



# Silicon Alley: A Framework for New York City's Entrepreneurship Ecosystem and its Public Policy Considerations

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## Executive summary

In the last decade, there has been no dearth of literature seeking to define “innovation.” Literature spans the globe, outlining characteristics that include multi-sector stakeholder engagement, horizontal and lateral collaboration, and the use of different technologies. Yet, in defining and distinguishing innovation ecosystems, experts and actors are often in dialogue to the standard set by Silicon Valley, which is not a sufficiently comprehensive lens through which to look at the innovation ecosystems emerging within urban areas as these are rapidly evolving and changing. Furthermore, it is pertinent to assess not only the use of different technologies but also its disruptive role in the economy, workforce, and skills, which have a large impact in shaping entrepreneurship ecosystems.

In each quarter of 2017, New York City surpassed San Francisco in venture capital funding. Moreover, where seed and Series A funding increased across the board, an uptick in Series C funding in New York shows the pervasiveness and maturity of New York as a true hub of entrepreneurship. With more people moving to cities than ever before, it is time to look at what makes cities innovation districts distinct from Silicon Valley and how cities can foster entrepreneurship.<sup>1</sup>

As cities like New York emerge as hubs of innovation resolved in using technology and engaging non-governmental actors, this white paper pursues an analysis of the actors in the urban innovation ecosystem to pinpoint what makes these ecosystems distinct from their suburban counterparts. New York is unique in the way it describes innovation and entrepreneurs, pursuing an open and loose definition, enabling it to engage stakeholders and actors in a way that other places cannot. By bringing multiple perspectives and stakeholders into the fold, New York is able to pursue entrepreneurship hand in hand with civic duties, fostering an environment that centers public and social good in many cases. Actors then blur the boundaries between being entrepreneurs, public servants, and civil society members.

This paper explores the urban dynamics of innovation ecosystems, focusing on the role of New York in fostering and orchestrating them. Section I analyzes the disruptive role of emerging technologies in society, focusing on workforce and skills. Section II defines urban innovation ecosystems, assesses the forces that are propelling this new spatial geography of innovation, and provides insights into redefining the new dynamics and while arguing that the urban innovation

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ecosystem remains distinct from traditional “innovation ecosystems.” Section III provides a case study of New York’s innovation ecosystem and lists the multiple assets of the city as an innovation district. Finally, it puts forward policy considerations for a diverse set of stakeholders, including policy makers, technology companies, and civil society on how leveraging technology and entrepreneurship ecosystems can catalyze innovation; and illustrates policy actions applied to a number of challenges.

## I. Background: Emerging Technologies and Disruptive Innovation

Technology is moving fast and in different directions, which makes it challenging for public policy to track and adapt. Yet technology also drives economic growth and unleashes disruptive change.<sup>2</sup> Disruptive technologies change the way people live and work, enable new business models, and provide new forms of innovation ecosystems opening the door to new actors.<sup>3</sup> These technologies will have a large impact changing the way businesses organize themselves, how jobs are defined, and how technology is used to interact with the world. It is incumbent upon public policy to fully examine the implications of emerging technology and its impacts.

From *robots*, augmented reality, algorithms, blockchain, machine-to-machine communications, 3-D printing, blockchain to autonomous vehicles provide help and support to people with a scope of different tasks. Robots are expanding rapidly in the developed world. The total rose to around 1.5 million in 2014 and is projected to increase to about 1.9 million in 2017.<sup>4</sup> Tech experts predict that by 2030, thirteen core jobs will be automated including insurance-related roles, customer service and most warehouse and manufacturing jobs.<sup>5</sup> There are *computerized algorithms* that are able to take the place of human transactions.<sup>6</sup> An example is in the stock exchanges, where high-frequency trading by machines has replaced human decision-making by spotting trading inefficiencies or market differentials at a very small scale and executing trades that make money for people.<sup>7</sup> Further, *artificial intelligence (AI)* incorporates critical reasoning and judgement into response decisions. It is defined as

“machines that respond to stimulation consistent with traditional responses from humans, given the human capacity for contemplation, judgement and intention.”<sup>8</sup> AI is being incorporated in a variety of different areas, such as finance, transportation, aviation, and telecommunications. It is being used to replace humans in a wide range of areas, such as space exploration, advanced manufacturing, transportation, energy development, and health care.<sup>9</sup> *Augmented reality* is bringing 3-D technologies and graphic displays. For instance, Facebook’s Oculus, Google’s Magic Leap, and Microsoft’s HoloLens represent consumer examples of such development.<sup>10</sup> These enable people to supplement the usual senses with computer-generated graphics, video, sounds, or geo-location information, and these images can be mapped to the physical world and made interactive for the user.<sup>11</sup> *Machine-to-machine communications and remote monitoring sensors* remove humans from the equation and substitute automated processes and are often used in the health care area.<sup>12</sup> *3-D printing* is a method for software to send design plans to specialty printers and have those devices make identical copies of those products. This technology is used in the manufacturing area for things composed of a single material, which has transformed product manufacturing and delivery, and changed global supply chains.<sup>13</sup> *Unmanned vehicles and autonomous drones* are creating new markets for machines and performing functions that used to require human intervention. One of the most recent examples is driverless cars. Google has driven its cars almost 500,000 miles and found an extraordinary level of performance.<sup>14</sup> In India, unmanned drones are being used by authorities for crowd control. Whenever there is extensive violence, police deploy drones armed with pepper spray and cameras and use to disperse crowds.<sup>15</sup>

### 1.1. The Future of Work

Technological advances are also enabling a growing number of tasks traditionally carried out by humans to become automated. As reported by OECD (2017), while initially such automation occurred mainly in routine tasks (e.g., basic paralegal work and reporting, bookkeeping, etc.),<sup>16</sup> with the rise of Big Data, AI, the Internet of Things (IoT) and the growing computing power, non-routine tasks are also increasingly likely to become automated.<sup>17</sup>

Automation enhances efficiency by decreasing errors and improving speed, and has historically increased economic growth and prosperity. Based on the scenario modeling in the report “A Future That Works: Automation, Employment, and Productivity” from McKinsey & Company, it could raise productivity growth globally by 0.8 percent to 1.4 percent annually. The report recommends assessing the impact of automation at an individual level rather than at the overall occupation level.<sup>18</sup>

It has been estimated that by 2020, robotic automation and artificial intelligence will be responsible for a net loss of more than 5 million jobs across 15 developed nations.<sup>19</sup> The “Digital Revolution” is described by the World Economic Forum as a fusion of technologies blurring the lines between the physical, digital, and biological spheres.<sup>20</sup> The rapid technological development is disrupting the global economy with artificial intelligence, widening skills gaps, and rising independent workers.<sup>21</sup> A recent McKinsey report estimates that 50 percent of today’s jobs are susceptible to artificial intelligence capabilities that are already in the market.<sup>22</sup> The rapid advancements in robotics, artificial intelligence, and machine learning are leading to a new age of automation, as machines match or outperform human performance a range of work activities, including those requiring cognitive capabilities.

