,600 start-ups applied to TechStars New York for its most recent program in March 2012—up from 600 applicants in the initial class, in January 2011.
- We identified well over a dozen established tech start-ups that have moved to New York in recent years from the San Francisco Bay Area, Boston and other locations.
- At least 28 New York-based tech start-ups were founded by students from Harvard Business School.

Although it is still well behind Silicon Valley as a tech hub, New York City has the nation's fastest growing tech sector and has surpassed Boston as the number two tech center in the U.S.

- Of the seven leading technology regions in the United States, New York City was the only one to see an increase in the number of VC deals between 2007 and 2011, according to data from the MoneyTree report published by PricewaterhouseCoopers and the National Venture Capital Association.
- The number of deals shot up by 32 percent in New York during this period whereas venture activity was down significantly in every other region, including Silicon Valley (-10 percent), New England (-14 percent), LA/Orange County (-8 percent), Texas (-17 percent) and San Diego (-38 percent). Nationally, there was an 11 percent decline in VC deals.
- New York is either the clear leader or one of the leading centers of activity in several tech subsectors that are growing today, including ad tech, fashion tech, fin tech, digital media, ed tech and health tech.

More and more New York-based tech start-ups are achieving significant growth.

- Of the tech start-ups founded in New York since 2007, 15 have raised more than $50 million in investments, 27 have investments of at least $25 million and 81 have raised at least $10 million.
- More of the city's digital companies got acquired by other firms in 2011 (55) than in 2008 and 2009 combined (54).

The city's tech sector has created thousands of jobs in the past few years, giving New York's economy a much-needed boost at a time when few other industries have been growing.

- In the last five years, information technology jobs in the city have increased by 28.7 percent, from 41,100 to 52,900.
- During the same period, private sector jobs in the five boroughs grew by just 3.6 percent while employment was down considerably in several of the city's traditionally-strong industries, including the securities industry (down 5.9 percent), publishing (down 15.8 percent), legal services (down 7.0 percent) and manufacturing (down 29.5 percent).
- Nearly half (47 percent) of the 298 tech start-ups on New York Tech Meetup's "Made in New York City" list indicated that they are currently hiring in April 2012.

Unlike the fleeting dot com boom in the 1990s, New York now appears to be building a sustainable tech sector that has significant potential for future growth

- Today's tech start-ups are less about building new technology than applying technology to traditional industries like advertising, media, fashion, finance and health care—all of which New York excel in.
- Dramatic increases in people using the Internet and mobile devices have created huge demand for companies that create content, sell products and provide services online—all of which play to the city's strengths.

The city lacked a strong tech ecosystem during Silicon Alley's first wave of tech growth in the 1990s, but that couldn't be more different today.

- There are now more than 23,300 members of New York Tech Meetup, more than twice the number of members in December 2009 (11,500) and nearly triple the figure from October 2008 (7,500).
- There are more than 12 incubators and coworking spaces that house digital start-ups today, up from only a few prior to 2009. By our count, these shared spaces have already housed nearly 500 tech start-ups.
- Prior to 2009, there were no accelerator programs for tech start-ups in New York. Today, there are at least a dozen accelerator programs in the city.

Until four or five years ago, tech entrepreneurs in New York struggled mightily to access investment capital, but that has changed in a big way, particularly for early stage companies.

- There were almost as many tech-related VC deals in New York City in 2011 (165) as in 2006 and 2007 combined (172), according to data from SeedTable.

NYC DIGITAL START-UP INDEX SUMMARY FINDINGS

Accompanying this report is our New York City Digital Start-up Index, a list of the digital start-ups based in the city that were founded since 2007 and have received funding from angel investors, venture capitalists or other outside sources of capital. Our index includes 486 companies, an impressive tally but one that clearly only scratches the surface of all digital start-ups in New York. Below is a summary of how those companies break down by year founded, sector, funding raised and location.

START-UPS BY YEAR

Year	Start-ups Founded
2007	97
2008	87
2009	83
2010	118
2011	85
2012*	14

** Through April 2012*

NYC START-UPS BY SECTOR, 2007-2012

Sector	Start-ups Founded
Ad Tech	63
Digital Media	121
E-Commerce	103
Ed Tech	20
Fin Tech	33
Health Tech	19
Social Networking	79

START-UPS BY BOROUGH

Borough	Start-ups Founded
Manhattan	431
Brooklyn	27
Queens	5

START-UP SECTOR COMPARISONS BY YEAR

Sector	2007	2008	2009	2010	2011	2012
Digital Media	33	23	20	19	24	2
E-Commerce	14	13	20	27	26	3
Social Networking	10	15	9	25	18	2
Ad Tech	18	13	14	14	2	2
Fin Tech	6	10	5	8	3	1
Ed Tech	1	5	4	6	4	0
Health Tech	7	1	1	5	4	1

START-UPS THAT HAVE RECEIVED THE MOST FUNDING SINCE 2007

Gilt Groupe	$221M
Tumblr	$125M
ZocDoc	$95M
2tor	$90.8M
Buddy Media	$90M
Foursquare	$71.4M
AppNexus	$65.5M
ideeli	$64.8M
Knewton	$54M
Fab	$51.3M

NYC DIGITAL START-UPS BY LEVEL OF FUNDING

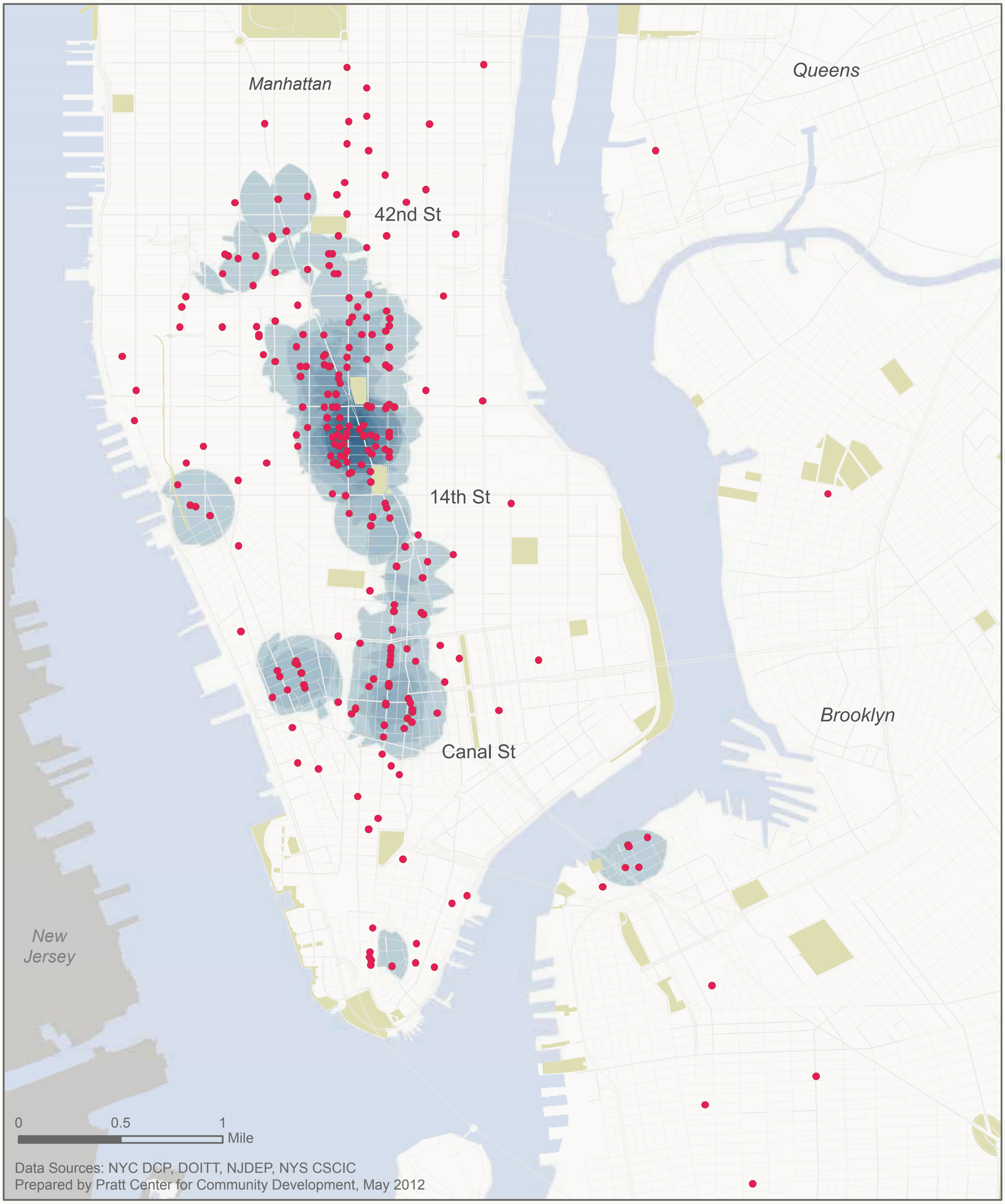
Over $50M	10
Btwn $25 and $50M	13
Btwn $10 and $25M	59
Btwn $5 and $10M	56
Btwn $1 and $5M	152
Less than $1M	99

START-UPS BY ZIP CODE

10010	56
10003	55
10013	51
10001	44
10011	36
10012	34
10016	27
10018	23
10014	20
10036	18
11201	18
10019	8
10004	7
10022	6
10017	5
10024	5
10005	4
10007	4
10023	4
10002	3
10038	3
10065	3
11101	3
11215	3
10006	2
10009	2
10021	2
10110	2
10020	1
10025	1
10026	1
10028	1
10128	1
10154	1
10178	1
10280	1
11206	1
11211	1
11217	1
11226	1
11231	1
11237	1
11368	1
11375	1

MAPPING NYC'S DIGITAL START-UPS

The map below shows that the more than 400 digital start-ups on our NYC Digital Start-up Index where we could find company addresses are clustered in a handful of neighborhoods—mainly in Manhattan and Dumbo.



NEW YORK'S NEW ECONOMIC ENGINE

The city's tech sector is providing a critical economic spark at a time when it has never been clearer that New York needs to diversify its economy

In a city whose economy has long been driven by Fortune 500 companies and global leaders in finance, media and real estate, it is easy to overlook the economic contributions of a sector whose sudden growth has been driven by hundreds of lean start-ups, many of whom were founded by 20- and 30-something entrepreneurs working out of incubators, coworking spaces and small offices. However, the burgeoning tech sector is already providing an enormous boost to the city's economy and appears to be the first legitimate opportunity to add long-term balance to an economy that has been overly reliant on Wall Street.

There is no accurate count of how many jobs have been created by the city's tech start-ups, in part because the individuals employed in ad tech, fin tech, fashion tech, health tech, digital media and other tech fields are not all counted as being part of a larger "tech" sector. But the data we do have makes it abundantly clear the tech sector in New York has been adding jobs at a phenomenal clip. In fact, tech employment has been growing faster than almost every other part of the city's economy.

In the last 5 years, information technology jobs in the city have increased by 28.7 percent, from 41,100 to 52,900, an amazing surge during a time when there were few other bright spots in the city's economy.[3] During the same period, private sector jobs in the five boroughs grew by just 3.6 percent while employment was down considerably in several of the city's traditionally-strong industries, including the securities industry (down 5.9 percent), publishing (down 15.8 percent), legal services (down 7.0 percent) and manufacturing (down 29.5 percent).

Using a more expansive definition, the city's Economic Development Corporation says that that there were 90,273 "high tech" jobs in the city, a 30 percent increase from five years ago.

The sector's impact on employment in New York is also apparent by looking at the numerous examples of start-ups that have hired dozens and sometimes hundreds of employees in a relatively short period. Five years ago, Gilt Groupe hired its first employee. Today the company has more than 900 employees, including 700 in New York. 2tor, the education tech company, has 275 employees while Ideeli, another fashion tech company, has 250. ZocDoc employs 165, up from 40 a year earlier. Digital consulting firm Huge has gone from eight employees in 2005 to 350 today. MediaMath has 125 employees, Tumblr has 103 and Foursquare has over 100.

Moreover, a significant share of the city's tech firms are currently adding employees. Just look at the "Made in New York City" list recently created by New York Tech Meetup. A self-reported compilation of tech companies that are actively being built in the city and coded here, the list includes 298 firms as of April 2012 and 140 of them (47 percent) indicate that they are currently hiring.

Importantly, tech has become a meaningful engine of growth at a time when it has never been more apparent that the city needs to diversify its economy. While finance remains considerably more important to New York's economy and still brings in a staggering share of the city's overall tax revenues, employment in that sector has essentially been flat for two decades even as finance jobs in the nation and around the world have grown significantly. The city's share of jobs in the nation's securities industry shrunk from 36 percent in 1987 to 20.7 percent in 2012.

