

MEDICAL

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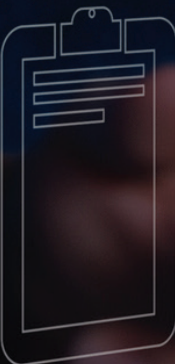


IN GOOD HEALTH

The Growth Potential of New York City's Digital Health Sector



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In Good Health: The Growth Potential of New York City's Digital Health Sector. This report was researched and written by Arlene Weintraub. Edited by Eli Dvorkin. Additional research support from Ilha Youn and Alexa Schatzmann. Design by Rob Chabebe.

Center for an Urban Future

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Center for an Urban Future (CUF) is a catalyst for smart and sustainable policies that reduce inequality, increase economic mobility, and grow the economy in New York City. An independent, nonpartisan policy organization, CUF uses fact-based research to elevate important and often overlooked issues onto the radar of policymakers and advance practical solutions that strengthen New York and help all New Yorkers participate in the city's rising prosperity.

MIDDLE CLASS JOBS PROJECT

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IN GOOD HEALTH: THE GROWTH POTENTIAL OF NEW YORK CITY'S DIGITAL HEALTH SECTOR

Over the past decade, the tech sector has emerged as one of the most important generators of new middle-income jobs in New York City. Employment in the city's tech sector has increased 71 percent since 2006, to more than 117,000 jobs. These positions pay roughly twice as much, on average, as the jobs being created in other fast-growing industries such as retail, restaurants, and healthcare.¹

There is clear potential to maintain this growth, thanks to the city's strength in a diverse array of tech fields—from advertising and finance to digital media and ecommerce. But few parts of the city's tech ecosystem are growing as quickly or offer as much potential for future expansion as digital health.

The ongoing transformation of healthcare delivery in the United States has sparked tremendous growth in the digital health sector. With hospitals, insurance companies, doctors and other health providers under unprecedented pressure to provide higher quality care at a lower cost, a crop of new businesses has sprung up to meet the challenge. These firms are building digital tools that will help the healthcare system transition from paper to electronic records, analyze big data to better manage chronically ill patients, conduct virtual consultations with patients and perform other key functions more efficiently than they ever could before.

New York City is already one of the primary beneficiaries of this growth. Today, the city is the nation's second-largest center for digital health innovation, behind only Silicon Valley. In less than a decade, the city's digital health sector has grown from just a handful of companies to nearly 100 digital health companies, ranging from large consumer-facing information providers to dozens of start-ups creating essential tools that healthcare providers are building into their back-office systems and using every day to improve patient care. In addition to sheer numbers, several of the city's digital health start-ups have achieved significant growth. Indeed, a disproportionate share of the city's most well-funded tech start-ups are in the digital health sector.

The industry experts and investors we interviewed for this report believe that New York is in a prime position to capture a significant share of this emerging industry's future growth. But while entrepreneurs in the field are drawn to New York's strong healthcare infrastructure and proximity to the insurance and pharmaceutical industries, start-ups in the sector face several challenges that could constrain future growth.

The upside is clear: the city could create thousands of well-paying jobs in a sector that's poised for continued growth. But as this study illustrates, New York will need to step up to help this burgeoning sector reach its full potential.

This report—the latest publication of the Center for an Urban Future’s Middle Class Jobs Project, a research initiative funded by Fisher Brothers and Winston C. Fisher—provides a comprehensive analysis of New York City’s digital health sector. The report is based on data aggregation and more than 20 interviews with executives of local digital health companies, academics who train students to enter the field, and venture capitalists and angel investors who are funding it. The report also includes input from managers of digital health incubators and accelerators in the city, as well as experts who are embracing these new technology tools as they guide the transformation of healthcare—once an entirely paper-based industry—into the digital age.

It is that transformation from paper to electronic health records and other new tools that has made digital health one of the fastest-growing subsectors of the technology industry. Nationwide, investors poured a total of \$6 billion into digital health in 2015, according to public data aggregated by New York-based StartUp Health.² And in the first half of 2016 alone, \$3.9 billion was invested in the sector—a 39 percent increase over the first half of 2015, and 11 percent higher than the previous first-half record set in 2014. The average venture capital (VC) round is expanding in digital health, as well. In 2015, the average deal size was \$13 million, more than double that of 2013.³

A confluence of factors is driving the growth of digital health. Advances in data processing, mobile and cloud computing, and encryption are making it feasible for health providers to digitize medical records, appointment schedules, and other data while maintaining compliance with strict privacy laws. At the same time, the Affordable Care Act (ACA) and other new legislation demands that insurers and healthcare providers embrace electronic health records, decrease hospital readmissions, and provide higher quality care at a lower cost.

The ACA also expanded Medicaid access, opening up a whole new market for the digital health industry, as state-based health agencies look for technology tools to help them administer their programs efficiently. As of the end of 2016, 25 states had implemented Medicaid expansion, including New York, and another six states were in the process of implementing expansion programs, according to the National Conference of State Legislatures.⁴