In recent decades, the spread of digital technology into business and workplace has been reshaping the U.S. economy and workforce.<sup>23</sup> Digitalization has expanded the potential of individuals, companies, and society while also contributing to a number of exasperating inequalities.<sup>24</sup> The Brookings Institution’s “Digitalization and the American Workforce” report presents a detailed analysis of changes in the digital content of 545 occupations covering 90 percent of the U.S. workforce in all industries since 2001.<sup>25</sup> The report describes how between 2002 and 2016, the shares of U.S. jobs that require substantial digital knowledge increased rapidly due to the changes in the digital content to existing occupations, which varies widely among professions and across industries.<sup>26</sup>

According to the World Bank report “Boosting Tech Innovation Ecosystems in Cities” (2015), the rise of technology startups in cities—specifically information and communications technology (ICT)—is leading to

new employment and economic growth with the creation of new employment and business categories.<sup>27</sup> For instance, the technology sector in New York has increased jobs faster than in other sectors, becoming a source of direct and indirect employment,<sup>28</sup> and accounts for 12 percent of city tax revenue (HR & A Advisors 2014).<sup>29</sup> From 2006 to 2013, the technology innovation ecosystem in New York created over 500,000 new jobs.<sup>30</sup> The positive correlation between growth in the ICT industry of a city and job creation has been noticed in other cities, such as Barcelona and Bangkok.<sup>31</sup>

The concentration of these disruptive technologies in cities no doubt has an immense impact on entrepreneurial ecosystems, and urban entrepreneurial impacts more specifically. What is this impact and how do they differ from the Silicon Valley context? Moreover, when looking at the policy considerations for New York City, it becomes clear that the increasing prominence of these technologies across industries like fashion, finance, advertising and journalism which to a large extent are globally headquartered in New York, require centering in any analysis.

## 2. Defining Urban Innovation: Framework

### 2.1. New Urban Dynamics of Innovation

The emergence of suburban research parks like Silicon Valley in the San Francisco Bay area, Research Triangle Park in Raleigh-Durham, or Boston’s technology corridor on Route 128 in the second half of the last century, called into question the historical predominance of cities as major innovation and entrepreneurship hubs. These clusters were built as spatially isolated innovation ecosystems, mirroring residential and commercial suburb patterns. Similarly, reflecting a tightly controlled research culture and secretive patenting policies, they were “generally closed innovation systems in which firms and scientists carefully guarded their ideas, and where interactions between them were limited.”<sup>32</sup> AnnaLee Saxenian noted in her classic study of Silicon Valley that it has more independent and small firms than Boston’s Route 128.<sup>33</sup> In 1960, Benjamin Chinitz argued that New York’s entrepreneurship, in comparison to other East Coast cities such as Pittsburgh, was

dependent on small, independent suppliers in contrast to more vertically integrated, large steel companies.<sup>34</sup>

Several studies and reports have documented a recent resurgence of innovation in cities that is giving shape to new urban innovation ecosystems, fostered by an economy increasingly oriented towards *open innovation and cross-industry collaboration*,<sup>35</sup> *amplified value of density and proximity in knowledge intensive sectors*,<sup>36</sup> as well as *change in location preferences*<sup>37</sup> of people choosing to live in more walkable, amenity-rich, and mixed-use neighborhoods near the city core.

There is an interplay between disruptive technologies, urbanization, and entrepreneurship. The U.S. economy has become increasingly reliant on knowledge and innovation. Today, approximately 20 percent of all U.S. jobs are in science, technology, engineering, or math (STEM) related occupations—a share that has doubled since the Industrial Revolution.<sup>38</sup> An economy increasingly oriented toward open innovation is changing both where firms locate and how buildings and larger districts—from research labs to collaborative spaces to mixed-use developments—are designed.<sup>39</sup> As the knowledge and technology driven economy grows, it is also becoming increasingly characterized by what Henry Chesbrough and others call “open innovation.”<sup>40</sup> This process is described by Chesbrough as “a process whereby companies and firms more openly generate new ideas and bring them to market by nimbly drawing on both internal and external sources.”<sup>41</sup> Under this new paradigm, internal ideas can be commercialized by external start-up companies and entrepreneurs. Chesbrough observes, “the boundary between a firm and its surrounding environment is more porous, enabling innovation to move easily between the two.”<sup>42</sup>

The spatial dynamics of innovation present in urban centers and suburbs, measured by the location of new patents and its characteristics, reveal the differences between both types of ecosystems. While suburban areas still represent a considerable share of the knowledge economy, accounting for more than 40 percent of the overall patenting activity, dense cities disproportionately generate innovations with a higher degree of “unconventionality,” born out of these interpersonal social connections and intellectual exchanges that Sassen explores, and more tangibly, the patents based

on an atypical combination of knowledge and technology.<sup>43</sup> This phenomenon “stems from the fact that density is crucial in facilitating learning across distant fields, where ideas are more efficiently transmitted through informal channels.”<sup>44</sup> Unconventional innovations are more likely to be patented from university labs, small companies, or independent researchers clustered in dense urban centers rather than from large traditional companies in their suburban research campuses. Also, due to its revolutionary nature, these innovations are crucial for creating new products and have a more disruptive economic impact in the market. These results are in line with observations that point to a new pattern in the location of high-tech industry, “in which smaller startups are incubated in cities while established companies that require bigger floor plans and larger campuses remain in the suburbs where land is cheaper.”<sup>45</sup>

## 2.2. Redefining Urban Innovation Ecosystems

What precisely is an “innovation ecosystem?” As defined by the OECD, an innovation ecosystem is “the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations.”<sup>46</sup> The boundaries of what constitutes an innovation ecosystem are reliant on the stakeholders within it, which includes both the economic actors as well as multi-sector institutions including industry, governance institutions, and culture itself.<sup>47</sup> Existing literature compounds on this framework, built on top of the biological ecosystem paradigm, referring to the community of “interacted organisms.”<sup>48</sup> Yet where definitions of innovation ecosystems fall short in defining what we see in urban areas, specifically in New York, is not what innovation is but who is included or a participant in innovation.<sup>49</sup>

An ecosystem can also be conceived as two distinct and traditionally separated economies: the knowledge sector, driven by fundamental and applied research and development; and the commercial sector, driven by the market.<sup>50</sup> An innovation ecosystem is healthy when the public and private resources invested in the knowledge economy generate profit increases in the commercial economy, induced by new innovations introduced to



the market. At that point, the innovation ecosystem reaches a “balanced equilibrium” resulting from the interaction of its different actors and entities. This ecosystem approach to innovation has also been fostered by the fact that companies, and increasingly universities and other institutions, are starting to adopt open innovation strategies to challenge existing organizational structures —“a distributed innovation process based on purposively managed knowledge flows across organizational boundaries.”<sup>51</sup> There is a two-way relationship involved in open innovation, from borrowing ideas from the environment and other organizations to sharing your own and making them commercial to other actors in the ecosystem.<sup>52</sup>

These strategies enable new ideas and strategies to move and be adopted within organizations and then later between an organization and its surrounding environment, tapping on external knowledge sources to generate new innovations, or developing internal ideas through external paths for commercialization. Applying these open innovation practices broadly and systematically in an innovation ecosystem would therefore increase the flow of ideas and resources between different participants, and across the knowledge and commercial economies, multiplying innovation and allowing the whole ecosystem to thrive. The increased reliance on open innovation strategies has been an important driver and outcome of the recent emergence of innovation ecosystems in cities.<sup>53</sup> *This paper looks at what this innovation ecosystem allows for and facilitates within cities and amongst stakeholders, and describes this under the term of “entrepreneurship” in order to explore how cities, specifically New York, are uniquely qualified as an urban innovation ecosystem to foster and promote entrepreneurship both in the public and private sector.*

In this context, entrepreneurship—understood as “the pursuit of the generation of value, through the creation or expansion of economic activity, by identifying and exploiting new products, processes or markets”<sup>54</sup>—is a key component of an innovation ecosystem. While research and development focus on generating new ideas, entrepreneurs identify business opportunities to bring these ideas to market, through the creation of new startups and business ventures. This is seen in literature surrounding the innovation landscape in Silicon Valley and spaces trying to recreate those models, wherein the ideas and players are strictly in the private

realm.<sup>55</sup> Yet, within an urban innovation ecosystem, the co-mingling of multi-sector stakeholders persists with a bigger role for public players and public problems. Entrepreneurship has a broadened role in bridging the knowledge and commercial economies in innovation ecosystems, catalyzing the innovation process for both the public and private sectors.