With the city's unemployment rate stubbornly hovering just under 10 percent, New York could use an economic spark. But that jolt probably won't be coming from Wall Street.[4] The securities industry is expected to add only 1 out of 37 new jobs in the city between 2012 and 2016, according to a March 2012 economic forecast by the city's

Independent Budget Office (IBO). Whereas the securities sector is projected to account for just 2.2 percent of the city's employment growth over the next four years, the much smaller information sector is expected to provide 5.5 percent of the new jobs.

Mayor Bloomberg has spoken about the urgent need to diversify New York's economy since his first year in office, and his early embrace of the biotech sector was intended to help accomplish that. But despite clear potential, biotech has thus far failed to become a meaningful job generator in New York. There has been real growth in health care and educational services, but tech represents something unique: a sector where products and services made in New York can be exported across the nation and around the globe.

"We've got to find new engines of growth in New York," says Deven Parekh, a principal with Insight Venture Partners, a New York-based VC firm. "The technology sector is definitely that."

Although most of the jobs added in the tech sector have come at small companies, the burst of start-up activity in New York's tech sector is noteworthy since economic research has shown that the bulk of job growth nationally occurs in newly formed companies. "Net job growth occurs in the U.S. economy only through start-up firms," concludes a 2010 study by the Ewing Marion Kauffman Foundation, the Kansas City-based foundation that conducts research about entrepreneurship. According to the study, between 1977 and 2005, new firms added an average of 3 million jobs a year while existing firms lost 1 million net jobs per year.

New York has always been an entrepreneurial city, but in recent years the city had fallen behind several other cities when it comes to entrepreneurship and innovation. With the wave of tech start-ups, entrepreneurship has again become cool in New York. "New York is still the province of the large vertical corporation or the mom-and-pop and very little in between," says Dan Huttenlocher, the engineering professor and tech sage who will head the Cornell-Technion campus. "If we're successful, there will be a much bigger ecosystem of companies at all stages of growth, and that will be a big change to the economic ecosystem."

Companies on NY Tech Meetup's "Made in New York" list	Companies on the list that are currently hiring*
298	140
	* As of May 1, 2012

Another reason the development of a formidable tech sector here is important is that it has brought some of the world's brightest and most innovative people to New York. This can't be overlooked in today's global knowledge economy, where the most competitive cities are generally the ones with the strongest human capital. "It's so great for New York's economy," says Kevin Ryan. "We want jobs that pay $100,000, $150,000 and leverage all of the resources that we have here, because that's how we're going to be successful. So anything that convinces that guy who went to Yale to come here is great. He's not going to stay in New Haven, but does he move to New York? Does he move to Washington? Does he move to San Francisco? Does he move to LA? Those are the things he's thinking about. If we pull that talent here, it's a good thing. Banking jobs are even better, but we have probably all of those that we are going to have. Whereas this sector is going to grow."

Finally, it is worth noting that tech companies are accounting for a growing share of the city's commercial real estate. According to Cassidy Turley, the media/information and computer/tech sectors leased about six million square feet of office space in Manhattan in 2011, nearly double the figure from one year earlier (3.84 million). Additionally, CB Richard Ellis reports that the tech/media sector accounted for 13 percent of Manhattan leasing overall in 2011, up from 11 percent in 2005.

DRIVING NEW YORK'S TECH TURNAROUND

The lion's share of today's tech start-ups are not building new technology, but applying it—a trend that plays to New York's strengths

New York City has been home to innovative Internet and digital media start-ups since the mid-1990s. But something feels very different about the explosion of tech start-up activity happening in the past few years, as if someone hit a switch that enabled New York's tech community to go from second to fourth gear in a heartbeat. And it's not just that New York's tech sector is soaring to new heights; it appears that the city is building something more permanent this time around.

So why is all this happening in New York? And why now?

The simple answer is that, as Betaworks founder John Borthwick says, "the innovation that's happening today plays to New York's strengths."

More specifically, the vast majority of new "tech" companies being established today aren't building new technologies but applying them in creative ways to offer new products and services. "Technology has shifted from the development of technology to the application of technology," says Larry Lenihan, a managing director at FirstMark Capital.

This plays to New York's strengths in part because the city has always been a hub for creating content, designing new things, and marketing products and services. It was never the place where scientists and engineers developed computer hardware, semiconductors or the infrastructure of the Internet. Innovators in Silicon Valley, Seattle and Boston largely developed the plumbing and the vehicles for the digital marketplace, while New York companies are taking responsibility for how the digital marketplace looks and what people do there. Thus, New York wasn't the birthplace of Apple, Microsoft, Intel, Sun Microsystems or scores of other companies that were based on the creation of new technology. But New York is where Comixology brings comic books to the Internet; Warby Parker sells eyeglasses online; ZocDoc provides a Web-based service for scheduling doctor's appointments; Seamless offers consumers a new way to find and order take-out meals; Tutorspree digitizes the hunt for tutors and Sportaneous makes remote touchscreen fun of organizing a pickup game.

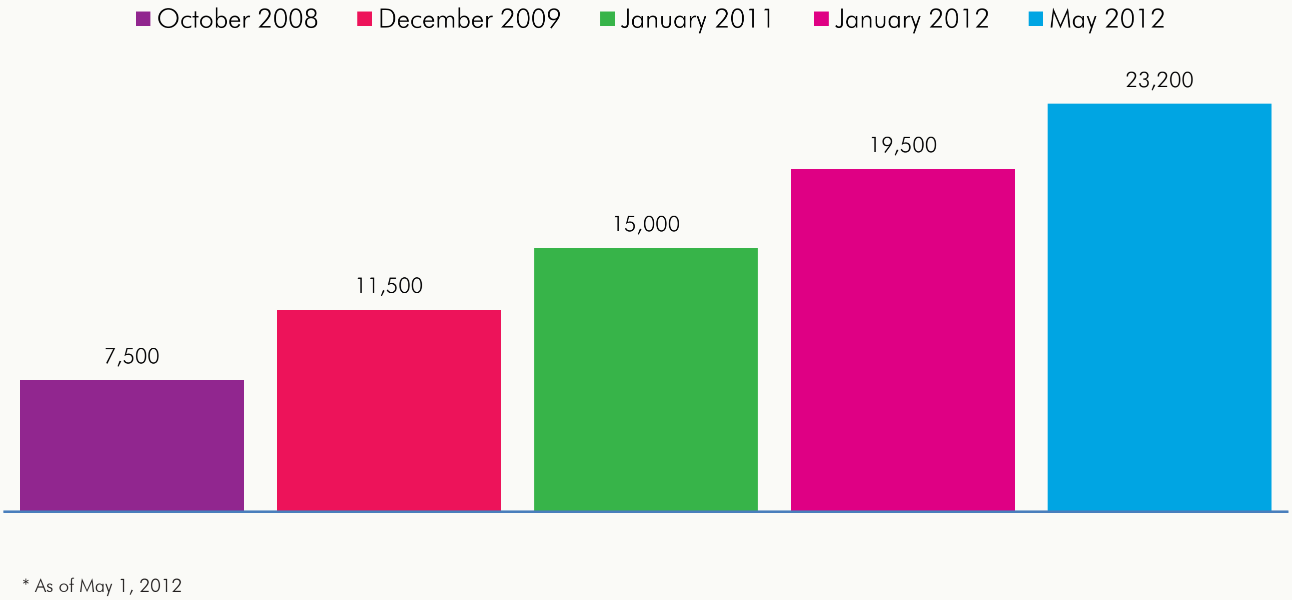
"We are having a renaissance in New York because technology and content are marrying each other," says Andrew Rasiej, chair of New York Tech Meetup. "We're living in the application layer of the Internet."

There's little limit to what tech might facilitate, says Brian Schecter, CEO of online dating website HowAboutWe. "Consumer desire is becoming more refined. As people expect more from what tech can do for them—how it should be able to aid in all of life tasks, from menial or entertainment to love or finance, people want their applications to do it all. This creates boundless opportunity for entrepreneurs."

There are lots of ways to improve, beautify or monetize online transactions, and New York is becoming a hub for commercializing them. For instance, at no lesser scale than the market for downloadable music, the market for instant "curated" personalized shopping is growing as fast as the apps that service it. "Look at Fab," says local online veteran Lockhart Steele, founder of online real estate magazine Curbed.com, speaking about New York start-up Fab.com. "Fab started as a gay social network, in a year it became an online design store, now it does $1.5 million in sales a day. Is the model sustainable? I think so. It's selling things."

It's not just individual consumers who are taking advantage of the Internet today. In the last few years, the Internet has begun to dramatically shake up how business is done in traditional industries like publishing, advertising, fashion, me-

On the Way Up: Membership of Tech Meetup



dia, finance, art and health care. New tech firms are coming up with new services that help legacy companies switch over to a digital platform without losing the ability to measure their own results. For instance, ad agencies, fashion houses and media companies increasingly turn to software vendors for rubrics they can use to cut costs.

No other city is better positioned to benefit from this shift. After all, New York has long dominated in most if not all of these industries. "There are seven major industries in New York, and every one of them is getting completely transformed," says Jim Robinson IV, managing partner at RRE Ventures.

Tech companies that work with other businesses want to be geographically close to their biggest customers, and a disproportionate number of them are here. This proximity seeds new start-ups and creates customers for growing ones. "What's cool about New York is all the subject matter expertise flows from the companies that are here," says angel investor Linda Holliday. "Northern California is more of a company town. New York has all these other centers of industry from law, finance, publishing, media, tourism."

The founding of Parse.ly is a perfect example of how new tech companies play on New York's traditional strengths. Sachin Kamdar and a fellow NYU classmate started Parse.ly initially as a news-culling service, after he had flamed out on teaching public school and his friend had a bellyful of coding for Morgan Stanley. They spent the summer of 2009 in a shared office space in Philadelphia, came back and found themselves able to pitch their product directly to huge media companies. "A direct consequence of being in the city is that we were able to go meet publishers face-to-face," Kamdar says. "We wanted to sell them our product, but they asked: 'how are you guys doing this, what data are you using?' We started giving free monthly reports about which articles were popular. They asked for them weekly and then they asked for them daily. We eventually realized that there weren't analytical tools for publishers available."

Parse.ly went in a summer from a concept to a vendor serving companies as big as *U.S. News and World Report*. Mainly, Kamdar says, because those companies were a short stroll away.

New York has another critical advantage: it provides an unmatched talent pool for growing Internet firms. Ad tech firms can hire people with years of experience at Madison Avenue ad agencies, fin tech start-ups draw from Wall Street, and fashion tech firms mine talent from the city's fashion houses. This talent base is especially important since today's digital firms require fewer hard-tech specialists and more people with a deep knowledge base in their field. "New York has a lot of people with domain expertise in the industries that are being digitized," says Jalak Jobanputra of RTP Ventures.

Just ask Kevin Ryan, who hired staff from New York-based ad agencies when he grew DoubleClick and is now luring people from the city's fashion sector for his fashion tech firm Gilt Groupe. "Gilt has to be here," says Ryan. "Why? Because I have 20 people from Saks alone. I have 20 people from Conde Nast. I need people that actually know the industry, know what the trends are and have done this for ten years. Those people do not live in San Francisco. They live here. Why was DoubleClick in New York? Why were our competitors 24/7 Media and Real Media here? Because the ad agencies are here."

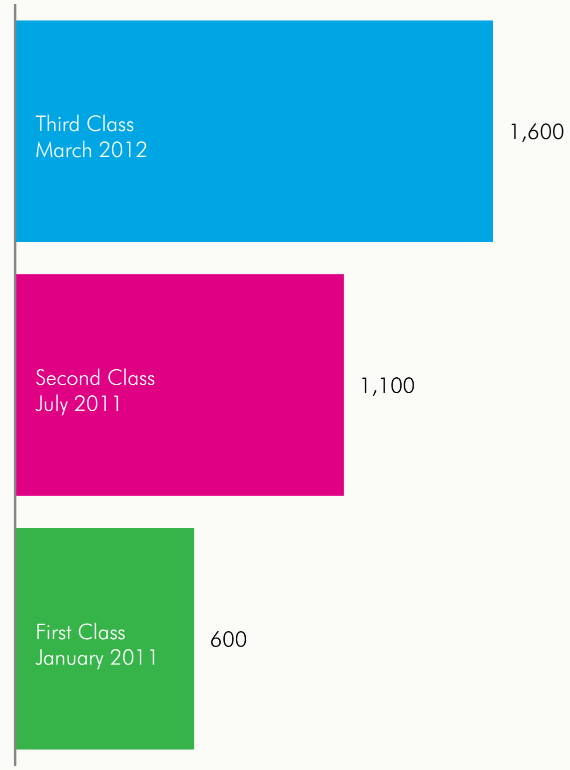
Eric Litman recently relocated his mobile ad platform, Medialets, to New York from Washington, DC in large part because he gets a competitive edge by being here. "The confluence of media and advertising and the consistent energy of the workforce give me tremendous advantage over competitors based in the Bay Area," says Litman, the company's CEO.

Underlying all of these changes are several powerful technology trends that have been playing out in recent years.