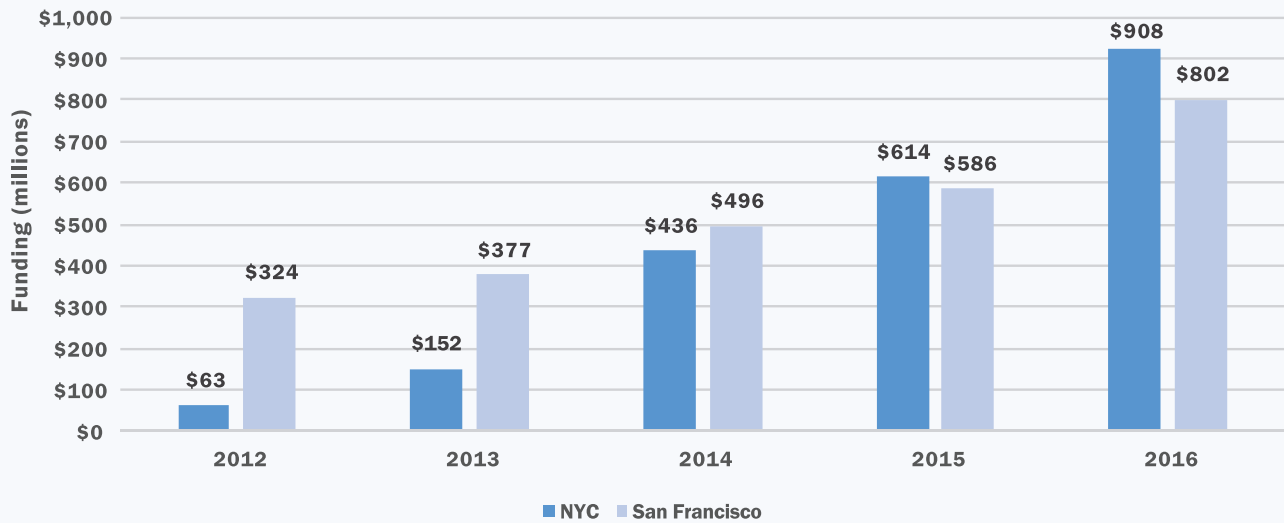
Despite efforts by President Donald J. Trump and congressional Republicans to repeal all or parts of the ACA, the United States is continuing to shift away from a fee-for-service model and toward value-based care. The Medicare Access and CHIP Reauthorization Act (MACRA) of 2015, which passed with bipartisan support, is just one of many recent laws and initiatives, both local and national, which incentivize health providers to focus on quality.

That’s why most healthcare experts believe the drive to provide higher quality care at a lower cost will continue to grow, fueling the demand for new digital health products that improve efficiency and reduce waste. The demand is coming from providers themselves, who want to use technology to improve their practices, as well as from patients seeking to do everything from scheduling doctors’ appointments online to getting medication reminders from electronic pill bottles. “This is not just policy—this is the march of history,” says Jeffrey Sachs, a principal at the New York-based healthcare consultancy Sachs Policy Group. “The digital revolution has been happening in every other sector, it’s finally coming to healthcare, and we can see how it’s going to transform every part of our lives.”

Largest Digital Health Employers in NYC	
Company	Number of Employees (2016)
WebMD	1,750
Medidata	1,500
ZocDoc	600
Everyday Health	700
Flatiron Health	375
Oscar	300
medCPU	86
Fit4D	70

Source: Employment figures are based on interviews and media reports.

Funding for Digital Health Companies



Source: Data collected for CUF by CB Insights, December 2016.

New York City is a major hub in the digital health ecosystem, one that's poised to grow in the years to come. Experts agree that the both the quantity of digital health companies and the funding they've raised make New York City the number two player in the industry behind the San Francisco Bay Area.

The city has seen an explosion in digital health companies starting up and getting funded over the past five years. In 2010, just 15 digital health companies in the city raised venture funding, bringing in a total of \$93 million.⁵ Five years later, 67 local companies raised \$614 million, according to information gathered by data aggregator CB Insights for this report.⁶ And though the total deal count dropped in 2016, CB Insights recorded \$908 million in total VC funding for digital health companies in New York City, making it the sector's best year to date.

Digital health is reaping a larger share of funding than other segments of the technology industry. An analysis by the Center for an Urban Future shows that of the \$1.16 billion in venture capital poured into New York-based tech companies in the first quarter of 2016 alone, more than 18 percent was invested in healthcare information technology, versus 15 percent in financial technology, 12 percent in enterprise software, and smaller por-

tions devoted to other types of digital start-ups and to biotechnology.⁷

New York has traditionally lagged behind the Bay Area in VC funding for digital health, but that has started to change over the past three years, thanks largely to three huge Big Apple success stories. Oscar, a health insurance company that provides care via mobile app to customers in New York, California, and Texas, raised \$728 million in six funding rounds. ZocDoc, an online medical-appointment scheduler, had raised \$93 million in three funding rounds prior to 2011 and then pulled in another \$130 million in 2015. Flatiron Health, a maker of cloud-based software used for oncology research and treatment, brought in \$313 million in three rounds.⁸

New York has stayed well ahead of Boston in VC funding for digital health, despite that city's much bigger life sciences sector. Boston-based digital health companies raised \$139 million in 2016, according to CB Insights, and just \$97 million in 2015.¹⁰ New York's lead underscores the fact that it has not only the second-highest concentration of venture capitalists behind San Francisco, but also a deep healthcare infrastructure, says Maria Gotsch, president and CEO of the Partnership Fund for New York City. "A competitive advantage of New York is that we have an extensive concentration

FLATIRON HEALTH: A NEW YORK SUCCESS STORY

Nat Turner and Zach Weinberg, co-founders of Flatiron Health, had a bit of a head start when they launched their company in 2012: They had sold an advertising technology they invented to Google for \$70 million two years earlier. But both had witnessed family members struggle with cancer, so they wanted to develop technology to help accelerate cancer research. The money from the Google deal was vital for seeding their idea.

“We were able to do some early pilot testing,” Weinberg says. “Finding that first customer that’s willing to participate in a reasonable time frame is the biggest obstacle for a digital health company.” Flatiron started by piloting its products with private oncology practices, Weinberg says. The company has since developed four software platforms that cancer centers can use to guide treatment choices, keep cloud-based medical records, manage billing, and engage with patients online.

Google Ventures led Flatiron’s first two rounds of funding. Then the company brought in a major strategic investor—Swiss pharmaceutical giant Roche, a leading maker of cancer drugs—to lead a \$175 million Series C round in January of 2016.

The deal included an agreement that Roche would purchase several of Flatiron’s products to help accelerate its clinical trials. “This partnership will generate valuable insights to shape progress in both the development of new medicines and the way those medicines are made available to patients,” said Daniel O’Day, Roche’s chief operating officer, in a statement.⁹

Roche’s investment is helping Flatiron expand its offerings to pharma companies that want to use its software to support decision-making in oncology drug development, Weinberg says. Weinberg, who is now an angel investor in digital health, believes New York will prove to be an important source of strategic investors to the sector going forward. “There’s a really strong hospital and biopharma presence here,” he says. “And there’s a tremendous amount of money and a strong investor community in New York.”

of leading healthcare systems, as well as payers,” she says.