Entrepreneurship is part and parcel of the innovation ecosystem and is only getting further solidified. Take, for instance, the increasing number of educational programs and courses dedicated to equipping New Yorkers with the skills they need to participate in the new innovation economy. NYU Stern describes these skills as the “tools and concepts necessary for careers as entrepreneurs or as investors in entrepreneurial ventures”<sup>56</sup> while newcomers like Cornell Tech and Grand Central Tech, seek to “provide critical resources for transformational startups to achieve scale.”<sup>57</sup> Private sector investment into startups coupled with academic and educational institutions investing in future entrepreneurial activities seeking to proliferate innovation only bolsters New York’s role as an innovation ecosystem and furthers its projection as a key player in entrepreneurship nationally and internationally. Organizations like NYCx a public agency dedicated to building and shaping the city’s innovation future and the futurists hired to explore technology in the public sphere are working in tandem on projecting the city’s role in the next few years and decades. The multiplicity of actors working side by side towards a shared vision take this broadened definition and catalyze the innovation process, but also bake it into the city’s culture and solidify the city’s innovation ecosystem. NYCx represents a new civic platform that aims to support tech startups and New Yorkers towards creating digital solutions to common problems.<sup>58</sup> Its challenge program invites entrepreneurs, technologists and tech professionals to participate in open competitions. Each challenge aims to solve a specific problem of urban life and move New York towards realizing Mayor de Blasio’s One NYC plan: “growth, equity, sustainability, and resilience.”<sup>59</sup>

World Bank also recognizes that cities are emerging as the main centers for technological innovation and has delivered a report on urban innovation ecosystems, identifying relationship-building or “networking” within dense urban environments as a critical asset.<sup>60</sup> The World Bank defines four categories of

assets that result from the agglomeration effects within a city, which provide the basic components to develop and grow an urban innovation ecosystem: *people or human capital, physical infrastructure, economic assets, and the enabling environment provided by government and its policies*.<sup>61</sup> It can be argued that these assets are important for any innovation ecosystem, but the World Bank paper also highlights a fifth category that operates as a second layer and is central to urban innovation ecosystems: *networking assets*.<sup>62</sup> This category includes meetups; bootcamps and skill training programs; hackathons and innovation challenges; co-working and collaboration spaces; accelerators; incubators; and networks of mentors. Networking assets are the connectors that support the social relationships of the ecosystem and have the potential to boost the ecosystem's growth by increasing the collisions and spillovers that result from social interactions between participants. According to the report, on challenges, co-working and collaboration connections, networking assets would play a critical role in the growth and success of urban technology innovation ecosystems.<sup>63</sup>

Urban innovation ecosystems are then distinct from Silicon Valley because of a few key themes. Examining the current literature and through stakeholder analysis, this paper primarily identifies core aspects which define urban innovation and are relevant for understanding New York's entrepreneurship ecosystem.<sup>64</sup>

1) *Multi-Stakeholder Actors*, 2) *Interconnection*, 3) *Geographic Advantage*, 4) *Access to finance*.

### 1) Multi-Stakeholder Actors

The research paper "Components of Innovation Ecosystems: A Cross-Country Study" by Mercan and Göktaş' centers the involvement of multi-sector stakeholders as paramount to an innovation ecosystem. The study argues that certain areas are specifically advantaged in acting as innovators because the geographic clustering of interconnected firms, suppliers, and institutions in a particular industry drives collaboration and increased innovation output. Yet an industry-centered view falls short too. Mercan and Göktaş' focus on a primary dichotomy between developed and undeveloped but do not extend their analysis between the rural and urban, a similarly geographically diverse paradigm. This paradigm falls short in analyzing the differences and distinct characteristics within each of

the developed or undeveloped siloes. It is important to know that technology does not come up here as a driver of innovation; rather, technology is simply one tool in the box that innovation actors leverage.<sup>65</sup>

### 2) Interconnection

"Interconnection" is another trope that emerges in the study of "innovation ecosystems." Saskia Sassen, in her paper *Cities in Today's Global Age*, comes close to exploring the distinct nature of cities that we can leverage to come closer to defining "urban innovation ecosystems" in relation to Silicon Valley or more traditional or suburban "innovation ecosystems." Sassen tracks the growth of cities and argues that their new economic preponderance is due to "the intensity in the organization of the economy," which enables it to deal more tangibly with and work with higher magnitude of profits, incomes, and complex transactions.<sup>66</sup> A recent case in St. Louis illustrates how interconnection among different stakeholders plays a crucial role in the evolution of the ecosystem by—among others—connecting entrepreneurs in order to enhance learning between entrepreneurs; communicating and collaborating with other entrepreneurial support organizations for readjustment of the local ecosystem; and supporting organizations to recruit staff with entrepreneurial experience.<sup>67</sup>

### 3) Geographic Advantage

Several scholars have identified that costs for entrepreneurs are critical. There is strong positive correlation between labor and intensity.<sup>68</sup> Ed Glaeser and William Kerr found that an abundance of independent suppliers was one of the best predictors of new establishment formation for manufacturing start-ups.<sup>69</sup> Economic organization as a factor that enables cities to deal with more complex issues is coupled with the idea of geographic advantage that Mercan and Göktaş' also touch upon. For example, the proximity of like-minded institutions is crucial. In New York this might include Civic Hall, Silicon Harlem, WeWork, The Wing, and major research universities including Columbia, Cornell Tech, CUNY, NYU, and others, that provide the intangible benefits that distinguish urban innovation ecosystems from their suburban counterparts. These intangible benefits include collaboration, human capital, and the ideas that Sassen

call the “social infrastructure” that undergirds urban innovation and gives actors here an edge over suburban innovation arenas where remote working thrives yet this co-mingling is made difficult because of distance between actors and institutions.<sup>70</sup>

#### 4) Access to Finance

The location of venture capital investments in the last years shows that innovation and entrepreneurship is shifting back to urban centers: San Francisco has become the world’s leading center for venture capital investment and startup activity, even surpassing Silicon Valley. Likewise, New York City has shifted from being an exporter of venture capital, with almost no local venture investment in the 1980s, to attracting more than \$7 billion in 2016,<sup>71</sup> with consistently increasing seed investment. According to the City’s Comptroller’s office, the city’s share of the global venture capital pie also grew from 4.58 in 2008 to 6.01 in 2017 and has grown by 256 percent when looking at the number of venture capital deals commensurate with global venture capital growth.<sup>72</sup> This growth is in the face of a relative decline in venture capital in the U.S., according to the Center for American Entrepreneurship, where the U.S. share of venture capital activity has declined from 95 percent globally to over 50 percent now.<sup>73</sup>

