



WHITE PAPER

Strengthening the Cybersecurity Talent Pipeline
Economic Development Meets Social Impact

New York City's investment in cybersecurity education and workforce training offers lessons in achieving social impact through economic development initiatives.

Nicholas Lalla | March 2018



Introduction

Cyberattacks are increasing at an alarming rate, yet there aren't enough cybersecurity professionals to combat this growing threat. In fact, there's an acute talent gap in the cyber industry: a report by Cybersecurity Ventures projects that worldwide, there will be up to 3.5 million unfilled jobs by 2021.¹ Today, in New York City, home to some of the largest purchasers of cyber technology, the nearly 5,000 cyber-related jobs posted each year are taking longer to fill than tech jobs overall—and many are going unfilled because of a lack of qualified talent.²

Cybersecurity protects against efforts to steal, destroy, or compromise information systems and data, such as the Internet, smartphones, computers, or even electric grids.³ Cyber professionals span disciplines and educational attainment levels and include security engineers, penetration testers, risk analysts, and compliance specialists. The recent headline-grabbing hacks of Equifax, Yahoo, and Anthem Healthcare show that all companies need cyber talent.

This talent shortage represents both an economic development and social impact opportunity for New York City. That's why New York City Economic Development Corporation (NYCEDC) is investing \$30 million in the local cybersecurity ecosystem through our Cyber NYC program. Launched in December 2017, this suite of public–private partnerships was shaped by over 100 stakeholder interviews, months of industry research, and extensive qualitative and quantitative analysis.

Cyber NYC will leverage New York City's concentration of Fortune 500 companies, burgeoning tech startup scene, and world-class research universities to create (1) a place-based hub to support startups and foster community, including the city's first cybersecurity-dedicated accelerator; (2) programs to commercialize academic-based intellectual property; and, notably, (3) education and workforce training programs to expand and diversify the local talent pipeline and to make New York City a global leader in cyber talent.

NYCEDC's overarching mission is to make New York City's economy fairer and stronger for all New Yorkers. This means aligning economic development initiatives with social impact goals. Creating an effective market solution that also increases the accessibility and inclusiveness of an industry can be a difficult task, but the reward is great. Building more inclusive business communities, creating career pathways, and providing greater opportunities for economic mobility are interconnected investments with the ability to truly transform a city.⁴

Strengthening the talent pipeline benefits both workers and employers and enhances local economies. "Skills have become the global currency for 21st-century economies," Jonathan Hasak, of the national education nonprofit Year Up, observes in the *Stanford Social Innovation Review*.⁵ "But until we resolve the talent marketplace failure... the competitiveness of companies and the standard of living for workers will continue to weaken," he warns.⁶ The volume of unfilled jobs and the lack of diversity within the industry suggest that the cyber talent marketplace isn't working effectively and that interventions are needed.

Our efforts to strengthen cybersecurity's talent pipeline can provide important insight on how to drive social change through economic development. What follows are Cyber NYC's education and workforce training solutions, a few interesting learning models we discovered during our research, and thoughts on what cities, businesses, and individuals can do to create fairer and stronger economies.

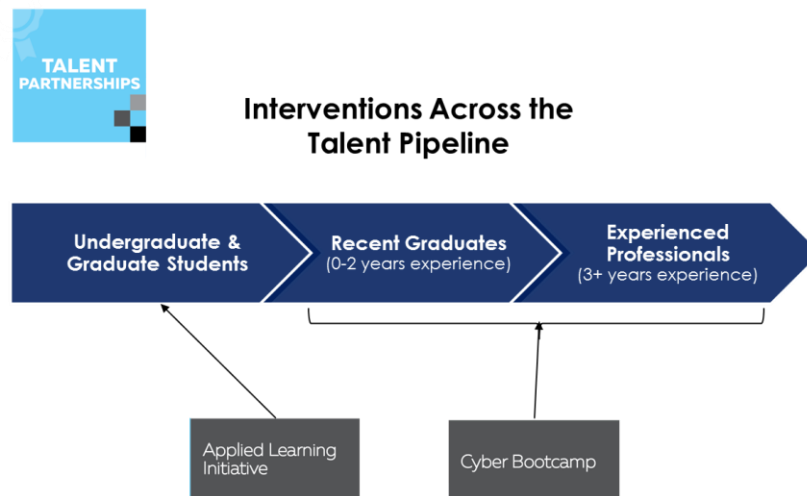
Cyber NYC’s Talent Partnerships

Despite important synergies, cities and states often separate economic and workforce development, so talent programs are somewhat new terrain for NYCEDC. To build the Talent Partnerships work stream, one of Cyber NYC’s three core components, we drew upon the expertise of our colleagues at the NYC Department of Small Business Services, which administers Tech Talent Pipeline, and the Mayor’s Office of Workforce Development.