The healthcare services sector in New York City is projected to grow 42 percent in the ten years ending in 2022, according to a report from the New York State Department of Labor.¹¹ Data collected by the City of New York shows that it is home to 11 hospital centers and 70 ambulatory care clinics employing more than 40,000 people.¹²

And New York has two of the largest non-profit health systems in the country, Northwell Health and New York–Presbyterian, and several major academic medical centers, including New York University and Mount Sinai, all of which are major investors in digital health products. In November 2016, for example, New York–Presbyterian launched a new venture fund, NYP Ventures,

which will devote \$15 million to fostering digital health startups, many of which are making tools it intends to field test in its hospitals.¹³ The city also enjoys close proximity to the heart of the insurance industry, which has been embracing digital tools.

Digital health has been a strong creator of jobs in New York, largely because some of the industry’s pioneering firms are based in the city. One of these market leaders is Medidata Solutions, a publicly traded company founded in 1999 that makes cloud-based systems to help drug companies manage clinical trials. Medidata now has a market value on Wall Street of \$3 billion. Also based in the city is consumer health provider WebMD, founded in 1996 and trading with a market value of \$2 billion. Medidata and WebMD each employ more

New York City has seen an explosion in digital health companies starting up and getting funded over the past five years. And digital health is reaping a larger share of funding than other segments of the technology industry.

than 1,500 people. ZocDoc and Everyday Health, another consumer information provider, each employ more than 500.¹⁴

All told, we have identified more than 80 digital health companies in New York City developing a wide range of technology products. They include consumer-facing tools like ZocDoc, as well as Noom, which provides weight-loss coaching and other lifestyle-based services, and Talkspace, which offers mental health counseling both online and on smartphone apps.

This sector also encompasses technology-driven health delivery systems, where New York is clearly a leading player. In addition to Oscar, the city is home to Sherpaa, a company that connects doctors with patients needing urgent answers to medical questions via a mobile app.

But the fastest growing segments of the city's digital health industry are business-to-business (B-to-B) and business-to-business-to-consumer (B-to-B-to-C) technologies. These companies build software and other tools designed to help health systems meet certain goals, such as making use of big data to improve efficiency, or to streamline interactions between health providers and patients. (See sidebar.)

The unparalleled size of the healthcare sector in the city creates not just a large and growing talent pool, but also a huge market of customers for technologies made by digital health companies. At the same time, one big demographic trend is driving the demand for digital health: the millennial

generation—some 1.6 million New Yorkers reared on technology—expect to have digital access to their health services. Mario Schlosser, co-founder and CEO of Oscar, told the audience at the 2016 Forbes Healthcare Summit in New York that when the company reached out to 18,000 of its members in 2016 to help them through a change of health plans, “the main mode of communication was text messaging and chatting in email basically, and messages through the apps we have.” Only 3 percent of phone calls made by Oscar were returned, he added, reflecting the necessity of digital communication for reaching younger consumers.

Most Well-Funded Digital Health Companies in NYC	
Company	Funding (millions)
Oscar	\$727.5
Flatiron Health	\$313
ZocDoc	\$225.52
Peloton Interactive	\$127.74
Phreesia	\$74.85
WorldOne	\$60
medCPU	\$54.2
Progyny	\$49.02
Quartet Health	\$47

Source: Data collected for CUF by CB Insights, December 2016

THE RISE OF B-TO-B HEALTH TECHNOLOGY

A look at the 20 top venture-funded digital health companies in New York City, as collected by CB Insights, tells an important story about where investors believe the future of this market lies. The vast majority of these leading companies derive most of their revenues by selling technology tools to health providers. In fact, only three—insurer Oscar, psychology-services provider Talkspace, and health coaching company Noom—offer any services that patients can buy directly from them. And just one relies entirely on direct-to-consumer sales: Peloton Interactive, which sells a fitness bike that live-streams cycling classes.¹⁵

New York City has clearly become a leader in B-to-B digital health. The buyers of these products adopt new technologies and either use them in-house to drive efficiencies within their operations, or they tailor them into apps or wearable devices that they can offer to patients to streamline the treatment process. They provide reliable revenue streams to digital health companies via software licensing fees or other recurring payment plans.

Truveris, for example offers a software-as-service platform to help employers and insurers analyze and manage drug costs. The company, founded in 2009, has raised more than \$29 million in venture funding. Phreesia, which was founded in 2005, offers digital tools to streamline patient check-in at doctors' offices. It has brought in nearly \$73 million in venture funding.¹⁶ ZocDoc's website for scheduling medical appointments is used by consumers, but its revenue source is the physicians who pay to be listed there.

One of the reasons B-to-B has come into favor in digital health is that some high-profile B-to-C startups have faltered. For example, Silicon Valley-based FitBit was heralded for its wearable fitness trackers, so much so that the company was able to go public at \$20 a share February of 2015, bringing in \$732 million. But sales growth slowed down, investors grew disappointed, and the stock was trading at less than \$7.40 by the end of 2016. "The hype over wearables is dying down," says Kimberly Ha, a senior director at FTI Consulting in New York.

At the same time, New York-based Medidata has shown the potential payoff of B-to-B digital health. The company's clinical trial management software brought in revenues of \$120 million in the third quarter of 2016 alone—a company record. Medidata has more than doubled its staff in the past five years to 500 in New York City, says president and cofounder Glen de Vries, demonstrating how far the company has come since it was started in a walk-up apartment in 1999. "When we started, people questioned why a software company focused on life sciences would be headquartered in New York," de Vries says. "Now no one questions that."

A HEALTHY START FOR NEW YORK'S DIGITAL HEALTH ECOSYSTEM

Fueled by demand from health providers seeking technologies to help them provide better care at lower costs, digital health is well positioned for explosive growth.

New York has become a major hub of digital health because the sector plays to the city's strengths. Positioned at the intersection of cutting-edge technology and the city's massive healthcare infrastructure, digital health companies find fertile ground in the city to plant roots and grow. That makes digital health similar to other technology subsectors that have excelled in New York due to the confluence of industries, including financial technology, advertising technology, and fashion technology.