In both cities, and others like Boston and Los Angeles, high tech development, entrepreneurial activity, and venture capital investment are increasingly concentrating in downtown areas and mixed-use walkable suburbs. These empirical observations show that “a new, more urban geography of venture capital and high-tech startups is clearly emerging,”<sup>74</sup> suggesting the “widespread movement of industry and people to the suburbs in the middle of the last century were historical aberrations, not the permanent new paradigm that many took it to be.”<sup>75</sup>

Today, just the top five metropolitan areas—San Francisco, San Jose, New York, Boston, and Los Angeles—account for more than 70 percent of venture capital investment across the United States.<sup>76</sup> Forty metro regions, such as the Boston-Washington-New York corridor, account for roughly two-thirds of the world’s economic output and more than 85 percent of its innovation, while housing only 18 percent of its population.<sup>77</sup> This in part reflects the repopulation of cities

after their abandonment and declining economic function in the 1960s and the 1970s. Texas alone is home to four of five of the fastest growing cities in America.<sup>78</sup>

### 3. New York’s Innovation Ecosystem

#### 3.1. Case Study

New York’s innovation ecosystem has experienced an extraordinary growth in the last decades, fueled by its thriving tech sector. It is now recognized as the largest truly urban center for technological innovation and the second tech hub in the world after Silicon Valley.<sup>79</sup> This case study primarily focuses on the abovementioned core aspects which define urban innovation and are relevant for understanding New York’s entrepreneurship ecosystem:<sup>80</sup> *Multi-Stakeholder Actors*, *Interconnection*, *Geographic Advantage*, and *Access to Finance*.

#### *Multi-Stakeholders Actors and Interconnection*

New York City’s urban ecosystem benefits from a diverse range of multi-stakeholders that create and promote innovation and entrepreneurship which includes a) government, b) private Sector c) investors and d) New York start-ups. Multi-stakeholders can provide public-private opportunity which can help action where one sector alone would not be as effective. According to sociologist and Ford Foundation Vice President Xavier de Souza Briggs, civic intermediaries can bring together multi-stakeholder actors and “compensate for a lack of civic capacity because of what government, business, or civil society organizations are not able, or not trusted to do, and also—along a more temporal dimension—for process breakdowns, such as impasse, polarization, and avoidance, that thwart collective problem solving.”<sup>81</sup>

#### a) Government

##### NYCx Labs

The NYC Civic Innovation Lab & Fellows Program is empowering NYC’s Community Boards to develop digital and open data practices that are appropriate for the local constituencies they serve. The Civic Innovation Lab (CIL) and Civic Innovation Fellowship (CIF) is the first and only comprehensive program dedicated to improving community boards’ use of data and technology while training the next generation of

civic leaders from CUNY. Incubated out of the Manhattan Borough President's Office, with support from the Mayor's Office of Data Analytics & CUNY Service Corps, CIL employs three technological researchers and a small class of qualified CUNY Service Corps students, a.k.a. CIF. While the early days of the tech sector were driven by the development of semiconductors, computer hardware, mobile technologies and the basic infrastructure for the internet, today's technology revolution is about applying these founding technologies to traditional industries. The fact that New York is a market leader for several of those industries, having a rich pool of creative, marketing, and business talent with expertise across different fields, has played to the city's advantage in the current landscape of technological growth.<sup>82</sup> This economic diversity has fueled its emergence as one of the top centers of activity in various tech subsectors, including adtech, fashion tech, fintech, digital media, and edtech.<sup>11</sup> In addition, a growing number of tech startups in the city are devoted to improving everyday urban life in ways like making online reservations, ordering food, finding an apartment, commuting, hiring a handyman, or looking for friends nearby. These new startups are clear examples of unconventional innovations, with cross-industry spillovers between tech and other sectors as disruptors of traditional markets.

The strategy followed by New York to build its tech innovation ecosystem is illustrative for other urban centers globally looking to take a similar path, as its initial challenges are shared by many cities. As Mulas and Gastelu-Iturri, describe:

These include: a) lack of technical talents, b) lack of available seed finance, c) limited affordable space for entrepreneurs, and d) a small and decentralized community. These challenges were addressed through a two-fold approach, combining an overall strategy from the Mayor's office and an operational program of policies developed and implemented by the NYC Economic Development

Corporation. This included, inter alia: a) creating a network of coworking spaces and incubators, b) developing a university tech education campus in the city, c) catalyzing the seed investment funds, and d) promoting the community and attracting outside tech talent and companies.<sup>83</sup>

### New York City's Economic Development Corporation (NYEDC)

As part of Mayor Bloomberg's plan to promote business innovation through entrepreneurship, in 2009 the NYCEDC provided the funds to create the first city-sponsored incubator in Varick Street. Operated by the Polytechnic Institute of New York University, this 16,000-square foot space offered high-quality office space with basic business services and administrative support.<sup>84</sup> Over the years the city has expanded the program, creating a total of 17 incubators that focus on different industries related to technology.<sup>85</sup> More than 1,000 startups have graduated from these city-sponsored incubators, and these new businesses have raised over \$180 million in venture funding. This initiative directly addressed the lack of affordable physical space for entrepreneurs and also catalyzed the development of additional incubators, accelerators, and coworking spaces in the city such as WeWork and General Assembly.

In addition, the city targeted the development of tech and entrepreneurial talent through the creation of several boot camp programs. The first two, FasTrac and JumpStart, were launched in 2009 and focused in training and educational programs to help emerging entrepreneurs through partnerships with the Kauffman Foundation and SUNY's Levin Institute, respectively.<sup>86</sup> Similarly, the city-sponsored incubators incorporated services more common to accelerators, such as mentorship and skill training programs for resident startups, which also helped strengthen the tech community. Finally, there were longer-term initiatives from the city to secure an increasing pool of tech talent, like the

11. Examples include; Fashion: Rent the Runway, Ideeli, Ecommerce: Etsy, Gilt Groupe; Fintech: Kickstarter; Health tech: Zocdoc; Edtech: Codecademy, Schoology, BrainPop; Social networking: Foursquare; Digital media: Tumblr, BuzzFeed, Gawker, Business Insider; Adtech: DoubleClick, Right Media, LinkShare, AdMeld, Interclick; Others: MakerBot, Quirky, WeWork, Seamless, Blue Apron, MondgoDB



recent opening of Cornell Tech on Roosevelt Island<sup>87</sup> after a request for proposals launched in 2011 by the NYCEDC,<sup>88</sup> and the commitment to introduce computer science in all NYC public schools by 2025.<sup>89</sup>

To address the funding gap in venture capital for local startups, in 2008 the city launched NYC Seed, a joint venture between the NYCEDC, NYU-Poly, the Partnership for New York City Fund, the New York State Foundation for Science, Technology and Innovation, and the Industrial and Technology Assistance Corporation. Making its first investments in 2009, the program funded up to \$200,000 per company, with the goal of moving from idea to a successful product launch.<sup>90</sup> In addition, in 2010 the NYCEDC partnered with First-Mark Capital to create the NYC Entrepreneurial Fund that provides promising NYC tech startups with early-stage capital. The NYCEDC contributed \$3 million to establish the fund and the New York City-based venture capital firm contributed an additional \$19 million.<sup>91</sup> Finally, the city launched a “NYC Digital City Roadmap” in 2011,<sup>92</sup> which channeled support to the tech startup ecosystem via development of broadband access infrastructure and incorporating “government as a platform”<sup>93</sup> into its open-government agenda.