First, while consumers and businesses were just getting used to the Internet in the 1990s, it is now deeply engrained in the daily lives of people around the world. More than 2 billion people globally now use the Internet. This shift, which has been facilitated by huge leaps in broadband capacity, has created an enormous demand for online content, products, services and tools.

Next, smart phones and tablets were a rarity even four years ago, but today hundreds of millions of people around the world go everywhere with mobile devices like the iPhone or iPad that allow them to instantly download vast amounts of content, shop, play games or simply follow the activities of friends. And this market is still on its way up. Last year, for the first time, sales of mobile devices were greater than PC sales.[5] By 2020, Morgan Stanley predicts that the number of mobile devices could easily top 10 billion units. By comparison, the personal computer boom of the 1990s only sold hundreds of millions of units.[6]

Rising Tide of Tech Startups: Applications to Tech Stars NYC



Source: David Tisch, TechStars NYC

The surge in usage of mobile devices, along with the rapid growth of cloud computing, Facebook and Twitter, has created a platform for all kinds of online innovation. New technologies and applications are being created almost daily, especially around mobile, search and social tools. "Most people in developing countries today are walking around with a computer in their pockets that is more powerful than desktops were four or five years ago," says Thatcher Bell of DFJ Gotham. "There is a hell of a lot of innovation driven

WHY NEW YORK IS BETTER POSITIONED TODAY THAN IN THE DOT COM BUBBLE

It's only natural to wonder if all the recent tech start-up activity in New York will meet a similar fate as so many of the dot com companies that went fizzled when the bubble burst in 2000.

There's no question that dozens of start-ups will fail in the months or years ahead. And if the overall economy does not improve, the entire sector could come back down to earth. But just about everyone we interviewed for this report believes that the ongoing tech renaissance in New York is fundamentally different from the city's first wave of tech growth in the 1990s.

This time around, New York tech companies are clearly benefiting from a dramatically larger population of individuals and businesses who are taking advantage of the Internet, many of them on their mobile devices. Digital businesses today are also much more efficient with their money, can go to market sooner, make money earlier and operate on a lot less capital.

"You can get traction before you have to raise money. The tools are orders of magnitude easier, and so investors aren't funding ideas," says Frank Rimalovski, managing director of the NYU Innovation Fund. "They're funding businesses." That's a contrast to the wasted money of Silicon Alley 1.0, which showcased executives from traditional media companies getting billions in stock-market capital for poorly thought-out online stores. Rimalovski remembers this era well in part, he says, because a friend of his who worked at the infamous flameout Pets.com was the staffer who "literally shut off the lights."

"What's happening now is markedly different from happened in Web 1.0," agrees Betaworks founder John Borthwick. "In Web 1.0, we had a lot of start-up activity in the city, but a lot of it was fed by the city's infatuation and confidence in the media industry. So you'd have all these start-ups that would raise $10, 20, 30 million dollars. But half of what they would raise they would go and spend on media. They'd go buy billboards and TV ads and all this stuff. Those companies didn't get a lot of return from that media. Who's reading bus ads for pets.com? It was just not that useful use of capital. You have a much more efficient use of capital today."

by that shift. These are new platforms and they need new technologies. New York is going to build those new technologies. Certainly, a bunch of them are being built in Silicon Valley and Boulder and Austin and Israel, but New York is pretty well positioned. We have a lot more people than most places walking around with these things."

Finally, in recent years, new tools like Amazon web services have made it infinitely easier for people with little or no real tech experience to start and run an Internet company. At the same time, the cost of starting an Internet business has come down dramatically. These two related trends are a big reason why there has been a flood of new technology start-ups in New York in the past five years, the vast majority of which were not founded by "techies".

"It's easy to start a tech company here today," says Robinson. "It's fast and it's a heck of a lot cheaper. You could come up with an idea tomorrow and in six weeks have a viable product launched as an Internet company or mobile service. Literally in six weeks. And it would cost us about $50,000. Contrast that with the companies started in the mid to late 90s where you were $2 million into equipment and servers and racks and IT teams just to create the infrastructure to allow the folks who were building the outside product to do their work. Younger teams can start earlier and they don't need to raise that much capital to do it."

"It costs a lot less to start, you can outsource more and do more cheaply," says David Rosenblatt, CEO of luxury marketplace 1stdibs and former DoubleClick CEO. "So people in New York who are good at the application layer benefit. If you're a really good merchant, you can just do merchandising."

IT TAKES A COMMUNITY

New York's digital entrepreneurs have greatly benefited from a much stronger local tech ecosystem than existed even a few years ago

The rise of the consumer Internet and the digitization of traditional industries may have paved the way for New York's ascent as a tech leader in the past few years, but the city was able to capitalize on these macro trends in large part because of the huge strides made in developing a strong tech ecosystem here.

Why is the creation of a strong tech ecosystem so important?

Just look at Silicon Valley. While it is today viewed as a tech center without equal, its growth happened not overnight, but gradually over half a century. As more and more tech companies there succeeded with each successive generation, it unleashed a chain reaction of events that created and then strengthened a rich, self-supporting tech ecosystem. It is this dynamic ecosystem that has helped sustain the Valley's growth and make it a one-of-a-kind setting for starting and growing tech companies: As the region's growing tech companies attracted techies from all over the globe in search of jobs, it made the Valley the hub for engineering talent, perhaps the key ingredient for long-term high-tech success; high-profile examples of tech entrepreneurs becoming millionaires led countless others to leave their places of work and establish their own start-up—and created an unusually strong entrepreneurial ethos in the region; successful start-up founders and company CEOs took advantage of their expertise to start or take the helm of new tech companies; a class of serial entrepreneur developed, and many of them became angel investors or venture capitalists—reinvesting their new wealth in other local start-ups and mentoring the next generation of start-up founders; as an ever-increasing number of tech companies succeeded, more investors set up shop in the region, hoping to strike it rich by betting on the next hot start-up; and numerous entities sprung up to provide advice, networking opportunities and other supports to entrepreneurs and aspiring entrepreneurs.

New York sorely lacked this type of self-sustaining tech "community" in the first wave of tech growth in the 1990s. But in the past five years, tech entrepreneurs in the city have benefited enormously as an ecosystem evolved to provide entrepreneurs and would-be entrepreneurs with ample opportunities to network, share ideas, learn from one another, raise capital, find workspace and hire workers.

Capital

A locally-based network of angel investors and venture capital firms is critical to any region looking to develop a sustainable tech cluster. These investors not only offer the capital that the vast majority of technology start-ups depend on, but they also provide valuable advice and mentoring to those managing the companies they invest in. Until relatively recently, however, New York was lacking in this area.

In the 1990s, there simply weren't a lot of New York-based VC firms with expertise in the tech arena and angel groups here were still in their infancy. "When we started in 1996, it was extraordinarily difficult to get venture capital money that was East Coast based," says Heidi Messer, cofounder of LinkShare, a New York digital marketing company that was sold to Rakuten for $425 million in 2005. "There were so few VC firms that were here and none of the West Coast people were interested in investing in New York companies."

Even four or five years ago, California-based VC firms weren't heavily investing in New York tech companies. "Three to four years ago, you wouldn't see any West Coast firms funding New York companies," says venture investor Deven Parekh.

At the same time, New York often lacked investors focused on providing seed-stage funding to start-ups. "There was a giant gap between companies that deserved to get support—as well as good rigorous guidance—and companies that were being funded," says Owen Davis, managing director of NYCSeed.

Today, the climate couldn't be more different. New York now has a lot more venture capital firms today and several of them—chief among them Union Square Ventures—set an early example by greatly increasing the number of investments they make in local start-ups. Meanwhile, the number of angel investors and seed stage funds in New York has literally exploded in recent years.

"In 2007, we made announcement at the New York Tech Meetup that we were going to start making seed stage investment," says Thatcher Bell, a principal at DFJ Gotham Ventures. "At that time, the announcement got a standing ovation, and the reason is that nobody was doing it and there was a recognition that there was a need for that kind of capital in the community. If we made that announcement today, no one would even look up from their mobile device. There are just many firms providing seed capital in New York these days."

"This whole environment of seed funding never existed at all," adds Divya Gugnani, founder of Send the Trend. "Now, you can go to any VC fund and get seed funding of $50,000, $100,000 or $250,000."

On top of all this, out-of-town VC firms are no longer avoiding New York. In the last couple of years, a number of venture firms with headquarters on the West Coast, in Boston and elsewhere, such as Accel Partners, Canaan Partners, Matrix Partners, First Round Capital and New Enterprise Associates, have opened up New York offices. "Out of the ten most successful VC firms in Boston, not a single one had a person in New York," says Kevin Ryan. "Now they are all realizing they need to be here. They are all hiring partners here."

Even the VC firms that haven't yet established an office in New York are visiting the city more regularly and investing in companies based here.

# of NYC accelerators went from

0 in 2008

to

12 in 2012

Ron Conway, the famous Silicon Valley based angel investor, recently reported that 20 percent of the companies he is investing are in New York, up from five percent. "More of the investor attention is coming here in a big way," says David Karp, founder of Tumblr. "People who have joined our board who never used to make it to New York now end up coming to our board meetings and end up spending 3 or 4 days out here, meeting with anybody they can get a hold of. That's changing really quickly."

Finally, the number of New York-based angel investors has been on the rise. Membership in the New York Angels has reached 75 investors since 2004; Gust, the angel database managed by New York Angels founder David Rose lists 30 local angel funds on its site.

Accelerators/Incubators/Coworking Spaces

One of the more astonishing changes in New York's tech community over the past few years has been the explosion of coworking spaces, incubators and early stage accelerators. There are nearly two dozen of these programs around the city today, an amazing development since few of them existed five years ago.

While there are clear differences between incubators, co-working spaces and accelerators, all essentially provide a nurturing environment where start-ups can launch and grow a business and take advantage of shared services, access to mentors and investors, and daily opportunities to collaborate with other entrepreneurs, designers and developers—and all at no or low cost for the entrepreneurs. It's hard to overstate the importance of these programs at a time when scores of first-time entrepreneurs need the space—and the time—to develop a product, test it and find a market for it. They are particularly valuable in a city with some of the highest real estate prices in the nation and where few landlords are willing to enter into long-term leases with start-ups that have yet to make a profit.

Some of the biggest changes have happened with accelerators. Indeed, New York was distinctly overlooked when the first wave of accelerator programs were birthed, beginning when Paul Graham launched Y Combinator in 2005. Under Graham's model, Y Combinator invited entrepreneurs to submit proposals for innovative businesses to its panel of highly successful Web pioneers, who choose the 30 best teams of applicants to come out to Silicon Valley for live auditions. From that group, 12 or so are selected to participate. Each start-up chosen gets $6,000 while another $6,000 is awarded to the founder (average age: 25) to get them through a three-month product development boot camp. The teams are mentored throughout and eventually present their products to a roomful of seasoned investors at Demo Day.

But in the past few years, a dozen of these programs have arisen in the five boroughs. "In 2009, SeedStart was the only accelerator program in the city," says Owen Davis, managing director of NYCSeed, which created the venture accelerator program. "By the summer of 2011, I counted 9 accelerator programs in the city."

"Every day you see a new accelerator," adds David Rose of New York Angels and Gust.

By far, the most well-known is TechStars, which operated accelerator programs in Boulder, Boston and Seattle before starting its first New York City class in January 2011. According to David Tisch, managing director of TechStars in NYC, the number of start-ups applying to the program skyrocketed from 600 in that first class to 1,100 in the second program (July 2011) and 1,600 in the third program (March 2012).

Other venture accelerators include Entrepreneurs Roundtable Accelerator, DreamIt NYC, FinTech Innovation Lab, First Growth Venture Network, Women Innovate Mobile, Founder Institute, Founder Labs, Blueprint Health, Startup Health Academy and Startl.

While venture accelerators generally provide short-term space as part of a 8- or 12-week start-up boot camp and offer an array of mentoring and coaching services in return for an equity stake in the company, incubators and coworking spaces provide longer-term space for young companies and entrepreneurs still looking to put together a team.

Prior to 2009, there were no tech "accelerators" in New York City. Now, there are at least a dozen.

New York is home to a handful of incubators that cater to tech firms. NYU Poly runs two incubators that are funded in part by the city's Economic Development Corporation. Together, the two facilities—one on Varick Street that was founded in 2009 and another in DUMBO that opened in January 2012—are home to 38 companies today and 12 start-ups have already graduated into larger space.

Betaworks is not a typical incubator in that it makes investments in companies. Its website points out that it isn't actually an incubator. But since it was founded in 2007, Betaworks has housed a number of young tech firms at its space in the meat-packing district and has taken pride in "creating" and "scaling" companies, including Bit.ly and chartbeat.

Coworking spaces in New York really only emerged in 2008. Today there are more than a half-dozen of these spaces. Together, they have housed more than 400 early stage start-ups, and most of them currently have waiting lists.

The most celebrated is General Assembly, on Broadway at 20th Street. Inside GA, start-up execs can take classes in code-writing and rent space that ranges from a slot by a wall to a full room. A canteen stocks coffee and munchies, and tenants sometimes power-nap in the beige carrels. Just as Foursquare or Sonar pierce the anonymity of city life, this and other coworking spaces blunt the loneliness that comes with being an entrepreneur.