What's more, the barriers to entry are lower in digital health than they are in other sectors of healthcare. Unlike life sciences companies, tech start-ups don't need laboratory space, which is both expensive and limited to parts of the city that are specially zoned to house labs. Nor do entrepreneurs with good ideas for digital health tools need large teams of engineers or scientists to make those plans come to life—they can, and often do, build prototypes at their kitchen tables and then pilot test their inventions at their neighborhood hospital.

That's how Bronwyn Spira, a trained physical therapist who had her own practice in New York, founded Force Therapeutics in 2010. Spira's idea was to create customized digital rehabilitation plans, complete with video guides, which orthopedic surgeons could give to their patients to help them comply with at-home exercise plans. She worked with her husband, TV producer Mark Liberman, to make a rehab video. Then she tested it on her own patients. Positive feedback encouraged her to leave her clinical practice, raise a small amount of money from friends and family, and start customizing rehab videos for other practices.

In 2011, 300 patients used the company's videos. That number ballooned to 25,000 in 2016.

Force pulled in \$4.7 million in venture capital in 2015 and 2016, which Spira believes speaks to the increasing enthusiasm for digital health among financiers in the city. "When we went out six years ago to raise money, health IT wasn't really a 'thing.' A lot of VCs were unsure about this space," Spira says. "Biotech had not done well, electronic health records were not well-received. They saw it as risky. But now I see them embracing it wholeheartedly."

Force has since expanded from three to 23 employees—a testament to the job opportunities this sector is creating. The company has hired people with diverse skills, including software engineers, video producers, editors, and marketing professionals, Spira says, and she expects the company to grow to 50 employees by mid-2017.

Indeed, several digital health companies in New York are creating a wide range of job opportunities and hiring at a fast pace. These jobs aren't just for engineers and software developers with years of experience or advanced degrees. Digital health companies are also adding hundreds of good jobs in nontechnical roles, including office managers, community specialists, sales and marketing, and recruitment.

Flatiron, for example, employed 30 people in May of 2014 and was up to 375 by the end of 2016. ZocDoc added 50 employees in 2015 alone. We have identified at least eight digital health companies with more than 50 employees as of 2016.

One of those companies, Fit4D, has 70 employees and contractors, and it is hiring so fast its staff should grow about 170 percent in 2017, says David Weingard, founder and CEO. Fit4D is a technology

Positioned at the intersection of cutting-edge technology and the city's massive healthcare infrastructure, digital health companies find fertile ground in the city to plant roots and grow.

platform built to connect diabetes patients with certified diabetes educators who can help them manage the disease. It's a tool that Fit4D sells to pharma companies, insurers, and providers. The company's revenue and volume of patients grew 400 percent from 2014 to 2015, Weingard says, and another 300 percent in 2016.

Nomad Health, which hooks up freelance clinicians with hospitals in need of short-term workers, expects to expand from 12 employees to 30 by the end of 2017. "As a young, growing company, we're going to need talent in all different areas," says CEO Alexi Nazem, a Weill Cornell physician who co-founded the company in 2015. Nomad raised a \$4 million Series A round in the summer of 2016. "We're hiring engineers, designers, product managers, salespeople, and a lot of people with healthcare expertise. So we're going to be growing in a well-rounded fashion."

The digital health sector in New York is supported by a variety of state and city organizations that are seeding a strong market for health information technology. For example, in 2006, the New York State Department of Health worked with local healthcare leaders to found the New York eHealth Collaborative (NYeC). It has been working with hospitals and physician practices to transition to electronic health records and to develop technology standards to make it easy for all players in the health industry to connect with each other electronically. NYeC (pronounced "nice") is partially supported by grants from the U.S. Department of Health and Human Services Office of the National Coordinator for Health Information Technology.

NYeC has hosted an annual digital health conference since 2011 and has filled the venue to capacity, attracting 500 attendees per year. In 2012, it teamed up with the Partnership Fund for New York City to launch the Digital Health Accelerator, an ongoing program that provides mentoring to six to eight start-up teams per year, as well as opportunities to pitch to venture capitalists. The inaugural class raised \$11.4 million in funding. And one graduate of that class, Avado—which developed cloud-based tools for managing patient relationships—was acquired by WebMD¹⁷.

Since then, alumni of the New York Digital Health Accelerator have racked up a string of successes, says Maria Gotsch. Cureatr, which offers technology that health providers can use to track patients across the continuum of care, has raised more than \$18 million in funding. MedCPU, a maker of software that digitizes and analyzes physicians' hand-written notes, has raised more than \$50 million. Remedy Systems, a care-coordination platform, was acquired by Remedy Partners in 2013.¹⁸

Each year, Gotsch surveys VCs to make sure the investment community is interested enough in digital health to keep the accelerator going, and the enthusiasm hasn't waned, she says. "We're seeing a trend of investors who were more traditional life-science investors and are now looking at digital health," she says. "So we're actually seeing an expansion of investors who are moving to digital health."

Among the venture capital firms that are boosting their investments in digital health are Alpha

Ventures, RRE Ventures, and New Leaf Venture Partners. Philippe Chambon, founder and managing partner at New Leaf, says his company has long held an interest in investing in biopharma companies, but that New York has proven to be a stronger source of digital health opportunities, partly because of the workforce the city tends to attract. “In New York you have a whole bunch of people in their 20s and early 30s that are coming out of the IT industry and are interested in healthcare,” he says. “It’s a much younger labor force than what you find in biopharma, and that makes it easier to grow early-stage investments in digital health in the city.”

New Leaf is a leading investor in New York companies Truveris, a provider of software to prescription benefits managers, and AiCure, which makes an app that drug makers can use during clinical trials to track patient adherence to medication regimens.

New York is home to two additional organizations that are dedicated to fostering digital health startups. Blueprint Health, which was founded in 2012, is an incubator that takes a 6 percent stake in each of the companies accepted into its program. Blueprint received 300 applications for nine spots in its inaugural class.¹⁹ It has run a total of nine incubator sessions, building a portfolio of 75 companies, including 44 from NYC, in which it has invested a total of \$4 million. At the end of each 12-week program, Blueprint hosts a demo day that attracts up to 500 venture capitalists.