In addition to the initiatives pushed by the mayor’s office and the NYCEDC, relationships among entrepreneurs catalyzed the growth of the city’s innovation ecosystem, showing the centrality of its networking assets. A dynamic has been unfolding in New York where a few entrepreneurs give “rise to many generations of spinouts. Through five types of influence—*inspiration, mentorship, investment, serial entrepreneurship, and former employee spinouts*—New York City’s tech sector is benefitting from a virtuous cycle in which entrepreneurs grow their businesses, financial, and social capital in the next generation.”<sup>94</sup> DoubleClick, Buddy Media, and AppNexus, are three companies, for example, founded that directly influenced 75 new startups in the city through one of the paths described above. These startups have in turn gone to influence other 177. Within just three degrees of relationships, the original three companies touch over 400 New York tech firms.

## NYCEDC-Sponsored Incubators

Incubator	Area	Year Launched
Varick Street Data Future Lab	Tech	2009
CFDA Fashion Incubator	Fashion	2010
Chasana Artist Studio	Art	2010
BMW i Ventures	Future mobility/ Cleantech	2011
Dumbo Digital Future Lab	Digital Media/Tech	2011
Entrepreneur Space	Industrial/Culinary	2011
HBK Incubates	Culinary	2011
Harlem Biospace	Biotech	2013
Harlem Garage	General business	2013
Made in NY Media Center	Digital Media/Tech	2013
Staten Island Makerspace	Industrial	2013
Urban Future Lab	Smart cities	2013
Bronx Business Bridge	General business	2014
BXL Business Incubator	General business	2015
MetaProp NYC	Real estate tech	2015
BioBAT	Biotech	2016
Brooklyn FoodWorks	Culinary	2016
Jamaica FEASTS Incubator	Culinary	2017
42 Floors	Real Estate/ General Business	2015
Union Square Tech Hub	Civic Tech	2016

Figure 1: Adapted from Mulas & Gastelu-Iturri, 2016, p 21 and NYCEDC website

## b) Private Sector

### Amazon HQ2 Bid

In September 2017, Amazon announced a request for proposals for a second North American headquarters, called Amazon HQ2.<sup>95</sup> The Seattle-based e-commerce behemoth projected to bring \$5 billion investment and up to 50,000 high-paying jobs to the new host city.<sup>96</sup> The unprecedented economic impact sparked intense competition between cities, states. Districts and territories, and a total of 238 bids for the HQ2 were submitted by the application deadline.<sup>97</sup>

After a yearlong selection process, in November 2018, Amazon announced it would split the HQ2 between New York City and Arlington, Virginia, with more than 25,000 employees in each location.<sup>98</sup> In New York City, Amazon projected to generate \$27.5 billion in state and city revenue over 25 years, a 9:1 ratio of revenue to subsidies. Governor Cuomo described it as the “the highest rate of return for an economic incentive program the state has ever offered.”<sup>99</sup>

When submitting their application for Amazon, NYC’s Economic Development Corporation named four neighborhoods—Midtown West, Long Island City, the Financial District, and the so-called “Brooklyn Tech Triangle.”<sup>100</sup> In its bid, advantages cited included access to a large and diverse population; industries; access to multiple airports; mass transit; and real estate, a mix of “historic gems” and office towers.<sup>101</sup> A challenge for New York is that housing and office costs are more expensive in comparison with other East Coast Amazon HQ2 options including Pittsburgh and Philadelphia.

There have been public concerns that cities are offering tax exemptions, property tax abatements, corporate income tax credits, and other state and local financial incentives to Amazon, which ultimately deprive the city of vital resources. Several civil society groups, including NY Communities for Change, Make the Road New York, and Showing up for Racial Justice, organized protests against tax breaks for Jeff Bezos and potential displacement of local business communities.

Unlike other cities, New York did not offer any specific tax subsidies to induce to Amazon, in contrast to cities such as Chicago and Newark.<sup>102</sup> New York State offered an incentive package if Amazon chooses any New York proposals, which include Buffalo, Rochester,

Syracuse, and the greater Albany area.<sup>103</sup> New York has a history of offering corporate incentive packages to companies including Goldman Sachs (with a subsidy value of roughly \$425 million); mall developer Pyramid Companies (\$600 million), and aluminum manufacturer Alcoa Corporation (valued at roughly \$5.6 billion).

While critics in New York City had been vocal about the new HQ2, specifically around issues of displacement and gentrification, the 2018 election of local Congressional representative Alexandria Ocasio-Cortez in November, the flipping of the State house in Albany, and the persistence of local labor unions in the region, enhanced political pressure which may have contributed to the Amazon HQ2 retreat from New York. The increased awareness of the subsidy package and the process of acquiring the vote of the state Public Authorities Control board may have also made it challenging for Amazon to continue with their plans once Michael Gianaris, new Queens State Senator and vocal critic, was nominated onto the board in early 2019. Although Gianaris was passed over for the board seat in February 2019, the fear of the political process may have had a role in turning Amazon and Bezos away from New York, according to technology experts in the city.<sup>104</sup> With the absence of a critical community outreach strategy, Amazon pulled their headquarters out of New York City on February 14, 2019.<sup>105</sup>

### Bloomberg Government Innovation

The Government Innovation team’s mission is to give cities support to leverage data, technology, and innovation towards improving public sector capacity among cities worldwide. The philanthropy supports cities’ work to test and refine urban innovations and equip mayors and local leaders with practical tools and approaches to tackle tough issues and enable civic innovation to flourish.<sup>106</sup> Bloomberg Philanthropies focuses on five key areas for creating lasting change: public health, environment, education, government innovation, and arts and culture. These five areas encompass the issues Michael Bloomberg and his team are most passionate about, and where they believe the greatest good can be achieved. While Bloomberg Philanthropies works on a wide range of issues within each focus area, it applies a distinctive approach to all of its endeavors.<sup>107</sup>

## Microsoft Cities

The Microsoft Cities team aims to leverage Microsoft's technology for social good, through products and branding (as opposed to funding). The team has worked with the City of New York on projects such as:<sup>108</sup>

- **Microsoft Translator**, used to help New Yorkers overcome language barriers. In New York City, according to the U.S. Census Bureau, 49 percent of households speak a language other than English at home.<sup>109</sup>
- **TEALS** (Technology Education and Literacy in Schools), supported by Microsoft Philanthropies, bringing professional computer programmers into dozens of schools to teach computer science to students and teachers.<sup>110</sup>
- **The Vision Zero Data Science** project, developed by Microsoft and the pioneering non-profit DataKind, helping the Department of Transportation virtually test changes to laws such as speed limits and street architecture.<sup>111</sup>
- **TechJobs Academy**, an innovative rapid re-skilling program delivered in collaboration with the NYC Tech Talent Pipeline and CUNY's New York City College of Technology to build expertise relevant to tech trends such as big data and cloud computing and the skills individuals need in collaborative workplace environments.<sup>112</sup>