While some warn that coworking spaces invite happy-hour networking at the expense of productivity, they undeniably deepen the bond between tech execs and thereby make one entrepreneur a likely cheerleader/troubleshooter for another. "It's an emotional roller coaster doing a start-up: one day you're elated and the next you think you're going to be wiped out," says Moveable Ink CEO and GA tenant Vivek Sharma. "Being around 20 people in the same boat normalizes things."

In little more than a year since opening, General Assembly has grown to have about 350 members and roughly 100 early stage start-ups that are curated through GA's selective application and interview process. Already, 16 member start-ups have graduated from the space. With a waiting list that is three times as large as the number of desks they have, GA is in the process of expanding into additional space across the street.

There are about 160 members and 60 start-ups operating out of Projective Spaces' two coworking facilities, one in Soho and the other in the Lower East Side. When they opened the Lower East Side facility this January, there were initially 34 members there. In three months, they were up to 85 and James Wahba, the founder, says that he gets about four new requests every day from start-ups looking for space. Start-ups housed there have included YCharts, Uber, Wanderfly, Eventbrite, BespokePost, SeatGeek, Gojee, PublicStuff, and SinglePlatform.

"I manage to recruit people from the West Coast. There's no way I could have done that five years ago."

Another co-working space, We Work Labs, has expanded from 3,000 square feet to 17,000 square feet in the past year, as their membership grew from 47 to 200. Another 400 people are on the waitlist. According to Megan Mallow of We Work Labs, over 125 companies have at one point called the space home. Start-ups operating at We Work Labs currently include Zemanta, PricingEngine, Backstory, Consumr, GiftFinder, RouteHappy, Fitocracy, One Fine Stay, Spling and Indewalls.

New Work City, which also recently expanded into larger space, has gone from 17 members in 2008 to 133 in 2012, according to founder Tony Bacigalupo. He says that 44 high-growth start-ups are currently based out of NWC, which Fred Wilson once called the "granddaddy" of coworking spaces in the city.

Hive@55, operating out of 55 Broad Street in lower Manhattan, has been home to 63 start-ups since its opening in July 2009. Dogpatch Labs, based in Union Square, is home to 23 companies. Last May, Betabeat reported that it had interest from 250 to 275 companies for ten desks.

Talent

Human capital provides the foundation for any sustainable ecosystem. Companies with significant growth potential simply don't want to be in a place that lacks a talent pool from which they can recruit top-tier employees when they expand.

New York has always boasted an incredibly strong base of human capital in media, design, finance and other traditional industries. For years, the problem was that the city lacked engineers and other technical talent, as well as a deep bench of people with experience in building and running technology businesses. But as New York's tech sector has evolved over the past couple of decades, so has the cadre of people who have expertise in the various aspects of taking a tech start-up to the next level.

Kevin Ryan says that the city's knowledge base in tech was incomplete at best when he was founding DoubleClick in the mid-1990s. "In 1995 and 96, out of the first 100 people we hired at Doubleclick, no one had done a start-up before," says Ryan. "I had to pull from Bain [the management consulting firm] and banking, and other sectors, and that's not ideal. I couldn't even find a lawyer to take us public. And that's in New York, where there are a lot of lawyers."

Today, New York has a much deeper talent pool. Indeed, one of the clearest signs that New York is now seen as a legitimate tech hub is that

THE BLOOMBERG BOOST

New York's tech sector has benefited greatly from an unprecedented level of support from Mayor Bloomberg and his top economic development officials.

The Bloomberg administration's commitment to helping the tech sector grow is best exemplified by the high profile contest to attract a new applied sciences and engineering campus to New York, an effort that resulted in 7 applications from 17 leading universities around the world and culminated in the selection of Cornell University and the Technion-Israel Institute of Technology to build a campus on Roosevelt Island. The widely heralded competition sent a clear message to tech entrepreneurs and investors in and out of New York that the Big Apple is firmly committed to building a sustainable tech cluster and addressing long term challenges, namely the shortage of engineering talent.

However, that is just the tip of the iceberg. Since the 2008 financial crisis, no other industry has enjoyed more attention from the Bloomberg administration than tech. The mayor himself has been an unflagging promoter of tech entrepreneurs. He's visited scores of start-ups, given major speeches at local industry events such as Tech Disrupt and the NY Tech Meetup, and last year installed a chief digital officer to help coordinate promotion efforts. As the "mayor" of City Hall on Foursquare, he's even become an avid user himself.

Beyond promotion, the city's Economic Development Corporation (EDC) has developed several different initiatives to help spur entrepreneurship and support tech start-ups. EDC has provided financial support for five different tech incubators and workshare spaces, including Varick Street, Hive@55, the Sunshine Bronx Incubator, General Assembly and most recently the DUMBO incubator. To help local start-ups bolster their businesses, the agency established a centralized information portal on local companies called NYC Venture Connect and created a competitive mentorship program for winning early stage start-ups.

EDC has also unveiled a number of high-profile competitions in the last few years, including the BigApps Competition, which awards $50,000 to the best app utilizing city data sets, and the Next Idea business plan competition, which awards $35,000 and networking opportunities to the winning entry. Next Idea is designed to lure promising young companies from other parts of the country and world to develop their ideas in New York.

The Bloomberg administration has also been forging new partnerships with some of the city's premiere research institutions. In addition to the new applied sciences campus on Roosevelt Island, it is backing a second new tech campus in downtown Brooklyn. The new NYU Center For Urban Science and Progress will transform a mostly empty building owned by the Metropolitan Transportation Authority into a cutting edge research facility in an area that is fast-becoming a hub for tech and design start-ups. EDC also unveiled a program in conjunction with Columbia and NYU Poly to connect tech entrepreneurs with researchers. Housed at NYU Poly in downtown Brooklyn, the so-called NYC Media Lab focuses on research in emerging market technologies, new search technologies, content formatting, computer animation, and products affecting content distribution.

start-ups here are no longer having such a difficult time convincing engineers to work for them. As we detail in section 5, finding engineers is still a major challenge, but that is no longer because New York based start-ups can't lure them away from large employers in New York or even from other regions like the Bay Area; it's mostly because the supply of engineering talent simply isn't enough to meet the surging demand.

"Recruiting in the 1990s for engineering talent was hard, even if they were local," says investor Jim Robinson IV. "Today, it has become fashionable to want to be in start-ups. At the same time, when we go to recruit from other tech centers, including the West Coast, it's much easier today. It used to be that when we tried to recruit someone from the West Coast it was met with skepticism and resistance. But people want to live here now."

Part of the change has to do with how far New York has come in the past couple of decades in becoming an attractive place to live. But engineers wouldn't be flocking to New York if there weren't tremendous opportunities to work for or start a tech company here. The surge in start-up formation and the emergence of so many fast-growing tech firms in New York has sent a clear message that New York is a city of opportunity—and a city on the way up in tech. "I manage to recruit people from the West Coast. There's no way I could have done that 5 years ago," says John Borthwick of Betaworks. "Why are people moving here? Because they know that on a company by company basis, they believe that there's opportunity here. I can go recruit them to come join our company, but the reason they are coming to New York is that they know that even if it doesn't work out with one company they can go to another company."

Tech start-ups in New York have also benefited greatly from the 2008 financial crisis, which led to an exodus of smart, motivated people from Wall Street investment banks. As the financial industry downsized, engineers and software developers left to found tech start-ups or work at growing tech firms.

"What does it mean to be in New York for us?" asks David Liu, chief operating officer of Knewton, a New York-based education technology company. "It means everything. The talent pool has changed so much in four years. We're getting the best, not just software engineers but data scientists and designers."

Community

There is no better illustration of how far the city has come in building a meaningful tech "community" than the monthly New York Tech Meetup. A monthly information sharing event for tech entrepreneurs that started with a few dozen people in the fall of 2004, New York Tech Meetup now has more than 23,000 members and has to hold its event in NYU's Skirball Theater. The membership has grown from about 15,000 since January 2011—and from 19,500 since January 2012. There is such a clamor to be part of these events that the roughly 900 tickets now sell out in about 90 seconds, and a secondary market for tickets has now developed.

In addition, there are scores of other events around the city every week that offer entrepreneurs the opportunity to network, learn from others and get advice on growing on a tech business—from the many smaller offshoots of Tech Meetup to pitch events held by groups such as Ultra Light Start-ups and the Hatchery. Almost every weekend, there is a hackathon going on somewhere around the five boroughs. Meanwhile, other organizations such as HackNY, NextNY, Women 2.0 and the New York City Investment Fund are adding important pieces to the rich ecosystem

"You just have to go to any of the dozens and dozens of tech related meetups in the city, or go to New York Tech Meetup, or the other events happening here, and it is absolutely apparent in your face that this is a vibrant living community," says David Rose.

NEW YORK'S DIGITAL LANDSCAPE

Snapshots of key tech subsectors in New York, including digital media, ad tech, social networking, e-commerce, fin tech, health tech and ed tech

New York's tech sector has been generating a lot of buzz recently, and, to its credit, the Bloomberg administration has taken a number of aggressive steps to ensure that the sector continues to generate new start-ups. However, 'tech' in New York tends to mean something pretty specific, a particular slice of a much larger industry space that includes defense contractors and superconductor manufacturers as well as e-commerce businesses and information technology companies. Although New York's technology strengths spread across a surprisingly wide spectrum of more traditional industries, a vast majority of the city's new companies offer products and services focused around the Internet. As Gilt Groupe founder Kevin Ryan says: "New York is just doing extraordinarily well in technology, but technology I'm defining as the Internet. It's a completely different story in biotech."

Andrew Rasiej, the current chairman of the New York Tech Meetup, insists that it is a mistake to conceive of Internet-focused tech companies as comprising a sector at all. "Technology is not a slice of the pie, but the pan," he says. And sure enough, whether they operate in health care, financial services, advertising, e-commerce or media, New York tech companies innovate and disrupt in surprisingly similar ways. Each industry relies to some degree on the meetup ethos: companies work in shared space, hire furiously, demo all over town, and grow customer bases by automating what used to require paperwork or shoe leather. Those that sell to unregulated industries share another feature: they grow customer bases very fast.

Yet some fields are natural growth areas for New York because of the talent and expertise that already exists here: These include news organizations and other content providers like television and music as well as advertising, finance, health care, art, fine food and fashion. Beyond traditional industries, scores of New York-based Internet companies are devoted to solving problems for urbanites: for example, making reservations at restaurants or theaters, ordering take-out, finding friends in the vicinity, finding an apartment or reliable laundry service, and on and on. More than a few of these services took off in New York and have since spread to other dense metropolises. Foursquare, for instance, has become a huge hit in Mexico City, and Kickstarter is now the go-to source for fundraising wherever there are large congregations of musicians, artists, writers and designers.

As much to show what these companies share as to illustrate differences among them, we have sorted New York's strongest tech assets into seven main categories, including digital media, social networking, e-commerce, ad tech, fin tech, health tech and ed tech. And, in one last catch-all category, we take a look at New York's prospects in video gaming, rapid prototyping, cleantech and biotech.

Digital Media

In New York's tech scene, no other subfield has as many legacy companies and start-ups as digital media. In fact, digital media start-ups accounted for more than a quarter of the companies on our New York City Digital Start-up Index—121 of the 486 start-ups founded since 2007 that have received some investment capital were in this field. No other subsector in our index even came close.

A vast majority of the city's tech companies serve consumers over the internet, and arguably the largest players in that sphere are content providers, including news organizations and aggregators, informational portals, TV streaming services and video sharing platforms, among others.

As more and more consumers continue to access media over the Internet, and increasingly via smartphones, it should come as no surprise that some of New York's largest digital media companies are old media companies desperately transforming themselves. For example, IAC, NewsCorp, NBC Universal, CBS, Universal Music Group and Viacom are among the nation's top 20 companies by revenue generated from online content and advertising, according to paidContent. But New York's huge supply of writers and other creative talent make it one of the world's largest hubs of digital media start-ups as well.

"Digital and social media companies are the two most dominant forms of start-ups you find here," says David Pakman, a partner at VC firm Venrock "If you want to start a digital property, a blog or mobile content provider, New York is still the capital of doing that—everything from *Gawker* to *Business Insider*. We're still a dominant place for digital publishers because you need the writers and content creators and so many of them live here."

In addition to *Gawker* and *Business Insider,* New York is home to dozens of other prominent companies that rely on reporters and opinion writers to generate original content, including *The Huffington Post*, which was recently purchased by AOL for $354 million, *the Daily Beast/Newsweek* and *Mashable.* But other prominent digital media companies more often facilitate access to digital content or curate it according to user preferences rather than generate it themselves. They include such companies as New York-based Outbrain, a content discovery platform, and Bit.ly, a link-sharing and tracking service. BuzzFeed, a popular news aggregator, raised over $35 million in venture funding last quarter, while Aereo, a TV streaming service based in Long Island City, raised $25 million.