Brad Weinberg, founder of Blueprint Health, says the New York startup scene for digital health is so strong he’s considering changing the incubator’s model so it can invest in mid-stage companies, as well. “Our focus has been entirely early stage. When you’re taking a set 6 percent for a small amount of capital, that’s going to preclude you from working with folks that have already raised a couple million bucks,” Weinberg says.

Then there’s StartUp Health, an accelerator that provides entrepreneurs with networking opportunities, pitch events, and coaching from executives in the field of digital health. Launched in 2011 by tech entrepreneurs Steven Krein and Unity Stoakes, the multi-year program is designed

to support founders at many different stages, offering everything from sessions with investors to tours of established digital health companies. “There are lots of short-term incubators,” Stoakes says. “This goes really through the entire life of the company, whether it ends up going public or getting acquired or even if it doesn’t make it. The idea is to support [founders] with resources and coaching, and access to customers and capital.”

StartUp Health has accepted 172 companies from around the world so far, many of which are based in New York, Stoakes says. “It’s exciting to see how much progress has been made in terms of a wave of innovators coming into the sector and lots of capital moving in,” he says of the New York digital health scene.

These programs can provide transformational connections for digital health entrepreneurs. “You get a lot of introductions, and some days we met up to 20 people back-to-back from all corners of healthcare and start-up life,” says Lawrence Monoson, founder of RxData, which participated in Blueprint Health in 2014. RxData is a repository of market information that pharmaceutical companies use to determine the best strategies for developing and pricing drugs that have a high likelihood of being covered by insurance companies. During Blueprint’s program, Monoson met the previous head of market access at Bristol-Myers Squibb. He became an early investor in RxData, Monoson says.

Several national organizations that are promoting innovation in digital health maintain a strong presence in New York City. For example, Health 2.0, a San Francisco organization that hosts conferences and other events for digital health developers, has attracted more than 5,000 members to its New York chapter since it started in 2008.²⁰ And Techstars, which operates general technology accelerators in more than a dozen cities around the world and provides seed funding for the companies it accepts, had turned out to be one of the biggest financial supporters of New York digital health startups. It has funded six such start-ups since 2012, according to CB Insights. Beneficiaries included Healthie, a maker of practice management software for dieticians, and MindMate,

New York City's many medical centers are looking to sample the growing selection of digital health tools, offering unparalleled opportunities for companies to test and validate the latest technology.

which makes apps to help patients with Alzheimer's and dementia.

Healthcare Innovation Technology Lab (HITLAB) is based in New York and sponsors events designed to bring digital health developers and users together. In February 2016, HITLAB partnered with the New York City Economic Development Corporation (NYCEDC) to launch the Digital Health Breakthrough Network, a program that provides funding, connections and logistical support to fledgling digital health companies that need to perform research studies to validate their new technologies.²¹

Medidata, a frequent host of Meetups and other networking events for digital health startups, was part of the committee that put together the Digital Health Breakthrough Network. "It's so important for the digital health world to figure out who to connect with," says Glen de Vries, president and co-founder of Medidata. "We're trying to create an environment where start-ups can get what they're doing validated in an actual scientific study, which is oftentimes a barrier to entrepreneurs getting their businesses off the ground."

Other resources include Grand Central Tech, a general tech accelerator that provides several floors of low-cost office space. Many digital health startups are based at Grand Central Tech, including Nomad and Cohero Health, which develops connected devices for patients with respiratory disorders such as asthma. Blueprint also operates a co-working space for digital health start-ups—a 12,000 square-foot SoHo loft that companies can rent for as little as \$125 per month.

It's just those types of supportive programs that are attracting digital health entrepreneurs to New York. Victoria Saucier founded her company, Bloomojo, in San Francisco but moved it to New York in 2016 and set up shop in Blueprint's co-working space. The company is developing an app to connect patients with providers of alternative medicine, such as naturopaths and chiropractors. "New York seems more focused on building a digital health hub than San Francisco is," she says.

CareDox, which moved from Palo Alto to New York in 2011, was an early participant in StartUp Health. "It gives me a great network of entrepreneurs to talk to and introductions to potential partners," says CareDox founder Hesky Kutscher. CareDox provides technology that allows K-12 school nurses to track health trends and communicate with parents, and the company has raised \$5.3 million in capital, some of which came from investors who discovered it through StartUp Health, Hesky says.²²

The city is also a hub of all-important "strategic investors," which are hospitals, pharmaceutical companies and other providers that invest in digital health start-ups with the intention of piloting those companies' technologies and perhaps acquiring them down the road. New York–Presbyterian Hospital and New Jersey–based Merck, for example, have venture funds investing in digital health. In 2013, Merck's Global Health Innovation Fund led a \$15 million Series B funding of New York–based Medivo, which markets data-analytics products to payers and makers of drugs and diagnostics.²³ It has also invested in MedCPU, most re-

cently participating in a \$35 million funding round in February 2016.²⁴

New York–Presbyterian launched its \$15 million investment fund just months after the hospital system introduced OnDemand, a wide-ranging effort to digitize everything from health records to emergency room consultations between doctors and patients. “One of the main driving factors for us looking at technology companies is to help us be able to expand medical services throughout the country,” offering second opinions, for example, to patients who do not live in New York, says Peter Fleischut, chief innovation officer at New York–Presbyterian. “We feel it’s really important to buy, partner, or invest in new and emerging technologies that we can deploy throughout the healthcare system.”

The city’s other medical centers are also looking for opportunities to sample the growing selection of digital health tools. Melissa Manice, co-founder and CEO of respiratory health technology maker Cohero Health, spent ten years doing clinical research in respiratory diseases at Mount Sinai before starting her company in 2013. She raised a \$9 million Series A round from venture capitalists that were based outside of New York, but the city offered unparalleled opportunities to validate the technology, she says. “We pilot tested our technology at Mount Sinai and expanded from there,” Manice says, working with Montefiore Medical Center and others to further test the products. Cohero now has 25 paying customers across the country covering 8,000 patients.