## c) Investors

### Innovate NY Fund

New York City is unique in the number of venture capital dollars that come from city and state agencies. The Innovate NY Fund is a \$45.9 million venture capital fund that invests in seed-stage businesses to support innovation, job creation, and high-growth entrepreneurship throughout the state. The program is supported by \$35.6 million from NY State and \$10.3 million from Goldman Sachs. The Innovate NY Fund operates through a "fund-of-funds" structure in which third-party investment managers, who were competitively selected, manage the investment activity on a state-wide basis. Investments from the Innovate NY Fund into individual companies may not exceed \$500,000 (or \$750,000 in the case of a biotechnolo-

gy-related company). Since its launch in December 2012, the Innovate NY Fund has made investments in 81 New York State companies. The Fund's capital was matched with over \$240 million in private sector investment funding, yielding more than \$277 million in investment capital for these start-up and seed-stage companies. This led to the retention of 662 jobs and the creation of 1,430 additional new employment opportunities for the state. The Innovate NY Fund is not currently investing in any new companies. For example, Governor Cuomo's announcement of the \$3 million that Empire State Development invested in Glossier, a three-year old beauty brand based in New York, would create more than 200 jobs. The expansion of Glossier's headquarters was a symbol of the sort of entrepreneurship that New York fosters. This was a boost for the cosmetics industry, as this company is led by young entrepreneurs, specifically young women, and it symbolized the public's investment in growing the city and state's entrepreneurship presence.<sup>113</sup>

In addition, the New York State Innovation Venture Capital Fund (the "Fund") is a \$100 million venture capital fund that invests in seed and early stage businesses throughout New York State. The Fund provides critical funding to promote the commercialization of new technologies, encourage job creation and drive economic growth.<sup>114</sup>

NYU's seed-stage venture capital fund invests exclusively in start-ups founded by, and/or those commercializing technologies and intellectual property developed by, current NYU students, faculty, and researchers. This opportunity is open to start-ups founded by current students, faculty, and researchers at any NYU school, college, or institute. The fund seeks early-stage businesses with inventions, discoveries, products or services that were developed in whole or in part at NYU, that have achieved proof of concept (or a prototype) and are ready for commercial product development. The fund does not invest in projects requiring further basic research.<sup>115</sup>

There are countless examples of New York start-ups, but the following firms exemplify the network effects that New York City enables. Through public-minded, civic and social entrepreneurship, these firms create environments for other start-ups to grow.

## New York Start-Ups

NYC Start-Ups by Sector, 2007-2012	
Sector	Startups Founded
Ad Tech	63
Digital Media	121
E-Commerce	103
Ed Tech	20
Fin Tech	33
Health Tech	19
Social Networking	79

Figure 2: Source: Bowles & Giles, 2012

### WeWork

In 2008 Adam Neumann and Miguel McKelvey established Green Desk, an eco-friendly co-working space in Brooklyn. Two years later, Adam and Miguel started WeWork in Soho. By 2014, WeWork was quickly expanding and has housed many New York based start-ups including New York Tech Meetup, Turf, Reddit, and others. Major corporations, including PepsiCo and IBM also rent office space in WeWork spaces. In 2014, WeWork raised investment from financial institutions including Goldman Sachs Group and J.P. Morgan Chase. By 2016, WeWork had raised \$430 million, with a valuation of \$16 billion. In 2017, SoftBank contributed \$4.4 billion from its vision fund and WeWork will expand into China. Roughly 20 percent of WeWork's occupants are in the legal, financial, and business services and 15 percent are in software. WeWork has many high-occupancy companies, which results in higher occupancy rates. Part of WeWork's allure has been streamlining the work of the office manager to enable more seamless interactions for companies across the country.

Currently, WeWork has amassed more than 14 million square feet with offices across the globe. WeWork has 220,000 members worldwide, from just 7,000 in 2014.<sup>116</sup> As of April 2018, WeWork is struggling to turn a profit and owes \$18 billion in rent. This is in part because WeWork rents out the space it is renting out.

Even though revenues have risen dramatically, costs have risen more,<sup>117</sup> so the company is exploring opportunities to manage and own buildings in addition to just renting them. In the meantime, WeWork has sold \$702 million in bonds in 2018 alone and is continuing to do so before going public to cover the gap.<sup>118,119</sup>

### The Wing

The Wing invokes the history of women's club movements in the late 19th and early 20th centuries. More than just a hub of "professional, civic, social and economic" activity, as proclaimed by its website, it provides members with the "soft benefits" that the company claims distinguish it from other co-working spaces: namely, encouragement and support. This includes lecture series and training sessions, in addition to elegant bathrooms and workspaces.

During its \$32 million series B funders included WeWork and SoulCycle. After opening a flagship Flatiron District location, it has quickly expanded across New York, Brooklyn, and Washington, DC with plans to open in Seattle, San Francisco, Los Angeles, and London. There has been some pushback against the single-sex model as potentially discriminating against certain subsets of the population. New York's Commission on Human Rights is investigating the Wing for possible discrimination because of its women-only policy.<sup>120</sup> The Wing is currently based on a model where women apply to be members and pay \$2,350 annually for access to a single location and \$2,700 annually for access to all locations.<sup>121</sup>

### 14th@Irving

In February 2017, Mayor de Blasio unveiled a \$250 million program to develop a Union Square tech hub of 58,000 square feet. The goal is to provide one space for tech worker training, education, start-ups and convening.<sup>122</sup> The project, on city-owned land, is going to be anchored by Civic Hall, a collaborative work and event space focused on technology for the public good.<sup>123</sup> Several workforce development partners including the New York Foundation for Computer Science Education, General Assembly, Per Scholas, FedCap, Code to Work, and Coalition for Queens will be included.<sup>124</sup> As New York's chief digital officer explained, "the Union Square tech hub is



another clear signal to the tech community across the country and around the world that New York City is committed to the next generation of digital and technology innovation. Come build here, grow here, thrive here.”<sup>125</sup> Through city investing, the goal is to make a central hub at the intersection of digital technology and entrepreneurship which will be attractive to start-ups, investors, and workers.

### **AlleyCorp and Gilt Groupe**

AlleyCorp has claimed the role as headquarters of the new Silicon Alley, dedicated to housing companies that are “dedicated to changing lives and transforming the world.”<sup>126</sup> Founded by veteran entrepreneur Kevin Ryan in 2008, AlleyCorp is the parent company, or “start-up factory,” of several internet-based companies, most notably Gilt Groupe; Business Insider; and MongoDB, an open-source software company that is used by everyone from Disney to Foursquare.<sup>127</sup> Situating itself as a start-up for start-ups, AlleyCorp sparked the first wave of Internet-based companies erupting in New York.<sup>128</sup>

AlleyCorp’s biggest success has been Gilt Groupe, an online luxury shopping destination. Launched in 2007, the company has expanded first with menswear in April 2008; then a travel site, JetSetter, in 2009; and then in 2010 Gilt City, a lifestyle site to help locate exclusive experiences at spas, restaurants, and stores in cities including New York and San Francisco.<sup>129</sup> In 2009, the Groupe received series C funding by growth equity firm General Atlantic, and by February 2014, it was preparing for an IPO.<sup>130</sup> But a prevalence of other luxury sites and e-commerce businesses lowered the valuation of the company, threatening the IPO, and in January 2016, the Gilt Groupe announced its acquisition by Hudson’s Bay Company, owner of luxury department store chains Hudson’s Bay, Lord & Taylor, and Saks Fifth Avenue, for \$250 million.<sup>131</sup>