Tumblr and Comixology are two more New York City-based digital media start-ups that have not only raised significant capital but experienced phenomenal world-wide growth in a short amount of time. In just over a year, Tumblr has become the Internet's dominate platform for user-generated content sharing. The company makes it as easy to set up a blog as it is to set up a Facebook account, and promotes community in order to eventually sell newfangled ads to that community. In 2011, content sharing on the platform grew 1,300 percent, making it the 37th most visited website in the world, according to the Alexa rankings.[7] Comixology, a 2008 winner of NYU's business plan competition, has also experienced tremendous growth. Working with some of the largest comic book publishers in the world to deliver comic books and graphic novels on consumers' e-readers and handheld devices, the company has facilitated over 50 million downloads in less than five years and can now boast of the top grossing iPhone app in Apple's App Store.

tumblr.

In 2011, content sharing on Tumblr grew

1,300%

making it the

37th

most visited website in the world

Overall, there were 85 VC deals in the media and entertainment sector in the New York metro area in 2011, up from 47 in 2009 and 21 in 2005. In 2005, the media and entertainment sector accounted for 10.8 percent of all VC deals in the region, while in 2011 it accounted for 22.4 percent of all deals.

Looking beyond VC-backed firms, literally hundreds of new media companies have either moved to New York or were founded here over the last five years. According to the Bureau of Labor Statistics, the number of New York companies in the 'Internet publishers and web search portals' category grew from 310 in 2007 to 470 in 2010, a 52 percent increase, while the number of employees working at those firms increased from 4,449 to 7,737, a 74 percent gain.[8] No other city in the country has as many firms or employees in this sector, and only San Francisco and Los Angeles have experienced New York's level of growth.[9]

"What New York has really shown in spades in the last couple years is an ability to develop both consumer and business focused applications around new media and social media, really taking traditional paper media and changing that experience for consumers and business," says Thatcher Bell, a principal with VC firm DFJ Gotham Ventures. "I think that will persist. We're just at beginning of the shift in how consumers access media."

Despite New York's clear strengths in digital media, many of the largest and fastest growing new media companies—such as Google, Facebook and Twitter—have been created on the West Coast. David Pakman of Venrock says the reason for this is that New York's legacy media companies were slow to embrace changes in technology. "The incumbents have not migrated to be the kings of the digital world," says Pakman. "Instead, a bunch of upstarts have disrupted them and they're all in the valley. So the future media companies like Google, Facebook and Twitter are not in New York. Yes, they have a presence here, but they did not come from New York."

Pakman says that New York remains the undisputed hub for digital publishers. But he warns, "The problem is that I don't think that's a really bright future for the Internet. You always need content creators, but everything we're seeing in digital media, is not 'Hey, let's get ten people to write really great stories.' It's 'let's use the power of everyone.' For instance, at Pinterest, there's no editors there, there's no publishers, there's no content creators."

Ad Tech

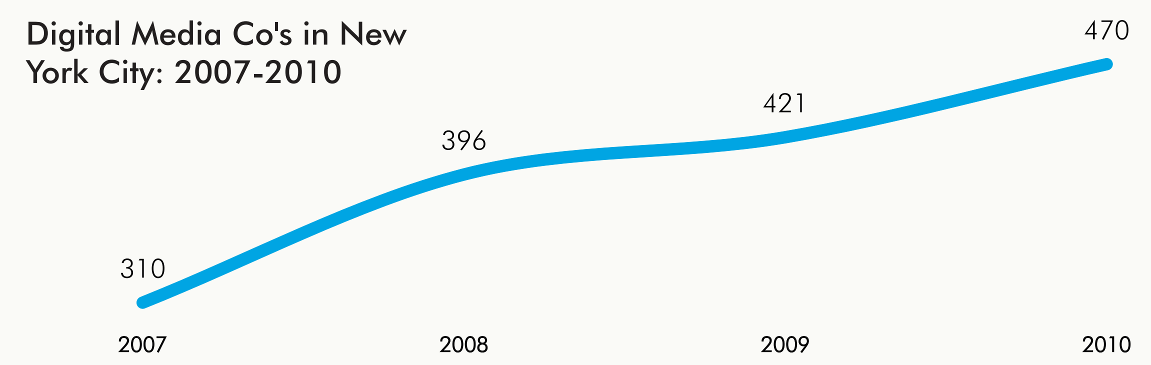
There aren't quite as many ad tech firms here as digital media companies, but New York is arguably the nation's dominant player in this tech subsector. Several of the city's ad tech companies have already achieved significant growth, and a disproportionate number of the largest tech start-up exits in New York have been in this field, including DoubleClick (bought by Google for $3.1 billion), Right Media (Yahoo for $850 million), LinkShare (Rakuten for $425 million), AdMeld (Google for $390 million) and Interclick (Yahoo for $270 million).

David Pakman says that New York is home to 60 or 70 percent of the nation's ad tech market.

Eight of the 12 members of the Council for Accountable Advertising, an association of leading ad tech companies, are headquartered in New York—and the other four members all have offices here. Moreover, this year's OnMedia awards, which recognizes the top emerging companies in media, advertising, marketing and public relations as judged by a panel of industry experts and VC investors, included 39 start-ups in advertising analytics and networks: Out of 39 global companies, 16 were based in Manhattan, compared to 15 in all of California and eight everywhere else.[10]

"Ad tech is very strong [here]," says Heidi Messer, a serial entrepreneur whose companies include LinkShare and Collective[i]. "Much of the stuff being trialed by Madison Avenue is coming out of New York."

New York's longtime dominance in the traditional advertising sector is one clear reason that



Source: Bureau of Labor Statistics, Quarterly Census of Employment and Wages; NAICS category Internet publishing and web portals

New York has cleaned up in ad tech. The start-ups in this space can hire sales teams and other staff from Madison Avenue agencies. The city is also well-positioned in ad tech because many large customers are here. It also doesn't hurt that some of the pioneers of the industry, like DoubleClick, 24/7 Media, Real Media and LinkShare, all came out of New York.

"New York has a significant amount of the gravity around ad tech," says Pakman. "But what's so exciting is that those are purely technology companies, and yet they happened in New York. It's not just a bunch of people who left ad agencies."

According to Messer, the vast majority of New York's ad tech companies, unlike Silicon Valley's, offer services to other businesses rather than consumers. Many of New York's most successful ad tech companies sell analytical tools to help ad buyers figure out what had once been incalculable; for example, what a person was doing before seeing an ad, where a person who responded to an ad pointed her browser next, and so on. Firms like Appnexus—which has received over $60 million in VC investments since 2008—serve ads on cloud-based exchanges that enable better pricing and targeting of ads. Other New York-based pioneers include Intent Media, MediaMath, Buddy Media (with over 50 staff), Clickable, and Turn.

Over the last half-decade, the industry has undergone both hyper-specialization and consolidation at the same time. Terence Kawaja of Luma Partners, an ad tech boutique investment bank, says he keeps track of ad tech companies in 24 different categories, including retargeters, verification and security managers, performance evaluators, creative optimizers, and more.

Clickable's Max Kalehoff says that while there has been much consolidation in the sector, the need for better and more sophisticated tech is driving new companies. A full reboot of agency spending must occur, says Kalehoff, because Silicon Valley-driven software like Google's AdSense creates "needless complexity" for agencies and their clients, creating "misalignment" between tech and strategy that ad tech can repair. "It's good to be down the street from agencies because the most important dimension between an ad tech company and an agency is trust," he says.

This year's OnMedia awards included 39 start-ups in advertising analytics and networks:

Manhattan
16

California
15

Everywhere else
8

Social Networking

If digital media is primarily about consuming content, then the much more diffuse field of social networking is about finding friends and colleagues, and creating communities around shared interests. The industry grew drastically after Facebook reached a billion users late in the last decade and now encompasses geolocation technologies, career and talent management services, and dating sites.

However, unlike the first generation social networking companies on the West Coast, New York-based companies tend to facilitate not only online interactions but in-person ones. "There are a lot of things developed in New York that are especially relevant to high-density populations, where people are out doing things all the time," says Jessica Lawrence, managing director of New York Tech Meetup. "A lot of tech entrepreneurs in New York are problem solving for life in the city."

Foursquare is without question the most visible and successful of these companies. Born in Gawker founder Lockhart Steele's office and coded around the East Village, Foursquare created the category of the "check-in," a way of sharing and cataloguing place visits with contacts and competing with others for most frequent visits. Steele says Google "euthanized" an early version of the service by failing to promote it energetically, but founder Dennis Crowley relaunched and rebranded the technology in 2009, after which it skyrocketed in popularity. Between August 2009 foursquare

Between August 2009 and August 2011, Foursquare's user base grew from approximately	100,000 to over 10 million

and August 2011, Foursquare's user base grew from approximately 100,000 to over 10 million, a 10,000 percent increase in just two years.[11] Today, the company boasts 15 million users.

Other New York companies that bridge the divide between cyberspace and physical space include Sonar, Hotlist and Centrl. Sonar, for example, is a mobile application that shows users whether they are socially connected to people standing nearby in the same building or room, and Hotlist is a platform that allows online communities to scan local events and coordinate plans. New York's density and rich array of cultural assets definitely plays in to these sorts of services—both qualities allow entrepreneurs to test out ideas on their friends and grow a base of early adopters. The city's high number of singles makes for another, similar advantage: over the last five years, seven different New York-based dating service start-ups received angel or venture funding, and several of those, including HowAboutWe and MeetMoi, go beyond the personality matching done by established companies like Match to emphasize in-person connections.

In New York, most social network companies are still largely focused on growing their user base and establishing control of their market niche, but as their attention turns to monetizing their often free services the potential for financial growth is not hard to visualize. On top of the traditional advertising revenue that comes from user impressions, location-based services like Foursquare have become extremely powerful marketing tools for a wide variety of brick-and-mortar businesses. And, in fact, later this summer, Foursquare plans to announce a new tool that will allow merchants to promote special, targeted deals for Foursquare users who check-in during certain times of the day.[12]

E-commerce

Once upon a time luxury buyers didn't seek out dramatic discounts (most were wealthy), and it wouldn't have occurred to most independent artisans to market their wares to a mass clientele. But in the last few years two New York-based e-commerce companies, Gilt Groupe and Etsy, have changed all that. Gilt amasses luxury items at cut rates for members, while Etsy creates a marketplace for craftspeople. Both deliver enough value to cut through shoppers' doubts about buying things online that they would normally prefer to touch and try on.

Etsy went from shepherding $170,000 in sales in 2005 to $526 million last year. Rob Schmults of the ad tech firm Intent Media says Etsy "changed the Web." One could say the same thing of Gilt, which has grown from just eight employees four years ago to over 900 today. Both firms have blazed a path for dozens of even younger, high-impact businesses. For example, Fab.com, an online marketplace for specialty design, raised $40 million in VC funds last year; and Bonobos, a men's fashion merchandiser, raised over $25 million.

Fashion, in particular, has quickly become a potent niche for the tech industry, with dozens of new companies in New York alone finding new ways to not only make high-end fashion available to a wider audience but to curate products and integrate styling advice and news about trends. New York-based Rent the Runway, Moda Operandi and Warby Parker all raised more than ten million in VC funds last year—and all four have experienced tremendous growth in sales. Moreover, promising new opportunities await in business-to-business fashion. For instance, ProperCloth creates tailored dress shirts for upscale retailers, and Joor allows fashion brands and boutique retailers to communicate in new ways while making wholesale purchases.

"New York is the preeminent leader of the fashion tech space," says Divya Gugnani, the CEO of a fashion tech start-up called Send the Trend. “The suppliers are here, the vendors are here, the editors are here, the magazines are here, and the buyers are here. This is the epicenter of fashion. So whether you are doing women’s couture dresses or selling fashion accessories like we are—it’s all here.”

The daily deals niche is another area that has seen a tremendous amount of activity over the last two or three years. Daily deals companies like Yipit and DoodleDeals offer time-sensitive and location-based information that consumers can use to get discounts on purchases. According to the Center’s accompanying tech index, New York is home to 11 investor-backed daily deals start-ups, though there have been some troubling signs for this market over the last several months. Earlier this year, Chicago-based Groupon had to restate its financial results after admitting it had underestimated the volume of discounts it expected to provide, and several insiders we spoke to thought the market might be oversaturated. Locally-based CityPockets, after amassing $4 million in vouchers in two years, may even close down according to founder Cheryl Yeoh. Yeoh says too many coupon sites have made valuations irrational.

Fin Tech

Fin tech is another sector where New York is using its advantages in a traditional industry—in this case, financial services—to become a major player in the tech space. While there are fewer overall fin tech companies than in digital media and e-commerce, in part because there are more unique barriers to starting one of these companies, New York has clearly carved out a leadership position.

“In absolute numbers, [fin tech] is not enormous. In relative numbers, it’s bigger in New York than anywhere else in the country,” notes David Rose.

Like ad tech companies, fin tech companies have traditionally developed products and services for financial companies rather than consumers, including big data and analytics, payments and processing services, risk management, security services, or some combination of the above.