New York’s educational infrastructure is increasingly helping to support the digital health industry in the city. Columbia and NYU are among the universities with strong engineering curricula. And programs that specifically prepare students for careers in digital health are starting to emerge. Among the new programs is a dual masters degree in health tech offered by Cornell University and Israel’s Technion, which was launched in the fall of 2015.

The health tech masters’ degree is now based at Google’s New York offices, but it will be one of the flagship programs at Cornell’s new Roosevelt Island tech campus opening in 2017. “It’s very much

a technical degree, but what’s unique is that we combine that with entrepreneurial, project-based learning,” says Deborah Estrin, associate dean and professor of computer science at Cornell Tech. Groups of students work with local digital health companies—opportunities that often result in job offers right after graduation, she says.

Force Therapeutics has already worked with Cornell Tech’s students on projects, Spira says, and has hired some of its students as interns. “We’re so thrilled to be partnered with them and we’ll continue to work with them to hire their graduates, who are just world-class,” she says. Force has also worked with Columbia’s masters’ in public health program, as has New York–based Wellthie, which makes digital storefronts for insurance brokers.

Sally Poblete, who founded Wellthie in 2013, says she partnered with a team of public health graduate students at Columbia to research what small businesses are looking for when they buy health insurance. The quality of the students is a testament to New York’s “exceptional talent pool” in technology, data analytics, and healthcare, Poblete says. “It’s one of the main reasons we’re here.”

The diversity of New York’s patient population is another benefit to city-based digital health inventors, Poblete argues. When Wellthie started rolling out its first product, Poblete received feedback about how to address a multicultural market. She was able to build those suggestions into future iterations of the software, she says. “We designed the software to help people buy insurance, and our first customers told us we needed multicultural features, like Spanish translation,” she recalls. “It’s dialogue like that makes for a better product.” Wellthie is now available in 20 states, and Poblete expects she will need to double her staff of nine in 2017 to support the rollout.

GETTING TO NO. 1 IN DIGITAL HEALTH

Challenges to boosting New York’s digital health industry include limited funding and other support for early-stage technologies, competition for talent, and a fragmented digital health community

Virtually everyone working in New York’s digital health industry agrees that the city has all the necessary elements to be the No. 1 player: a strong health infrastructure, a critical mass of venture funding, and plenty of entrepreneurial tech talent. But the city faces some key challenges that could prevent it from claiming the top spot. It doesn’t have extensive, easily accessible resources to help inventors of digital health technologies prove the value of their tools in real-world settings. That can make the challenge of finding seed funding even more difficult. And then there are the challenges that are shared with other burgeoning sectors, such as the high cost of living and of office space. These are areas where the city and state government can offer support to this fast-growing sector.

Lack of early-stage capital

Venture capitalists poured \$5.95 billion into New York City-based start-ups in all industries in 2015—a 62 percent increase from the previous year—according to PricewaterhouseCoopers and the National Venture Capital Association’s Money-Tree report. But despite the increasing amount of venture funding available in the city, it is difficult for digital health entrepreneurs to raise money in the earliest stages of the start-up process.²⁵

Indeed, even as the amount of capital available in the city has increased, the proportion of that funding awarded to fledgling technologies has fallen precipitously. In 2016, only 40 percent of venture funding in digital health went toward seed rounds, versus 76 percent in 2012, according to CB Insights.²⁶

There are several challenges specific to healthcare that cause investors to shy away from early-

stage digital health start-ups, says Brian Cohen, chairman of New York Angels, a network of 100 investors who have devoted more than \$100 million in seed funding to start-ups. “I don’t see a broad desire to invest in the category, because it’s hard to point to an angel-backed digital health company that produced a great outcome,” Cohen says. It can take time to prove out any product related to health, Cohen says, so most start-ups are forced to raise many rounds of capital, which dilutes the value of the investment for early angels.

What’s more, many of the early digital health companies that did raise funding in the early days were selling B-to-C applications like wearable fitness trackers or mobile apps for managing health. With a few notable exceptions like FitBit, most of those products failed to catch on with consumers. That left angel investors with no choice but to ask the same tough question of every entrepreneur in the sector who they meet: “Is it interesting enough to scale and scalable enough for us to get a good exit?” Cohen says. Most of the time, he adds, entrepreneurs aren’t able to produce enough evidence that there’s a strong market and the answer ends up being “no.”

Some entrepreneurs are putting up their own seed funding or raising cash from friends and family so they can at least get a beta version of their product finished and ready for testing. That used to be enough to attract a first small round of venture capital—but not anymore. VCs will no longer invest in ideas. They are demanding proof that there are customers willing to pay for new technologies.

“For us, when we’re looking at a digital health investment, we want revenue,” says Les Funtleyder, healthcare portfolio manager at E Squared

In 2016, only 40 percent of venture funding in digital health went toward seed rounds, versus 76 percent in 2012.

Investing in NYC

Venture capital firms are increasing their investments in New York-based digital health companies.

\$101 million (2012)
vs
\$908 million (2016)

VC investments in NYC's digital health start-ups have increased 900 percent over the past five years.

Capital in New York. “If founders don’t come with revenue, we’re not interested. That’s because a lot of these ideas sound good on paper, but as a practical matter, we have to see market validation.”

A panel of four venture capitalists at the 2016 Digital Health Conference in New York echoed that sentiment, advising entrepreneurs not to approach them at all without solid proof of revenues and a believable plan for scaling up their business while maintaining a solid profit. “Traction is proof of principal,” said Jason Holden, senior vice president and head of corporate and business development for WebMD, which has invested in digital health startups. In other words, one complete beta test isn’t enough. Financiers want to see to see that the beta-tester has signed a long-term contract, and ideally, a few more clients have agreed to implement the technology, too.

But gaining that traction costs money, and that presents a real chicken-and-egg conundrum for many entrepreneurs. Victoria Saucier of Bloomjojo,

who was at the conference just months after moving her company to New York, admitted that attempting to attract venture capitalists was “painful.” She managed to pull together \$150,000 in seed funding, she says, but was hoping to find a strategic investor to help roll out her alternative-health website to a wide audience.