Because talent is one of the industry’s urgent challenges and a strong talent pool, in turn, leads to new technologies, companies, and jobs, we developed two industry-driven solutions that target students and job-seekers post–high school. NYCEDC is selecting partners and operators for these two solutions: the Applied Learning Initiative and Cyber Boot Camp.

To implement these programs, we will team up with local universities, educational service providers, philanthropies, and large employers, among others. To reach the ambitious scale and impact we seek, we plan to leverage private sector resources. And to create a true center of gravity for the industry, our hub could house the Cyber Boot Camp and likely serve as a host space and educational event venue for our partners.

Figure 1: Interventions Across the Talent Pipeline



By launching both applied and accelerated learning programs that target a broad spectrum of beneficiaries at different stages of their careers, Cyber NYC is tackling the talent problem from multiple angles: changing educational practices to better prepare students for jobs over the long term, while helping fill the gap and diversify the pipeline in the near term.

Applied Learning Initiative

NYCEDC is helping build collaborative relationships between educators and industry partners to catalyze systems-wide changes to cybersecurity learning. A common refrain from stakeholders—including large financial services and technology companies like JPMorgan Chase and Google—is that it’s difficult to find the talent they need because job applicants too often lack the proper skill set and experience.⁹

Like all STEM fields, cybersecurity also suffers from a lack of diversity and enthusiasm from young adults. Intel’s chief diversity and inclusion officer Barbara (McAllister) Whye recommends that to alleviate these problems, “we can start by immersing young people in hands-on programs that break down stereotypes about STEM careers and give visibility to role models.”⁷

Aligning academia with employer needs, the Applied Learning Initiative will integrate experiential learning inside and outside the classroom and provide students and faculty alike with exposure to industry challenges and practitioners. For example, universities, working with industry partners, can enrich curricula with industry-led projects, develop new certificate and degree programs, build an open-sourced catalogue of industry datasets, design learning programs for students from underrepresented backgrounds, or collaborate with industry on competitions.

Our partners will build a network with each other, open-source ideas and data, and share resources, where possible. By bringing together endowed and under-resourced universities, students from across the five boroughs, and industry partners, the Applied Learning Initiative will change how cybersecurity is taught in New York City, widen the talent pipeline, and prepare thousands of students for the labor market.⁸

Several learning models have helped inform this initiative, including:

- **Deloitte UK BrightStart Apprenticeship:** This “earn while you learn” apprenticeship is open to individuals forgoing post-secondary education. Operating in select Deloitte offices in the United Kingdom, it provides apprentices with work experience, professional training, a full-time salary, and benefits.⁹
- **iQ4’s Case Study Course:** Utilizing software that enables virtual communication, the course pairs an industry expert with an undergraduate class to solve a challenge over a semester. Students learn about the industry through role-playing job positions and develop relationships with potential employers. Corporate sponsors are underwriting the course at some public universities in New York State.¹⁰
- **NYU Tandon School of Engineering’s NY Cyber Fellows:** This part-time, online master’s program in cybersecurity was created through corporate and government partnerships, including the New York City Cyber Command. The program reduces tuition to make it accessible and provides simulation training through a virtual lab.¹¹

In addition to technical skills, critical thinking ability, and a security mindset, employers tell us that they are looking for talent with experience applying cybersecurity to the business world. The models above illustrate ways to pair young adults with industry and create valuable learning opportunities.

Cyber Boot Camp

While the Applied Learning Initiative is a large-scale, cross-institutional investment, the Cyber Boot Camp is a targeted intervention to quickly build a steady stream of diverse talent. The Cyber Boot Camp will be designed to reach out to and train job-seekers—likely career changers—from nontraditional backgrounds, opening up a new, underutilized source of talent.

Here's how it will work: To achieve high job placement rates, we're recommending the operator formalize hiring agreements with employers. Working with community colleges and nonprofits, the boot camp will identify individuals from diverse backgrounds, potentially including those with high school diplomas or associate's degrees. Industry partners will collaborate on creating curricula and may also serve as instructors. To ensure accessibility and participants' success, the boot camp will also offer a bridge program to provide foundational skills training and career advising services. Depending upon the operator and their partners, some trainees could be sponsored by employers or underwritten by philanthropies. Finally, upon completion of the boot camp, participants will go directly into the job for which they had been training.