Etsy	GILT GROUPE
2005 sales $170,000	**2008 employees** 8
2011 sales $570,000,000	**2012 employees** 900

New York is already home to some of the biggest fin tech companies in the world, including ACI Worldwide and Moody’s Analytics. According to American Banker, seven of the top 100 fin tech companies by revenue are based in New York City, which comes second only to Mumbai with eight top 100 fin tech companies.[13] London and Bangalore both have three, while San Francisco, Atlanta and Jacksonville all have two. According to Maria Gotsch, president and CEO of the New York City Investment Fund, New York also produced a number of wildly successful financial exchanges that got developed as technology companies, many of the leading online financial exchanges, including Intralinks, Lava Trading and Creditex and Trade Web.

New York has also produced a number of fin tech start-ups in the last several years. SecondMarket, which now has around 115 employees, enables investors to trade shares of private companies in the secondary market. Gust, which matches entrepreneurs with angel investors, has over 40,000 accredited investors and 200,000 start-ups using its platform. Others like CB Insights and Hanweck Associates, similarly provide tools and services for investors.

A number of start-ups here have gained significant traction in the broader consumer market. TxVia, the New York-based mobile payments technology company founded in 2006, was acquired by Google this April. ZipMark, which creates a digital payment system using the money you already have in your checking account, raised $2 million in venture funding in December, while Lenddo, an experimental credit scoring service,

KICKSTARTER

2009-2012 investments

$175 million

tries to leverage users' online reputations in assessments of their credit worthiness. Other promising consumer companies include BillGuard, a personal financial security service, and Covestor, an investment strategy service.

Unlike social and media companies that grow virally from the appeal of their homepages or services, the technology undergirding fin tech companies has to pass a roster of security tests before it's ready to vie for customers. "It's a little more expensive to build than an ad tech or media business," says Zipmark founder Jay Bhattacharya. "Your engineers have to all be security experts, you have to have a higher level of encryption." The Center's accompanying tech index includes over 30 companies that could be broadly categorized as fin tech, but a majority of those with the most potential for growth are all still in the proving phase. In 2009, the New York City Investment Fund endowed a Fin Tech Innovation Lab in part so that they could encourage and promote more activity in this area, which should present a natural advantage for New York.

"The first generation of financial technology companies in New York City focused on commercializing new trading platforms and data," says Maria Gotsch. "Our Fin Tech Innovation Lab is building the next generation of successful financial technology companies by facilitating access to their customer base—largely banks—and by leveraging the experience of this first generation of financial technology entrepreneurs."

Kickstarter is easily the most recognizable brand in the fin tech space, having enabled over $175 million in investment in under three years. It is also the most unusual. The start-up has managed to revolutionize crowdsourced funding by leveraging New York's social and cultural capital in the way media and social networking sites do. In just over three years, a wide variety of small businesses and individual creatives, from film makers and video game companies to product designers and writers, have used the site to not only raise funds but measure potential sales and create buzz. In the last year, three different projects have raised over $1 million on the site, and in April 2012 a watch that communicates with an individual's iPhone broke records by raising over $8 million, or more than 80 times the fundraising goal. As Kickstarter founder Yancey Strickler told the BBC: "Ideas are being funded not because they might be a good investment or produce a good return, they're being supported because people want them to exist."[14]

Health Tech

New York's health tech sector is already fairly large with digital media companies like WebMD and Brooklyn-based Everyday Health having established themselves as go-to places on the internet for health information. But health tech goes far beyond informational websites to encompass health monitoring technology, e-prescribing, drug alert systems, clinical check-in services, and a whole slew of health IT platforms designed to automate the ganglion of paperwork associated with hospital and ambulatory care visits. Although there are serious obstacles in a number of these areas, industry insiders say this tech sector still has huge potential for growth. And many say New York is well-positioned to be a national leader in this space.

According to Unity Stoakes, a co-founder of StartUp Health, a New York-based incubator and academy for health tech entrepreneurs, start-up activity in health tech has really taken off in the last year. "We started a company in New York City in 2007 in the health tech space. We were one of a handful of companies. Now there are hundreds," he says. "We're seeing companies and talent that might in the past have stayed in ecosystems like Boston or the Midwest or overseas actually

“We’re seeing companies and talent [in health tech] that might in the past have stayed in Boston, the Midwest or overseas actually come to New York City to build their companies.”

come to New York City to build their companies. And that’s new.”

Stoakes says that over 600 people have applied to take StartUp Health classes in the last nine months, but most of the activity revolves around still nascent companies. For example, in 2011, the New York region raised just over $80 million in VC investments for health care services companies, and although that was the highest level in 12 years, $75 million of it went to just one company, ZocDoc. Founded in 2008, ZocDoc is an appointment scheduling service that patients can use to find last-minute appointments with doctors while screening for things like health insurance, location and availability. After a rapid expansion of its user base earlier this year, the company now has over 100 employees.

New York-based Medivo, a lab information tracking service, is another young company on the move. The firm has raised over $7 million in VC funds and earlier this year moved aggressively into the mobile space by acquiring a prominent health-related iPhone app. Moreover, after years of stagnation, New York is suddenly home to five health tech accelerators or incubators. Beyond the StartUp Health Academy, there is Blueprint Health, WellTech, Health 2.0, a meetup with over 1,500 New York-based participants, and the New York Digital Health Accelerator, which was launched in April by the New York City Investment Fund and the state Department of Health.

Although New York has a number of natural advantages in health tech, including perhaps the largest agglomeration of health care professionals in the country, there are still a number of major obstacles to growth. Industry experts have long argued that widespread adoption of comprehensive Electronic Health Records (EHRs) could fuel dozens of other breakthroughs and innovations, including software that consumers could use to receive and organize vital health information from their doctors, communication platforms for electronic monitoring devices, and any number of mobile apps that analyze clinical information or communicate with doctors. But even though professionals have been heralding their widespread adoption and the 2009 American Recovery and Reinvestment Act (ARRA) contained nearly $20 billion in financial incentives to do so, adoption rates have remained surprisingly low. Doctors site steep implementation costs, hard-to-use technologies, and a lack of trained IT personnel as major challenges.[15]

Still, insiders remain optimistic. The federal Office of the National Coordinator for Health Information Technology is using the ARRA incentives to enforce much needed interoperability standards that should eventually ease the cumbersome adoption process for doctors. And even more of a motivator, the consumer demand for health tech products remains unbelievably strong. According to the Pew Internet and American Life Project, for example, 80 percent of Internet users search online regularly for health information, making it the third most popular online pursuit among those tracked, following email and using a

Codecademy

In just under 4 months, Codecademy has enrolled over

450,000

people worldwide in its online coding tutorials

search engine. Although the existing health related mobile apps are nowhere near as powerful as they could be with access to clinical information, 15 percent of 18-29 year-old cell phone users already use health apps, including apps to calculate disease risks and body mass index, monitor vital signs and log personal health information.[16]

Ed Tech

Like health care, economic growth in the education sector seems almost inexorable. According to a recent report by the Sloan Consortium, the digital revolution may be a big reason why. Between 2002 and 2010, the number of students taking at least one course online increased by 283 percent, a rate of growth that is ten times greater than the enrollment increase across all of higher education. In the fall of 2010, 31 percent of all postsecondary students were enrolled online.[17] Needless to say, all that growth is creating major opportunities for companies in the ed tech space.

"Three years ago, the online education world was dead," says Owen Davis of NYC Seed. "But fast forward to now, it's finally happening. [In New York] there are now accelerators just for education companies, and a bunch of high profile wins in the space."

Dumbo-based Wireless Generation was acquired by News Corporation in 2010 for $360 million while New York's Schoolnet was bought by Pearson in 2011 for $230 million. In addition, over the last two or three years, very few companies in any tech field have raised as much money as 2tor (pronounced like tutor), a company that partners with universities to build, administer and market online degree programs. Founded in 2009 by Princeton Review founder John Katzman, the company develops software modules, including iPhone and Android apps, while working with individual schools and professors to develop specific courses. In just three years, 2tor has raised almost $97 million in venture funding and added high-profile clients such as UNC Chapel Hill, Georgetown and the University of Southern California.

Knewton, a software start-up that licenses code to academic publishers, is another rapidly growing local firm. It tailors a lesson plan to patterns in a user's behavior and is planning to create an API model that anyone could use to create a digital class. Since launching in 2009, it has attracted $30 million in venture funding. Other promising young firms include Schoology, which develops a course management system that uses social networking tools and Citelighter, which crowdsources highlighting in academic textbooks.

According to a report by the Economic Development Corporation (EDC), New York City is home to 78 ed tech companies employing roughly 5,000 people, a number that is almost sure to grow as tools assisting in digital learning continue to advance and as the number of people who consume educational services online continues to increase.[18] Because of New York's huge customer base, including over 1.1 million K-12 students, 620,000 post-secondary students, and a large number of educational publishers, the city could easily emerge as a major hub in this sector.

Meanwhile, a number of local companies are developing educational programs designed to grow the city's tech sector itself, including most prominently General Assembly (GA) and Codecademy. At its campus in the Flatiron District, GA is currently offering between 2-4 classes everyday with an average attendance of 25 students; the company has built 13 long-form courses taught by top practitioners, covering such topics as front-end web development, code, user experience design, business development, and game design. In just under four months so far this year, New York-based Codecademy, which offers online tutorials and a supportive network of meetups, has enrolled over 450,000 people worldwide in its courses.

Other Tech Fields

Because venture capitalists are chasing deals and tech platforms are so easy to set up, a number of other specialties are growing in New York, albeit to lower swells and, in several cases, with many more structural limits.

According to GA's Brad Hargreaves, for example, video game developers are flourishing in the city. Three years ago New York had a small but promising group of video game companies, and although Gamelab and Kaos, two of the city's biggest in the casual games space, have closed down since then, the rise of mobile devices has turned the industry on its head.[19] "Now someone who learned how to code and is living in Brooklyn can pull down five or six figures a year just creating apps, creating cool games," says Hargreaves. "Seventy to 80 percent of the people coming to my gaming industry group now are in that category, independent developers, designers and people creating ancillary services around gaming."

Several bigger developers have also been doing extremely well. For example, OMGPOP, a social games company, had generated over 1 billion game plays before being acquired by Zynga in March for $210 million, and Arkadium, a company that develops games for social networks as well as other companies for advertising, has increased its number of New York employees to over 100.

Additive manufacturing or 3D printing has also been generating a lot of buzz in New York recently. In the fall of 2010, the so-called Amazon of 3D printing services, Shapeways, moved its headquarters from the Netherlands to New York City and promptly raised $11 million in VC investments. In contrast to a traditional ink printer, Shapeways' printing machines turn digital models into three dimensional objects made of a variety of materials, including plastic, stainless steel, ceramic and glass—and by offering tweakable prototypes and easy-to-use software, they are hoping to appeal to more than just professional designers. Brooklyn-based Makerbot, meanwhile, is manufacturing and marketing the 3D printers themselves. Founded in 2009, the company has sold 6,000 units and last year raised $10 million in venture funds.

By comparison, in investment-intensive, highly regulated industries such as cleantech and biotech, New York has struggled to gain a foothold. In cleantech—or certain subfields like energy IT—New York has the potential to be a technological leader, says NYC ACRE's Micah Kotch. Whole-building data companies that analyze how a building uses heat, electricity and water, could grow from public-sector demand, he says, as the city requires more landlords to retrofit their buildings. One of the city's most promising cleantech companies is Brooklyn-based Energy Hub. On the basis of its elegantly designed smart meters and mobile apps that let you control your home's energy consumption from a distance, the company attracted $14.5 million in VC investments last year. The Center's tech index includes nine other New York-based cleantech companies that have attracted outside investment in the last five years.

Moreover, although NYU's Center for Urban Science and Progress (CUSP), a research consortium focused on sustainable urban development to be built in downtown Brooklyn, will be primarily focused on research in the big data realm, the center definitely has the potential to spin-off new start-ups in energy or environmental IT, as does the planned Cornell/Technion campus on Roosevelt Island. Still, New York has a long way to go before it's ready to compete with leading cleantech cities like San Jose or Boston.

In addition to environmental science, Cornell/Technion will emphasize research in bioscience—as will Columbia's new campus in Manhattanville. And, in a major break from the past, both schools will emphasize so-called "tech transfer" or the creation of new businesses from research breakthroughs. However, despite sustained efforts by the city and independent groups to foster a local biotech cluster, New York is still barely on the map in this space.

THE TALENT GAP

The lack of top-tier engineers is the biggest barrier to the city's continued growth in the tech sector, and the nation's backwards immigration laws only make the challenge more difficult

New York's tech sector has without question been booming over the last three years—and what's more, there's good reason to believe that it will be longer lasting than the dot com bubble 12 years ago. Still, if the city is going to reap all the advantages it can from the enormous entrepreneurial energy in this space, there are a number of important challenges to address. First, and foremost, is the city's dearth of top-flight engineering talent.