Broader concerns about the future healthcare environment make the search for capital that much more challenging. Despite the expectation that the drive for efficiency and quality in healthcare will continue, President Trump’s actions aimed at repealing the Affordable Care Act have caused a lot of healthcare organizations and financiers to put their plans on hold until there is more clarity about what the new administration will do. That could lower the amount of capital available to start-ups and the number of pilot tests that are being planned—at least temporarily. “Clearly the uncertainty around the ACA will have some effect in 2017,” says New Leaf’s Chambon. “We will be careful about making new investments until we get more clarity around what’s happening with the ACA.”

Difficulties getting to proof-of-concept

Compounding the lack of seed funding for digital health is another challenge that’s unique to the health industry: Sales cycles for hospitals and other health providers are often longer than they are for other consumers of technology. Even if a customer pilots a technology and likes it, it could take a year for a rollout across an entire health system to happen, Gotsch says.

“You may be able to raise small amounts of money to get started, but where things get tough for companies is signing on those paying customers,” Gotsch says. “You have to recognize that if you’re going to sell into that market, it’s a long

“In healthcare, pilot testing has ethical implications. People on the customer side of your digital health idea will be in a difficult position of having to decide if they want to be the first to use it.”

sales cycle, and you have to be smart about how you’re structuring your pilot, how you’re charging for it, and how you might get it done faster.”

That challenge is what prompted NYCEDC to introduce the Digital Health Breakthrough Network in February 2016. As part of that launch, it awarded a total of \$500,000 to 11 digital health start-up teams, so they could pilot their technologies in health facilities in the five boroughs. NYCEDC also introduced 170 tech companies to potential healthcare clients.²⁷

It’s a good start, says Medidata’s de Vries, but more needs to be done to help start-ups pilot their digital health innovations. That’s because it’s not just the long sales cycles that are an obstacle, he says. “In healthcare, pilot testing has ethical implications. Whether or not your technology works, people’s lives are involved,” de Vries says. “So a lot of people on the customer side of your digital health idea will be in a difficult position of having to decide if they want to be the first to use it. This is a challenge that is specific to digital health. And I agree 100 percent that more needs to be done to help companies validate their technologies.”

The digital health sector hasn’t enjoyed the same level of support from the city as the biopharma sector has. On December 13, 2016, Mayor Bill de Blasio unveiled LifeSci NYC, a \$500 million effort to create 16,000 well-paying jobs in the city. The plan includes a \$100 million life sciences campus for biopharma entrepreneurs, \$20 million in seed funding for start-ups, \$300 million in tax incentives, as well as internships, incubators, and other programs designed to foster employ-

ment opportunities in that sector.²⁸ A city-led initiative of that scope has not been proposed for digital health.

Fierce competition for technology talent and affordable office space

Start-ups in digital health are finding it hard to compete for tech talent against bigger companies like Google and Facebook. Even if they offer intangible compensation, like stock options, and a stimulating company culture, they often lose talent to bigger companies that can pay higher salaries and offer more benefits.

Andrew Colbert, managing director of healthcare investment banking firm Ziegler, says part of the challenge is that the millennial generation has different priorities than their parents did, and that places new demands on employers. “The millennial generation seems to be different when it comes to long-term motivation,” Colbert says. “They are more focused on quality of life and the certainty of the income stream. They don’t view a career as an investment, where working hard will pay off down the road. They want a higher salary straight out of school.”

When start-ups are just scraping by as they try to get pilot tests up and running, they can struggle to offer competitive pay packages. “To find people who are not just 9-to-5 workers but have the hunger to build a business takes a while,” says Fit4D’s Weingard. Add to that the high cost of living in New York, he says, and “we’re expected to pay more. As a start-up, that’s hard.”

That sentiment is shared by Andrei Zimiles, co-

founder and CEO of Doctor.com, which automates marketing services for physician practices. “We’ve had discussions here about relocating our sales team or customer-service team outside of Manhattan, given that salaries have to be higher because it’s an expensive place to live and work,” Zimiles says. The company hasn’t resorted to that yet, but Zimiles admits it can be hard to persuade candidates to join a scrappy digital-health start-up. “It is very competitive. It puts pressure on us. We try to pay commensurate with the market, but to be a competitive employer in New York, you also have to pay 100 percent dental, medical, vision, and offer stock options.”

And despite the availability of co-working facilities like Blueprint and Grand Central, many startups struggle to find affordable office space, especially after they outgrow places that were meant for two- and three-person startups. As of the end 2016, Manhattan was neck-in-neck with the priciest city in the nation when it comes to office rent, San Francisco. The rental cost per square foot was \$73.01 in Manhattan, vs. \$73.65 in San Francisco, according to real estate investment management firm JLL.²⁹ Even Brooklyn is starting to get expensive: The average asking rent for a sampling of Brooklyn office spaces grew nearly 5 percent between the second and third quarters of 2016 to \$36.11, according to Colliers International Research.³⁰

Although the high cost of renting office space is not unique to digital health, it is causing some entrepreneurs in the space to consider moving elsewhere. “Rent is just astronomical here,” says Force Therapeutics’ Spira, who moved her company into a 19th Street loft as it started to grow. “We would very much like to stay in New York, but we may need a bigger space, and that’s becoming more and more difficult.”

A fragmented digital health community

Although there are several incubators and accelerators devoted to digital health in New York, efforts to foster the industry are fragmented. That makes it challenging for entrepreneurs in the sector to network with each other, and more importantly, to meet potential customers for their technologies.

This stands in stark contrast to other technology subsectors. New York City’s Fintech Meetup group, for example, has more than 7,000 members and events at least once a month that draw up to 300 attendees. The city’s biotechnology industry has its own trade group, New YorkBIO, which brings together 250 companies, offering everything from a CEO breakfast club that meets several times a year to workshops on topics such as fundraising and laboratory computing skills.

Individual organizations like StartUp Health sponsor their own events, but because there is no single forum where professionals in the digital health community in New York can go to find out about them, those events are often poorly attended, many entrepreneurs in the field report. “The tech community in the city is very siloed,” StartUp Health’s Stoakes says. Even Health 2.0 and its 5,000 members aren’t all that active: The group organizes about one event every two months, generally drawing around 50 attendees.