### **Center for Social Innovation (CSI)**

The CSI is a coworking space that provides its members with tools to accelerate their success and amplify their impact. It is building a movement of nonprofits, for-profits, entrepreneurs, artists, and activists working across sectors to create a better world.<sup>132</sup> Its model is “work, connect, create, transform.”<sup>133</sup> It provides desks,

offices, meeting rooms, projectors, and other amenities and manages the office administration. It nurtures a culture of collaboration that fosters strong relationships and opens opportunities. Further, as a platform for content delivery, CSI works with leaders to provide their members with knowledge they need to strengthen their skills, build, their capacity, and achieve their goals.<sup>134</sup> Finally, it makes strategic interventions in the most promising projects, providing mentors, investors, public sector and decision-makers.<sup>135</sup>

### ***Geographic Advantage***

There is a growing initiative in creating accelerators, workspaces, business groups, events, and government strategies in New York City. There has been an expansion occurring, both in geographically and in industry focus. The tech industry, originally concentrated in Silicon Alley, has expanded north into Harlem and the Bronx, as well as out to Queens, and even to new developments in Brooklyn. Silicon Alley is still filled with traditional tech companies (fin tech, adtech, etc.), but Brooklyn attracts more urban tech and creative tech companies, while foodtech and biotechnology is emerging in Queens and social good enterprises are setting up in Harlem and the Bronx.<sup>136</sup>

Further, New York is a highly diverse city. Almost three million of its residents were born outside the country.<sup>137</sup> There are more than 800 languages spoken in Queens alone.<sup>138</sup> This is a strength not only in the myriad perspectives people in the city have to offer and which can enhance entrepreneurial thinking,<sup>139</sup> but also in distinguishing it from Silicon Valley, which is historically a non-diverse place to work.<sup>140</sup> Though hard to quantify, studies have shown that individuals from different backgrounds, ethnicities, and countries contribute to the sort of social infrastructure that Sassen holds up as an important driver for innovation.<sup>141</sup> Moreover, diversity can distinctly change the nature of work and entrepreneurship in innovation ecosystems. Where companies like Microsoft are still based in Silicon Valley, they are opening up social enterprise divisions in New York, working with Mayor de Blasio to open tools like Microsoft Translator, The Vision Zero Data Science project, and the Microsoft Reactor, that support the use of technology for the social good.<sup>142</sup> Further, diversity and an increasing number

of individuals moving to New York from all over the world address the tech talent gap that the city and others like it face. A Pew Research Center poll from earlier this year reports that while jobs that traditionally fall into the categories of entrepreneurship and innovation have increased by 338 percent since 1990, there has not been a corresponding investment in education and training for Americans, and less so for women and underrepresented communities.<sup>143</sup> However, the number of women-owned businesses in NYC has increased dramatically in recent years.<sup>144</sup> Over the last seven years, the number of female-owned businesses increased by 36 percent, while the number of male-owned businesses increased by just 8 percent during the same period.<sup>145</sup> Women-owned businesses now make up more than 40 percent of private companies in New York City.<sup>146</sup> With a total of 413, 899 women-owned firms, New York has more than double the nearest competitor, Los Angeles, which has 192,358.<sup>147</sup> Infor's former president, Duncan Angove, remembers when the company was looking for a new headquarters. Angove cited New York's culture, diversity, and interdisciplinary perspectives to be the reason why it chose New York over Silicon Valley.<sup>148</sup> The eight-hour flight, on average, from cities like London, Paris, Berlin, and Rio de Janeiro also makes the city appealing for innovators.

### *Access to Finance*

Reports show that venture capital investments in New York were around \$6 billion in 2015,<sup>149</sup> with more than 14,500 startups located in the city.<sup>150</sup> In 2016, venture capital investment rose to \$9.5 billion and in 2017, a PricewaterhouseCoopers (PwC) report stated that New York surpassed San Francisco in venture capital in the last two quarters of the calendar year.<sup>151</sup> This amounted to a 25.5 percent growth in the tech sector for New York City, according to the comptroller's office, surpassing all states but California and Washington.<sup>152</sup> What is important to note, however, is that in terms of total dollar investments, number of deals, number of employees as reported by industry association, and number and size of IPOs in New York City and nationally, the technology and entrepreneurship sector is increasing everywhere given growth in perceived viability, number of skilled talent, and other factors. In New

York, the increase in late stage and series C funding can equip us with a better sense of the staying power of the industry and the city's innovative credentials. The \$2.5 billion in funding that was garnered by the NYC-based co-working space WeWork led New York to a uniquely successful year in terms of funding and is predicted to lead to more firms, especially B2B and co-working companies, calling New York home.<sup>153</sup> In 2017, WeWork received a \$4.4 billion investment from Softbank and its "Vision Fund."<sup>154</sup>

Private sector dollars still make up the bulk of entrepreneurship funding in the city. \$9 billion dollars across public and private sectors makes up New York and are ready for commercial product development. The fund does major VC companies: Orbimed, New Enterprise Associates, Venrock, Deerfield Management, and Canaan Partners.<sup>155</sup> However, where private sector contributions make up the bulk of seed funding and capital in Silicon Valley and other entrepreneurship ecosystems, New York City benefits from, first, twice the opportunities to receive funding; and second, private sector contribution that bolsters public-minded entrepreneurship initiatives. Take for example, Union Square Ventures, a "thesis-driven venture capital firm" that has in the past supported such initiatives as Shapeways.

Further, in February 2018, the three city-designated banks—Amalgamated, Bank of America, and TD Bank—committed \$40 million towards two of New York's three programs that help minority and women-owned business enterprises (M/WBEs) and small businesses access affordable loans to grow and sustain themselves.<sup>156</sup> The programs, known as the Contract Financing Loan Fund (CFLF) and the Emerging Developer Loan Fund (EDLF), are two financial tools established by the de Blasio administration to address historic barriers faced by many M/WBEs and small businesses in accessing capital.<sup>157</sup> This initial funding built on the city's initial investment of \$20 million to both funds. With this funding, M/WBEs and small businesses will have access to \$60 million in total revolving loan funding, triple the city's initial investment.<sup>158</sup>

Past successes and the growth of late-stage and series C funding shows New York's firm place as an innovation ecosystem, demonstrating maturity and staying

power in this sector. In addition, a look at the top 10 ventures that received the most Series C and late-stage investment include PlayBuzz, BlueCore, Common and Stash, mostly B2B, are symptomatic of a city rich in entrepreneurs and stakeholders, something that will prove beneficial to the ecosystem at large creating more investors and experienced executives to fund and found new ventures.

The main factors that helped New York emerge as a tech leader are rooted in its unique competitive advantages and urban nature and were fostered by a set of strategies from city government to set the foundations for a thriving innovation ecosystem.

## Policy Considerations for New York's Innovation Ecosystem

Each of these examples exemplify New York City's urban enterprises which leverage *multi-stakeholder actors*, *interconnection*, *geographic advantage*, and *access to finance* to spur, catalyze, and support entrepreneurship. The city has tapped into its leadership in a diversity of areas including fashion, finance, advertising, and journalism to develop entrepreneurship which leverages technology in these various subsectors. Finally, through strategic investment and the New York City Economic Development Corporation, it has created a fertile ground for attracting talent, investors, and innovation. Public policies have been a critical part in making New York a 21st century technology and innovation hub.

However, there can be limits and challenges in dictating innovation and entrepreneurship. Glaeser and Kerr warn against local governments playing venture capitalists. For example, Japan's Ministry of International Trade and Investment, though staffed with top talent, was not successful in identifying companies.<sup>159</sup> Scholars argue for a balance between government-led interventions and spontaneity and competition between local banks and financiers. Ultimately, the direction of public policies around urban innovation is dependent on the outcome desired. If the outcome is for more entrepreneurial solutions to public challenges—whether the compacting, solar trash cans New York's Innovation Lab has funded in Brownsville or subsidies for more coding classes in city schools—public policy will need to play more of a role to provide risk capital and lure

talent and resources.