Start-up CEOs speak of "talent" so gravely that one thinks of sorcerers who can conjure living things, and although ace engineers can't quite create life, the mystique reflects a very real competitive force. People who are good at writing thousands of lines of scalable code, and who are good at anticipating the thousands of unlikely ways that code can fail, are extremely rare. According to Dan Huttenlocher, the head of Cornell/Technion's new applied sciences campus on Roosevelt Island, such people bring a singularity of focus common among concert pianists or champion swimmers, and moreover, because software engineers operate under comparatively few physical or organizational constraints, they have the capacity to really make or break a company. Smaller companies, if they fail to acquire the necessary engineering talent, may never emerge from the proof of concept stage, while successful larger companies may have a hard time bringing their business to scale.

"The consistent challenge for the companies we work with at any stage of development is finding good tech talent," says Thatcher Bell of DFJ Gotham Ventures. "The hunger for developers and technological talent is totally insatiable."

"It is the biggest gap that New York has today," agrees Jay Bhattacharya, founder of fin tech start-up Zipmark. "If we were to open a second location outside of New York, it would solely be to hire engineers."

By all accounts, fin tech should be a major area of growth for New York. It already has a larger cluster of start-ups than anywhere else in the country as well as the industry knowledge needed to innovate new products and services. But fin tech also requires a bit more customized engineering prowess to deal with complicated security issues, and as Battacharya points out, very few, if any, start-ups can match the salary levels that engineers command at Goldman Sachs or JP Morgan. In fact, Vivek Wadhwa, a serial entrepreneur and columnist for *Bloomberg Business Week*, claims that the two industries occupy opposite sides in a zero-sum game: "The success of the tech sector is inversely proportional to success of the financial services sector," says Wadhwa. "Whenever the financial services sector is booming, they start hiring up all the engineers, offering ridiculous salaries. It distorts the environment."

Of course there are at least two obvious solutions to this problem. The first is to start building the educational infrastructure needed to turn out more engineering talent, and the second is to make it easier for firms to hire qualified engineers from abroad. Some headway has been made on the first of these solutions, but there are still a number of challenges.

Earlier this year, the administration awarded Cornell and Technion 11 acres and $100 million in infrastructure support to build an applied science campus that will house 280 professors and 2,500 students. And, in April, the administration awarded an additional $15 million for a new NYU campus in downtown Brooklyn. The business leaders and industry observers we talked to for this report were unanimous in their praise for these initiatives. However, although both Cornell/Technion and NYU plan to start classes long before their new campuses are complete, most also acknowledged that it will take years, if not decades, before they begin to turn out enough talent to make a noticeable difference to the city's economy.

Meanwhile, the rapid expansion of private sector schools offering coding and entrepreneurship courses could have a more immediate impact, but it is unclear whether they can turn out engineers who have the sort of deep knowledge and talent to drive innovative businesses.

By far the most immediate and effective remedy for the city's engineering talent gap would be to streamline the visa process and dramatically raise the federal cap on highly qualified immigrants. Whether they are just starting out or trying to scale up to meet demand, literally hundreds of tech companies in New York struggle needlessly because of federal visa issues. In our interviews, nearly every executive who was hiring top-level staff could describe in excruciating detail the kinds of problems visa issues presented. Tumblr founder David Karp, for instance, says his company has waited over nine months to get top-level employees cleared for visas, while Collective[i] founder Heidi Messer says the system drove one of her top engineers to a competitor in Canada. "The process to get him working papers was so onerous," says Messer, "that one day he just decided he couldn't deal with the uncertainty."

Beyond long waits, the 65,000 person cap for H1B visas covering highly educated immigrants barely scratches the surface of what's needed. Even top start-ups like Gilt Groupe and Tumblr are having trouble competing with the deep pockets of financial companies, never mind the many more smaller companies that are still trying to get a foothold. Another, related problem concerns the severe restrictions the system places on immigrants who want to start their own companies. Given the backlog on green cards, entrepreneurial engineers who rely on the sponsorship of their current company—something all H1B visas require—can't break away to start their own companies in the U.S. "There's a hidden cost," notes Gilt's Kevin Ryan. "The guy I employ to come here, there's a good chance he's going to want to start another company after being here for a few years."

In fact, an influential study by AnnaLee Saxenian in 1999 found that a quarter of all technology companies that were started between 1980 and 1998 in Silicon Valley were founded by immigrants, especially from China and India. Meanwhile, newer research by Vivek Wadhwa shows that a whopping 52 percent of Silicon Valley tech companies started between 1995 and 2005 were founded by immigrants. New York was not far behind, with 44 percent of tech start-ups founded by immigrants.[20]

"What we found is that immigrants would typically come here as students, and 13 years later they would found a company," explains Wadhwa. "But it would now take you 15 to 20 years to get a green card, so forget about starting a company. You're stuck in limbo. You're stuck with an H1B visa, and you can't do anything. So unless you address that green card problem, we're going to tremendously shrink entrepreneurship because immigrants can't do it anymore."

"[That so many talented people want to come to the U.S. to work] is a luxury that will not last," adds Messer, "because progressive places like Canada know that talent is migratory."

"If we were to open a second location outside of New York, it would solely be to hire engineers."

BARRIERS TO GROWTH

From limited bandwidth to the high cost of housing, there are other potential obstacles to the city's future tech growth

Finding talent may be the primary long-term threat to the city's tech sector, but it isn't the only challenge. During the course of our research, we uncovered several other key obstacles that need to be addressed. These include:

Bandwidth

It's not difficult to grasp why a strong, reliable broadband infrastructure is absolutely essential for tech companies built around the Internet and mobile technologies. What is surprising is that New York—the world's media capital—could be behind the curve in having the bandwidth that the city's tech companies need. Unfortunately, that appears to be the case. Over the course of our interviews for this study, the state of broadband connectivity in the city came up as the second most frequently cited threat to New York's future growth in the tech sector.

To be sure, we didn't hear of a single tech company in New York that doesn't have a broadband connection. And whereas virtually everyone we interviewed noted the challenge in finding talented engineers, bandwidth was cited as a problem by less than half of those we interviewed. However, it came up again and again. "It's like the elephant in the room is that bandwidth here sucks," says David Pakman. "You should be able to walk into any building and have at least 150 megabit connection available to you. There has to be ways for the city to construct much better bandwidth availability for start-ups."

A number of those we interviewed for this report told us that their Internet connection goes down on a relatively consistent basis. Some said that the problem is a lack of redundancy, since only one telecom provider offers high-speed service where they are located. Still others say that they had to abandon plans to relocate to former industrial districts outside of Manhattan that happen to offer inexpensive rents, solely because there is no broadband infrastructure in buildings there.

"Bandwidth is one of the big, big constraints out there," says John Borthwick of Betaworks. "It's really crappy and there is uneven accessibility to bandwidth. I know a lot of our companies complain about this. Even here [at Betworks' office in the Meatpacking district], we have FIOS in the building, which is good. But we don't have a backup to it. Time Warner Cable doesn't pass the building, so there's no backup. And so if FIOS goes down, which is conceivable for a day, we're screwed. Hopefully it won't happen, but there should be redundancy to bandwidth."

Chris Dixon, the co-founder of start-up Hunch, the recommendation engine which was purchased by eBay in November 2011, recently blogged about the problems getting broadband at his company's office, which is centrally located on 21st Street in the Flatiron district. "Amazingly, one of our biggest challenges being a NYC start-up has been getting reliable Internet access" Dixon wrote in December 2011. "It's embarrassing how bad Internet access in Manhattan is."[21]

While a number of tech companies have a problem with spotty Internet service, another issue is that there are some commercial districts outside of Manhattan where it is still difficult to get a broadband connection, period. This problem is by no means widespread citywide. The gaps are mainly limited to a handful of former industrial neighborhoods—including several along the Brooklyn and Queens waterfront—where the telecommunications infrastructure is roughly 100 years old. Because they were mainly filled with manufacturers who generally weren't online, telecom carriers like Verizon never saw enough demand to justify the huge upfront cost of building out fiber optic lines to these commercial buildings. And since these districts had few residential customers, the economics never made sense for cable television companies like Time Warner and Cablevision to develop the infrastructure to serve these areas. The Center for an Urban Future's 2004 report, "New York's Broadband Gap," detailed many of these problems.[22]

The problem is that many of these older industrial districts are now appealing neighborhoods for tech start-ups—not to mention graphic design firms, fashion companies and other businesses and artisans—because they tend to offer much more affordable rents than in Manhattan office districts and, in many cases, are in close proximity to areas where many techies live today. But without a fast Internet connection, buildings in these districts become a nonstarter for tech companies. "There is a company I know of that is one of the most exciting new start-ups in NYC," venture capitalist Fred Wilson blogged recently. "They are locating their new office in the emerging area in Brooklyn between DUMBO, Fort Greene, and the Brooklyn Navy Yard. This is a cool new neighborhood that could be home to a lot of start-ups looking for great workspaces at low rents. But there is no commercial grade Internet service in this neighborhood. Time Warner Cable wants this young start-up to guarantee them $80,000 in revenues so they can afford to dig up the street and lay the cables. That is nuts. We need to wire up this city from Staten Island to the Bronx, from Harlem to Rockaway Beach."[23]

Real estate

When we asked dozens of tech entrepreneurs and investors to name the challenges that could keep New York from achieving additional growth in its tech sector, very few cited real estate. In fact, many of those we spoke with emphatically told us that finding space is decidedly not a problem. "I don't know of companies that can't find space," says John Borthwick, whose Betaworks has housed several start-ups.

Owen Davis of NYCSeed adds, "Real estate is off my list as a problem. No company has failed because they can't find real estate."

Perhaps this is not surprising. With well over a dozen incubators and coworking spaces in operation around the five boroughs today, and more on the way, there are numerous space options for early stage tech start-ups—choices that generally didn't exist prior to the past few years. The city's tech start-ups have also shown a high degree of flexibility in adapting to the real estate that is available. For instance, two companies we interviewed recently outgrew the coworking space they both called home and jointly subleased a new office space, not even bothering to subdivide the raw space with new walls or partitions. And while many tech companies favor hot districts like Union Square, the Flatiron area and West Chelsea, most have been willing to move to other neighborhoods if it means less expensive space. The recent tech boom in DUMBO is one example.

But even though real estate isn't considered a significant threat to New York's future competitiveness in the tech sector, chances are good that finding space will become more of a problem in the near future, especially if local start-ups continue to add jobs and outgrow the incubators that house them today. Another reason to think that real estate will become more of a challenge is that the phenomenal growth of New York's tech sector in the past few years has occurred at a time when other key industries in New York were not growing—and not absorbing a lot of real estate. When law firms, media companies, architecture firms, investment banks and other major sectors begin to grow again, tech start-ups could find it far more challenging to find space at the price points they have been accustomed to in recent years.

At the height of the 1990s Silicon Alley boom, real estate did become a thorny issue for the city's growing dot coms and digital media companies. Things were so bad that, in 2000, Senator Schumer formed a blue ribbon task force called the "Group of 35" to identify long term solutions to the commercial space squeeze. "The sad truth is that New York City does not have the commercial space to sustain growing New Media companies," Senator Schumer said at the time.

There are signs that real estate is already becoming more of a challenge for the fast-growing tech firms that need expansion space. "In the next six to 18 months, you'll definitely see a greater shortage of space for the companies that are growing fast," says Jason Schwartzenberg, managing director of Julien Studley. "If you are looking for 40,000 square feet and you want that in one or two contiguous floors and in midtown south, you certainly don't have a large pool of options to choose from. It's definitely a landlord's market in midtown south. You're seeing rents for this part of town, which a year ago were in the mid to upper $30s, now into the mid $40s and in some cases the upper $40s and even low $50s."

Brooklyn is becoming an increasingly popular location for tech firms, and could be a natural home for start-ups that outgrow their Manhattan spaces. But real estate officials say that there is essentially no empty commercial space today in DUMBO, where the vast majority of the borough's tech firms are located today. And tech entrepreneurs say that nearby neighborhoods in Brooklyn don't necessarily have the space that start-ups are looking for: either the buildings don't have the broadband capacity that tech firms need or the rents are too high.

There are already some specific real estate challenges. Unity Stoakes, co-founder of StartUp Health, says that the biggest problem they have is a lack of space for health tech start-up founders to meet and network. "The most important thing is space," says Stoakes. "We need a campus, a place where meetups can happen, where events can happen, where these start-ups can congregate. The only reason we have to turn people away is we don't have enough room."

Affordability

It is already clear that New York needs more top tier engineering talent. This need will only grow as more of the city's start-ups expand, more local companies get to the IPO stage and tech giants like Facebook, Twitter and Google continue to expand their engineering presence here. While the plan to create a new applied sciences and engineering campus on Roosevelt Island could go a long way to addressing this problem, the bigger long-term challenge may be ensuring that engineers—and other key tech talent—who are interested in working or studying in New York can afford to live here.