While the advertising technology and financial technology communities have formed close-knit and active consortia to support startups, digital health has remained highly fragmented, he says. “You’ve got Google over here and Cornell over there and New York-Presbyterian up there, and there’s no collaboration. It’s been frustrating for us that there isn’t a consortium for digital health in the city.”

That can make it difficult for digital health startups to make vital connections. Fit4D’s diabetes technology is a natural for the NYC health market, says founder Weingard, who himself suffers from the disease. But he has struggled to find easy ways to network with potentially valuable connections. “I can’t even begin to figure out who to talk to in New York City about partnerships or getting the talent we need,” Weingard says. “For a fast-growing company time is everything. So to invest a half a day for a conference is hard. We need to find a way to get the right people together who are actually empowered and committed to make introductions that are meaningful.”

Adds CareDox’s Kutscher, “More Meetups and other programs with unique speakers that create [networking] opportunities would be helpful.”

RECOMMENDATIONS

Five Ways to Support the Digital Health Sector

Digital health may not eclipse other segments of New York City’s booming tech scene, such as advertising and finance. But the sector has already created thousands of jobs and is poised to become a much bigger source of employment in the future. The following recommendations will help New York strengthen its position in this growing industry.

Create a digital health ecosystem.

New York City should establish a consortium of companies, accelerators, and other organizations that are dedicated to digital health, bringing together what is now a fragmented community of professionals that are trying to foster the growth of this industry. The city could contribute to this effort by sponsoring networking events dedicated to digital health, as well as subsidized courses to help entrepreneurs navigate challenges such as raising venture capital and navigating health regulatory systems.

The Mayor’s Office of Technology and Innovation is working on a number of initiatives to strengthen the overall tech community in the city, including Neighborhoods.NYC, which is aimed at establishing online hubs for community groups. But these initiatives do not focus on any specific subgroups within the technology industry. The effort to boost the digital health ecosystem could be strengthened by appointing a director of digital health innovation either in the Office of Technology or the city’s Department of Health. This person could liaison with the New York State Department of Health’s Office of Health Information Technology Transformation, which was established in 2007 to coordinate health IT initiatives across the state’s health providers.

Part of the effort to create a digital health ecosystem should include publicizing the success of the strong industry that’s already well established. Whether it be ad campaigns touting the digital

health companies that started in New York City—and found success here—or Mayor de Blasio simply showing up at the city’s next digital health conference to talk about the importance of the sector, all of that will shine light on this emerging sector and foster a sense of unity. “We have to celebrate its success,” says Maria Gottsch of the Partnership Fund for New York City. “That will help fuel private investments.”

Develop more opportunities for early-stage companies to pilot their technologies.

New York City should build on the NYCEDC’s Digital Health Breakthrough Network by offering more funding for pilot testing of new technologies, so start-ups can attract the VC funding they need to get to the next stage of development. The city and state should also expand efforts to match government-run healthcare programs, such as Medicaid, with beta versions of new digital tools. Likewise, the NYC Health and Hospitals Corporation should be tapped to help implement pilot testing of early-stage technologies.

Private healthcare providers should also pitch in to foster early technologies. One promising model launched in December 2016 in Philadelphia. Safeguard Scientifics, Independence Health Group and the Ben Franklin Technology Partners of Southeastern Pennsylvania worked together to set up a \$6 million fund to support Philadelphia-based digital health startups. Similar partnerships should be encouraged in New York.³¹

Incentivize healthcare providers to adopt new technology.

The government should incentivize hospitals, insurance companies, and other health providers to invest in digital tools. For example, it could offer tax credits or grants to companies that pilot a certain number of homegrown technologies per year.

The city should also consider establishing a website where New York-based technology provid-

ers can list their planned pilots and connect with partners to test their technologies. That will enable health facilities to gain a better understanding of what emerging tools are available for testing, further accelerating match-ups between digital health innovators and potential customers.

Establish digital health campuses.

Expand the availability of shared workspaces for digital health companies that would provide affordable office space and the opportunity to network with others in the industry. This would encourage startups to go forward with hiring plans that they may otherwise put on hold due to a lack of space and financial resources.

One way to accomplish this would be to offer incentives for developers to preserve and grow Class B and C office space, which is highly sought after by technology startups because of its relatively low rental rates. In 2014, the NYCEDC predicted that the supply of Class B and C office space would outstrip the demand by 2018. Between 2000 and 2012, Manhattan lost 6.2 million square feet of B and C offices because developers were purchasing those buildings and converting them primarily to apartments and hotels, according to NYCEDC.³² WeWork, which specializes in turning Class B properties into shared workspaces popular among the tech crowd, does have 31 locations in Manhattan, as well as four in Brooklyn and one in Queens. But still more could be done to make affordable space more accessible.

Grow a talent pool of tech workers dedicated to improving healthcare.

The city should work with local universities and companies to train engineering and computer programming students for careers in digital health, and to direct graduates toward those jobs. Universities such as Cornell and Columbia could establish career days dedicated to digital health, which would allow entrepreneurs in the sector to meet students who may be interested in working with them in the future.

Training for careers in digital health could start even earlier, with programs in the New York City school system designed to groom tech-minded

students who might want to apply their talents to improving the healthcare system. In 2012, the city worked with Union Square Ventures' Fred Wilson to start up the Software Engineering Academy, a high school that trains students for careers in that field.³³ That and other private institutions might also be good hosts for classes and training programs dedicated to technology and healthcare.

Another venue for digital health training could be the Tech Talent Pipeline, established in 2014 by Mayor de Blasio. The \$10 million public-private partnership is devoted to training New Yorkers for careers in technology, and its advisory board includes Oliver Kharraz, co-founder and president of ZocDoc.³⁴ Tech Talent Pipeline currently offers nine different training programs, some of which are held in partnership with Queens College, Brooklyn Tech, and City University of New York, but none are focused specifically on digital health. Integrating digital health content into these training programs would help grow the talent pool in New York.

MIDDLE CLASS JOBS PROJECT

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