As New York's entrepreneurship ecosystem continues to evolve, there are several policy considerations. The rise of 14 @ Irving and other spaces like it provides an opportunity for more public-minded, civic, and social entrepreneurship, which seeks to solve public problems and train citizens for how to adapt to the 21st century work force through digital skills and entrepreneurship. Civic Hall has already served as an anchor and catalyst for this work. Many technology companies, including Alphabet, are situating their urban governance divisions in New York. Intersection and Sidewalk Labs are examples of those focused on leveraging technology to improve the urban experience. Is there an opportunity for a start-up ecosystem with civic, public-minded values? New York-based entrepreneur Tristan Louis said, "this translates into an attitude that may focus New York tech companies more on the social impact," citing Kickstarter and Etsy as examples.<sup>160</sup> The lack of diversity and culture is a systemic problem in Silicon Valley, and there is increasing public critique of this festering issue. Over the past year, tech giants such as Google and its parent company, Alphabet, are grappling with culture clashes at shareholder meetings<sup>161</sup> and lawsuits over their hiring practices.<sup>162</sup> In addition, tech companies are facing a wave of 'techlash'—backlash resulting from concerns over user privacy, election security, and ethics lapses.<sup>163</sup> Perhaps the tide is shifting for more policy interventions to help foster technology-based ecosystems to address social problems.

## Public Policy Challenges

Urban innovation ecosystems face a myriad of challenges. The following table illustrates how New York City addressed past challenges, which may be instructive for other urban systems seeking to use public policy as a tool to enhance urban innovation ecosystems:

## Challenges New York City's Innovation Ecosystem and Policy Actions

Challenge	Explanation	Policy Actions Applied
Lack of physical space for entrepreneurs	Office space in New York is too expensive for start-ups and there was no specific offering of office rentals	<ul style="list-style-type: none"> <li>City-sponsored network of coworking spaces and incubators like the Union Square Tech Hub, which will be the new space for Civic Hall; it will include digital training hub for 21st century jobs and flexible workspace for growing start-ups</li> </ul>
Lack of technology-specialized talent	New York lacked strong engineering and technical schools; most talent was imported	<ul style="list-style-type: none"> <li>Rapid tech skill training programs like the NYC Tech Talent Pipeline (TTP), which offers no-cost training for jobs in the tech field.<sup>164</sup></li> <li>Attraction of science and technology universities</li> <li>Introduction of coding in public schools</li> </ul>
Insufficient seed capital available for local start-ups	Although New York was home to many firms in the VC industry, they did not consider NYC startups mature enough for funding	<ul style="list-style-type: none"> <li>Creation of seed funds supported by the city like the NYC Seed, formed to provide deserving seed-stage entrepreneurs with capital and support to move from idea to product launch; partners include ITAC, NYCEDC, NYC Investment Fund, NYSTAR, and Polytechnic Institute of NYU</li> </ul>
Limited and uncoordinated community of tech-led innovators and entrepreneurs	The tech community was growing but scattered and uncoordinated, there was no robust community infrastructure or institutions, and entrepreneurship was not considered respectable	<ul style="list-style-type: none"> <li>BigApps competition, like launch of NYCx Challenge program, which includes local communities</li> <li>Political support for community events, like NYC Open Data Week, a collaboration between NYC Open Data, BetaNYC, and civic tech and data communities</li> <li>Promotion and marketing campaigns, like NYC Computer Science Opportunity Fair (CS Fair), large annual college and career inspiration event for public high school students studying computer science</li> <li>Attraction of prominent tech firms</li> </ul>

Figure 3: Adapted from Mulas and Gastelu-Iturri, 2016, p. 20

Below are a few key recommendation areas which are increasingly relevant for the continued growth of entrepreneurship in New York City and the opportunity for public policy to play a role. As cities continue to be hubs of technology clusters and innovation, several of these considerations will have applicability for other places.

Around the globe, in places like Barcelona, Paris, Buenos Aires, and New York, there is a new concept propelling innovation: multi-sector innovation hubs that comprise a range of business models, ownership structures, and physical layouts.<sup>165</sup> Their main

goal is to create a “motivating” work environment where businesses of different industries can learn from each other, network, develop new skills, and inspire each other.<sup>166</sup> Many of these hubs occupy iconic buildings, such as train stations, navy yards, hospitals, and de-commissioned warehouses.<sup>167</sup> These “creative hubs” are stimulating environments to work in for both large corporations and start-ups. For instance in New York City, there are the Industry City Brooklyn, the Brooklyn Navy Yard, and the Greenpoint & Williamsburg.



## Recommendations

### 1. Create and offer affordable technology & entrepreneurship training and education

- Establish partnerships between co-working spaces, technology and design skills training institutions, incubators/accelerators, and technology companies. For example, UXDI General Assembly is leveraging start-ups and projects residents of WeWork as capstone projects for their students. Another example is the partnership between Microsoft Cities and NYC Tech Talent Pipeline providing a free intensive program on building expertise relevant to tech trends.
- Promote and fund university programs focused on innovation and entrepreneurship. New York has leveraged resources and funding from a number of initiatives at Columbia University, New York University, and CUNY, for example.<sup>168</sup>
- Create and offer programs providing resources and support to leverage the most emerging technologies: AI, Cryptocurrency, Cyber Security, IoT (especially NYEDC), Fin Tech, Cryptocurrency Start Ups, New Technologies of Money, and Blockchain.

### 2. Promote visa and regulatory frameworks for international entrepreneurs

- Provide affordable city-sponsored loans available to immigrant entrepreneurs, women, and other underrepresented communities.
- Provide further legal alternatives and resources to international entrepreneurs starting up their business in the U.S. (e.g., streamlined visa entry).
- Set up talent pipelines to attract talent and facilitate people from all over the world to come to work in the field of technology and entrepreneurship in New York City. For example, Canada has a high-tech visa.<sup>169</sup>

### 3. Facilitate networking and interconnection between multi-stakeholders

- Incentivize actors across the technology and innovation community to engage and interact in coworking spaces, accelerators, incubators, and events in New York City.
- Engage with local stakeholders and community residents to identify urban challenges and collaboratively design solutions.
- Connect relevant actors of community by creating and promoting city-sponsored events like the NYC Open Data Week, or the Computer Science Career Fair.
- Create hubs to coordinate and connect communities such as Civic Hall, WeWork, The Wing, and Meetup.

### 4. Provide affordable housing

- Address rising housing costs/more shared housing opportunities. For example, cities such as San Francisco and New York are already exploring “co-living” housing opportunities focused on Millennials.<sup>170</sup>
- Provide a wide range of flexible memberships for students, graduates, the unemployed, startups, and so forth, in the way that co-working spaces like The Wing and WeWork do.

### 5. Provide access to seed funding and venture capital

- Make more public venture capital funding available; state and city funds should be used for entrepreneurs and social enterprises backed by people of color and women.

### 6. Leverage and experiment with emerging technologies

- Use and experiment with new emerging technologies (AI, Blockchain, IoT, etc.) by opening urban challenges to solve (for example NYCx).
- Create small funds to experiment with and leverage new technologies. For example, the city could provide funds and other resources for entrepreneurs and other members of the community to advance on these fields.

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