While so many young entrepreneurs have demonstrated that they are willing to pay a premium to be in New York today, the high cost of housing in New York could prove an impediment to attracting and retaining experienced engineers. "It is really hard to build a scalable engineering team in New York. It's the cost of living," says Divya Gugnani of Send the Trend. "That's the biggest barrier to me. It's a hard place for people to come and look for a job."

Even amid a period of relatively tepid economic growth and when the city's unemployment rate is nearly 10 percent, the average apartment rent in Manhattan in March 2012—$3,418 a month—exceeded the all-time high previously set in 2007. According to real estate firm Reis, the city's average effective rent in the fourth quarter of 2011 ($2,953) was not only highest in the nation, but 51 percent higher than the second place city (San Francisco, where the average effective rent was $1,961).

Home buyers in New York don't have it any easier. In the fourth quarter of 2011, only 29 percent of homes in the New York City metropolitan region were affordable to individuals earning the median income, a lower share than any other metro area in the nation. By way of comparison, 37.1 percent of homes in the San Francisco region were affordable, as were 56.8 percent of the homes in the San Jose/Sunnyvale/Santa Clara region, 65.6 percent of the homes in the Boston area and 78.9 percent of the homes in the Austin region.[24]

Mayor Bloomberg deserves credit for spearheading a major new middle class housing development on the waterfront in Long Island City, which is expected to create around 5,000 units of middle-income housing. But New York will probably need to develop and preserve a lot more middle-income housing units in the years ahead if the city is to attract and retain the workforce needed by growing tech companies.

RECOMMENDATIONS

New York City's tech sector has come a long way in a short time. Even though it's likely that a significant number of recent start-ups in New York will eventually fail, the city appears well positioned for continued growth in the years ahead, thanks to larger technology trends that now favor New York as well as the city's increasingly strong tech ecosystem. In addition, New York is also in a relatively strong position to be a center of activity in several sectors that are expected to grow in the years ahead, including mobile applications, health tech and video. However, New York's digital sector is still very much a work in progress. Too few tech start-ups have grown into large ones, and many of the companies here struggle with hurdles from attracting engineers to getting good bandwidth. As these recommendations detail, there are a number of things that city and state policymakers could do to address these obstacles, build on the now-strong foundation and help take New York's tech sector to the next level.

Accelerate the Pipeline of Tech Talent from New York's Public Schools

For the tech sector to grow, New York will need to attract top-tier engineers and other talented workers from across the country and around the globe. But it could also do a lot better job of grooming the city's homegrown population to fill many of the in-demand tech jobs. The Bloomberg administration has made some progress on this front in recent months. It partnered with IBM on an innovative new six-year high school focusing on preparing New York City teens for careers in computer science. More recently, the city worked with venture capitalist Fred Wilson to establish a new Software Engineering Academy in Union Square, which is set to open this fall. However, in a world where virtually every industry needs workers who are adept at using technology, these innovative schools should represent the beginnings of a much larger effort to incorporate technology into New York's schools. "One out of 1,100 schools teaching code is not close to meet the need," says Andrew Rasiej of New York Tech Meetup.

Push for Immigration Reforms

Perhaps no other city is impacted as much by the nation's backwards immigration system as New York, which as the nation's most global city has long been well-positioned to attract the best and brightest from around the world. More recently, the restrictions in the immigration system are hurting the city's tech companies, which face an inadequate supply of U.S. born engineers to meet the growing demand. Mayor Bloomberg has been one of the leading advocates for reforming these laws. He and his successor in City Hall should continue to push for changes—not only with broad immigration reform but also interim measures, such as freeing up more green cards for students from abroad who receive their technical degree at a universities in the U.S. and foreign entrepreneurs who start high-growth businesses here.

Experiment with a Start-Up Visa Corporation

Only Congress can change the nation's counterproductive immigration laws. But since that doesn't appear imminent, city officials should consider innovative ways that the city could provide relief.

One idea worth considering is the creation of a nonprofit corporation that could sponsor foreign workers on behalf of fledging start-up companies. Too often talented immigrants—including those who studied for advanced degrees at U.S. institutions—are prevented from staying on in the country to start their own companies or, because of the high cost of visa sponsorships, to serve as executives in early start-ups founded by others. But with the help of the city's Economic Development Corporation a nonprofit could be set up to "hire" these immigrants on behalf of select start-ups. And because certain nonprofits are exempt from the 65,000 person cap on H1-B visas, this nonprofit could not only enable new start-up companies but expand the country's pool of engineering talent. The organization could either incorporate some of the functions of an incubator by housing the start-ups and providing ancillary services, or it could work as a leaner legal maneuver to aid participating companies in the visa sponsoring process. To fund its operations the nonprofit could work with established VCs and/or take a small stake in the participating companies. "This would be such a boost to entrepreneurship in the city," says Vivek Wadhwa, a former tech entrepreneur who has written extensively about the need to reform immigration laws. "If New York was the only place to do this, you would get hundreds of people from all over looking to start a company there. You'd have hundreds of start-ups out of nothing at all."

Set a Goal of Making New York the Most Wired City in the World

Just as Mayor Bloomberg set out to create the most far-reaching vision for a sustainable city with his PlanNYC 2030 initiative, city officials should set an ambitious goal for being the most connected city in the world. The next mayor should outline a series of steps to dramatically improve the city's broadband and wireless infrastructure, and ensure that every New Yorker is connected to the Internet. As one start-up founder told us, "If we had great bandwidth here, for everybody, people would talk about it and think that New York believes in my tech company."

As part of this, city officials should work with the city's telecom providers to come up an achievable plan for adding redundant networks to commercial buildings that currently only have one option for high speed Internet service and wiring commercial and industrial districts around the city where high speed Internet connections are currently lacking.

Preserve Watchtower buildings in DUMBO for Commercial Use

DUMBO has become a prime destination for Internet start-ups, design firms, music businesses and other growing companies. But with DUMBO's commercial vacancy rate at a rock-bottom two percent, it is all but impossible for new start-ups or growing tech firms to find space in the area. Making matters worse, tech entrepreneurs say that the space that is available in adjacent neighborhoods in Brooklyn is not well-suited to their needs.

But there is one giant opportunity to create a large amount of new office space in DUMBO: the buildings owned by the Watchtower Society, otherwise known as Jehovah's Witnesses. The Watchtower buildings currently occupy millions of square feet, most of which is zoned for manufacturing—and which could be converted as-of-right into office uses.

There has been much talk about converting these valuable properties into high-end housing. But given the rapid rise in tech companies looking for office space in the neighborhood, and the lack of other good options, city officials should commit to preserving a substantial amount of the Watchtower space in DUMBO for commercial uses.

Establish New Incentives to Preserve and Upgrade Class B Office Buildings

A large number of the city's tech companies today rent space in Class B and C office buildings and former industrial properties, all of which tend to command significantly lower rents than Class A office towers. These older buildings often serve as natural incubators for fledgling firms with huge growth potential. Unfortunately, there are dramatically fewer Class B and C buildings around the five boroughs today than 10 or 15 years ago. In fact, the total amount of Class B and C space in Manhattan declined by 47 percent between 1995 and 2009; the amount of Class A space is virtually unchanged, falling less than three percent during this period.

A number of Class B and C properties have been converted into apartments in recent years. Some of these conversions have made obvious sense: in lower Manhattan, for instance, the addition of thousands of new housing units has been a key component of efforts to build a more vibrant, 24/7 community. But given the need for affordable office space, it is time to develop new tools to encourage the preservation of these spaces.

City economic development officials should create a new set of incentives, including tax exemptions and low-cost financing for tenant improvements, which make it financially attractive for Class B and C owners to preserve their buildings as office spaces. Modernizing their buildings could enable owners to attract slightly higher paying tenants and increase occupancy rates, and the availability of incentives likely would help convince many Class B and C owners to make these investments.

Similarly, it is worth considering new city incentives for owners of industrial loft buildings who convert their properties to office uses rather than condos. Zoning already allows for industrial buildings to be used for these other commercial purposes, but owners of industrial lofts rarely go this route. More often, they convert their spaces to residential uses—a shift that permanently removes space in which tenants could pursue industrial, office or artistic uses. As a result, neighborhoods like Williamsburg today are full of technologists and designers, but but have relatively few office space options for them despite the dozens of industrial loft buildings in the area; most of those properties have been converted into apartments. City incentives might encourage some loft owners to make the investments necessary to turn their industrial facilities into attractive office spaces, thereby reducing the likelihood that they will make the leap from industrial to residential.

Make the Applied Sciences Campuses Catalysts for Local Start-Ups

Mayor Bloomberg hit a homerun with his plan to attract a new applied sciences and engineering campus to New York. But it is important that current and future mayoral administrations understand that simply building an applied sciences campus on Roosevelt Island or in Downtown Brooklyn is not enough. These tech campuses must become catalysts for local start-ups, a role that is second nature to institutions like Stanford and MIT but which has not always come naturally to New York's research universities. As such, city officials should make sure that the leadership of the new applied sciences campus promotes and supports entrepreneurship at every turn—and forms deep connections with New York-based start-up founders.

Clear Hurdles for Tech Start-Ups to Work with City Government

Several people we interviewed for this report remarked that the Bloomberg administration wouldn't have wasted hundreds of millions of dollars on a new time-keeping payroll management system, known as City Time, if he had given the contract to a local start-up company. Whether or not that is true, the bigger issue is that the city rarely contracts with New York-based tech start-ups to do the city's technology work. "The city does a terrible job of working with innovative companies to actually run the city," says one local techie. "If you travel around the city's start-up world, you'll probably find only one that has the city as a client."

Many of those we spoke with say that tech start-ups are disadvantaged in the city's RFP process merely because they are small. "If you have a 50-person company, I bet you're not going to get the RFP," says a leading tech expert. "Instagram was about 13 people. They have 25 million users. Would they be qualified to run an infrastructure for the city? Yes, they probably would be. But they wouldn't get a chance, and everyone seems to think that's ok."

Going forward, city officials should re-evaluate its RFP system and eliminate the barriers that make it difficult for small companies to compete for projects. It doesn't have to give New York firms a leg up, but it shouldn't make it harder for them to compete.

Don't Overlook Other Promising Tech Sectors

While New York's tech sector has been on an amazing roll in the past few years, it hasn't necessarily been a broad-based tech renaissance. Most of the growth here has been in Web-based companies that leverage the Internet or mobile technologies to create content, sell things or provide services. While New York has become the clear number two hub of activity in the Internet sector, it has not done nearly as well in other tech sectors like biotech and clean tech.

City economic development officials certainly should be advancing programs and policies to ensure that New York continues to build on the already-exciting growth in these digital fields. But they shouldn't overlook other tech subsectors that have clear potential for growth here but which require more patience—and more work—to produce the kinds of success now being seen in the Internet sector. To its credit, the Bloomberg administration has invested considerable time and resources into growing the city's biotech sector. But that work is far from done. The new applied sciences campuses on Roosevelt Island and in Downtown Brooklyn could strengthen the city's capabilities in other promising technology areas, but city leaders should push these universities to invest in cutting edge engineering research in areas like clean energy and life sciences—not just information technology and computer software engineering.

Continue to open up government data to the public

The mountains of data collected by city and state agencies could serve as the building block for a significant amount of innovation by local entrepreneurs who use the data to create new tools and apps. The problem has been getting the government to turn loose most of its data—at least the data that does not pose a security risk or reveal personal information—to the public in digital, machine searchable format.

Earlier this year, the New York City Council took an important step when it passed the Open Data Bill, which requires city agencies to post a wide range of government data to a central portal. Bloomberg administration officials should push its agency chiefs to comply quickly, while city and state officials should continue to push for easier access to government data. New York might take a cue from San Francisco, where Mayor Ed Lee unveiled a new cloud-based open data site for the city, building on the city's already ambitious efforts to use data accessibility to drive innovation and develop better tools to enhance city services.

Create More Middle Class Housing

New York City's exorbitant housing costs aren't typically thought of as a tech issue, but it will likely provide a key obstacle to the city's goal of increasing the pool of top-tier engineers. That is why New York needs to commit to creating and preserving more housing units that are affordable to middle class New Yorkers—including teachers and fire fighters, but also university professors, research scientists and software programmers.

To be sure, the greatest need for scarce housing subsidies is with low-income New Yorkers. But city officials should make it a priority to create more affordable options for middle class housing. Mayor Bloomberg deserves credit for supporting a major new middle class housing development on the Long Island City waterfront, but this should just be the beginning.

Encourage Traditional Industries to Turn to Entrepreneurs and Start-Ups for Innovation

One of the reasons New York has seen so much growth in its tech sector in recent years is that young companies here are creating innovative new tools, platforms and applications in traditional industries like fashion, advertising, finance and publishing. It is happening because entrepreneurs, many of which previously worked for traditional companies in these industries, are looking for ways to solve problems. But incumbent companies in some key industries, from health care to energy, are still standing in the way of important innovations. This needs to change.

As evidenced by the recent Sanofi Open Innovation Challenge, some established corporations are turning to the entrepreneurial community for innovation. But more of this needs to happen, and city economic development officials should be able to help facilitate this.

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