Many employers—especially in the tech sector—already recognize that degree requirements unnecessarily limit their talent pool. By opening up new streams of diverse, tailor-trained talent, the Cyber Boot Camp will cater to this existing awareness and catalyze recruiting changes at large corporations, providing new career opportunities for New Yorkers.

A few existing accelerated learning models have been informative:

- **Israel Tech Challenge:** Based in Tel Aviv and drawing upon the expertise of the Israeli military's cyber units, this company offers a six-month course on cybersecurity, culminating in a full-time, paid internship at a local company.¹²
- **LaGuardia Community College TechHire Program:** Funded by a grant from the United States Department of Labor, the program provides free training in coding to young adults (age 17 to 29) and is conducted in partnership with General Assembly, a skills training company.¹³
- **NPower's Symantec C3 Program:** NPower creates career pathways for veterans and young adults from underserved communities. They partner with Symantec to train entry-level cybersecurity talent. The 26-week program includes classroom training, certification preparation, internships, and career advising.¹⁴

Our research suggests that it's important to reach beyond corporate social responsibility teams and to engage core business units, identifying hiring needs and building partnerships directly with practitioners. While accelerated learning programs like boot camps do have a mixed track record, we've seen that the closer the alignment between curriculum and employer needs—and the more formalized the hiring agreement—the more successful the program.

Fairer and Stronger Economies

Cyber NYC's education and workforce training programs are just getting off the ground, but a few lessons have emerged that are relevant to cities, businesses, and individuals working to create fairer and stronger economies:

- **Cities should invest in people:** Rather than merely creating tax incentives to attract companies, cities should invest in their workforce and connect job-seekers with opportunities. By training workers for the economy of the future and by supporting small businesses and entrepreneurs, cities can grow their economies from the inside out.
- **Businesses should engage new sources of talent:** Cybersecurity isn't the only industry lacking qualified and diverse talent. Businesses should value skills and experience over credentials and partner with nonprofits and workforce organizations to reach and train talent, especially from underserved communities.
- **Individuals should serve as mentors:** Education and workforce experts, students and job-seekers, and industry professionals themselves all openly acknowledge the importance of mentorship. Lending a guiding hand to someone looking to grow professionally is time well spent and strengthens the talent pipeline.

Like locking in affordable housing and resiliency features in real estate development, there, too, are ways to embed social impact goals into economic development. Thoughtful and well-executed projects should have multiple benefits. Economic development initiatives should create new jobs and provide economic mobility opportunities for local residents. As NYCEDC's work to strengthen the cybersecurity talent pipeline shows, economic development and social impact can—and most definitely should—be complementary pursuits.

References

¹ Cybersecurity Ventures. "Cybersecurity Jobs Report," 2017.

² According to Labor Insight Jobs (Burning Glass Technologies), a three-year average (2015, 2016, 2017) shows 4,782 cybersecurity-related job postings each year, March 1, 2018.

³ "Glossary of Key Information Security Terms." National Institute of Standards and Technology, 2013.

⁴ For more information on the benefits of workforce training, see this report by the Center for American Progress: <https://www.americanprogress.org/issues/economy/reports/2018/02/22/447115/better-training-better-jobs/>

⁵ Hasak, Jonathan. "Hiring Incentives Won't Solve America's Talent Problem." *Stanford Social Innovation Review*, August 21, 2017.

⁶ Ibid.

⁷ McAllister, Barbara. "The Heart of STEM Education." *Stanford Social Innovation Review*, February 14, 2014.

⁸ For information on how community colleges can build relationships with employers, see the Brookings Institution toolkit: <https://www.brookings.edu/research/a-toolkit-for-building-successful-community-college-employer-relationships/>

⁹ <https://www2.deloitte.com/uk/en/pages/careers/articles/brightstart-business-apprenticeship-scheme.html>

¹⁰ <http://www.iq4.com>

¹¹ <http://engineering.nyu.edu/academics/online/masters/cybersecurity/fellowship>

¹² <https://www.israeltechchallenge.com/fellows/cyber-security/>

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¹⁴ <https://www.symantec.com/connect/blogs/training-next-generation-cyber-security-leaders>



About the Author

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Recommended Bibliographic Listing

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About NYCEDC

New York City Economic Development Corporation is the City's primary vehicle for promoting economic growth in each of the five boroughs. NYCEDC's mission is to stimulate growth through expansion and redevelopment programs that encourage investment, generate prosperity, and strengthen the City's competitive position. NYCEDC serves as an advocate to the business community by building relationships with companies that allow them to take advantage of New York City's many opportunities. Find us on Facebook or follow us on Twitter, or visit our blog to learn more about NYCEDC projects and initiatives.

