

PATHWAYS TO INCLUSION



Expanding the District of Columbia's
Tech and Innovation Ecosystem

WHAT DOES TECH INCLUSION MEAN?

“Inclusion is about filling the gaps in the pipeline”

“Equitable access to learning opportunities in tech”

“Environment for everyone to thrive”

“Accessibility across for all students and community: subgroups (underrepresented youth, public and special education, etc.)”

“Creating a safe space...for people of all walks of life... there are others willing advocate for them”

“Every DC student has the opportunity to prepare for STEM careers with high quality education”

“The ability for communities, regardless of any previous barriers, to have equal access to full participation in tech economy”

“Tech inclusion is not having to talk about tech inclusion”

“Access to the same quality of opportunities, funding, resources, talent for all”



DEAR DISTRICT RESIDENTS,

As we move through the 21st century, cities across the country are looking for inclusive and innovative ways to grow their economies, create jobs, and tackle some of the biggest challenges facing residents.

Washington, DC is forging a new path toward an inclusive economy, one that supports our thriving tech and innovation ecosystem in a way that creates equitable opportunities for residents in all eight wards. Given our diversity, I firmly believe DC is uniquely positioned to be a national model for tech inclusion and entrepreneurship.

We have made great progress, but there is still much work to do to ensure our tech community reaches its full potential. Today, I am pleased to present “Pathways to Inclusion,” a study that offers the current state of inclusion in our tech economy, and also highlights the barriers underrepresented communities face upon entering an industry that is vital to our innovative growth.

While many cities around the world are thriving in tech, Washington, DC is one of the first major jurisdictions to study inclusive innovation in depth, with three goals in mind: First, we will expand the capacity of DC residents to engage in the tech economy by creating 5,000 new tech jobs for underrepresented workers. Second, we will grow our tech economy by creating 500 new tech businesses founded by underrepresented entrepreneurs. Third, building on our city’s diversity, we will establish the most inclusive culture among tech ecosystems on the East Coast.

Working in collaboration with the DC Innovation & Technology Inclusion Council, our hope is to become the nation’s premier inclusive tech hub, creating new opportunities that allow DC’s entrepreneurs to flourish and offering actionable steps toward expanding our tech economy in a way that benefits everyone.

I want to thank our local tech industry, non-profits, government leaders, and residents who shared their expertise and creative ideas for this study. Together, we will use “Pathways to Inclusion” as a tool to help transform Washington, DC into a more inclusive, innovative, and equitable city.

A handwritten signature in black ink, reading "Muriel Bowser". The signature is fluid and cursive, with a large, stylized "B" at the end.

MURIEL BOWSER

MAYOR



DEAR FELLOW WASHINGTONIANS,

On behalf of the Innovation & Technology Inclusion Council, I am pleased and honored to endorse “Pathways to Inclusion,” an important and impactful step toward helping the District of Columbia become the premier city – nationally and globally – for an inclusive tech economy. I also take this moment to applaud the leadership and determination of Mayor Bowser and her team who are working to translate vision into action.

This living document addresses where we are today by taking stock of the realities of participation and production in a variety of places – and is transparent about presenting those facts. Pathways also serves as a baseline for benchmarking and creating performance measurements, articulates goals, and defines a strategy for success. Ultimately, this integrated four-pronged strategy provides an opportunity to give the District the assets it needs to achieve its vision. It also strikes an important balance between residents and infrastructure, highlighting the needs and potential of people, first and foremost.

While this report is as important first step, there is much work to be done and we embrace the challenge with both realism and aspiration. In the months ahead, we are confident that DC’s broad and diverse community will come together to establish a true pathway for the District of Columbia to participate, and ultimately thrive, in our vibrant technology and inclusive innovation economy.

Sincerely,

REY RAMSEY

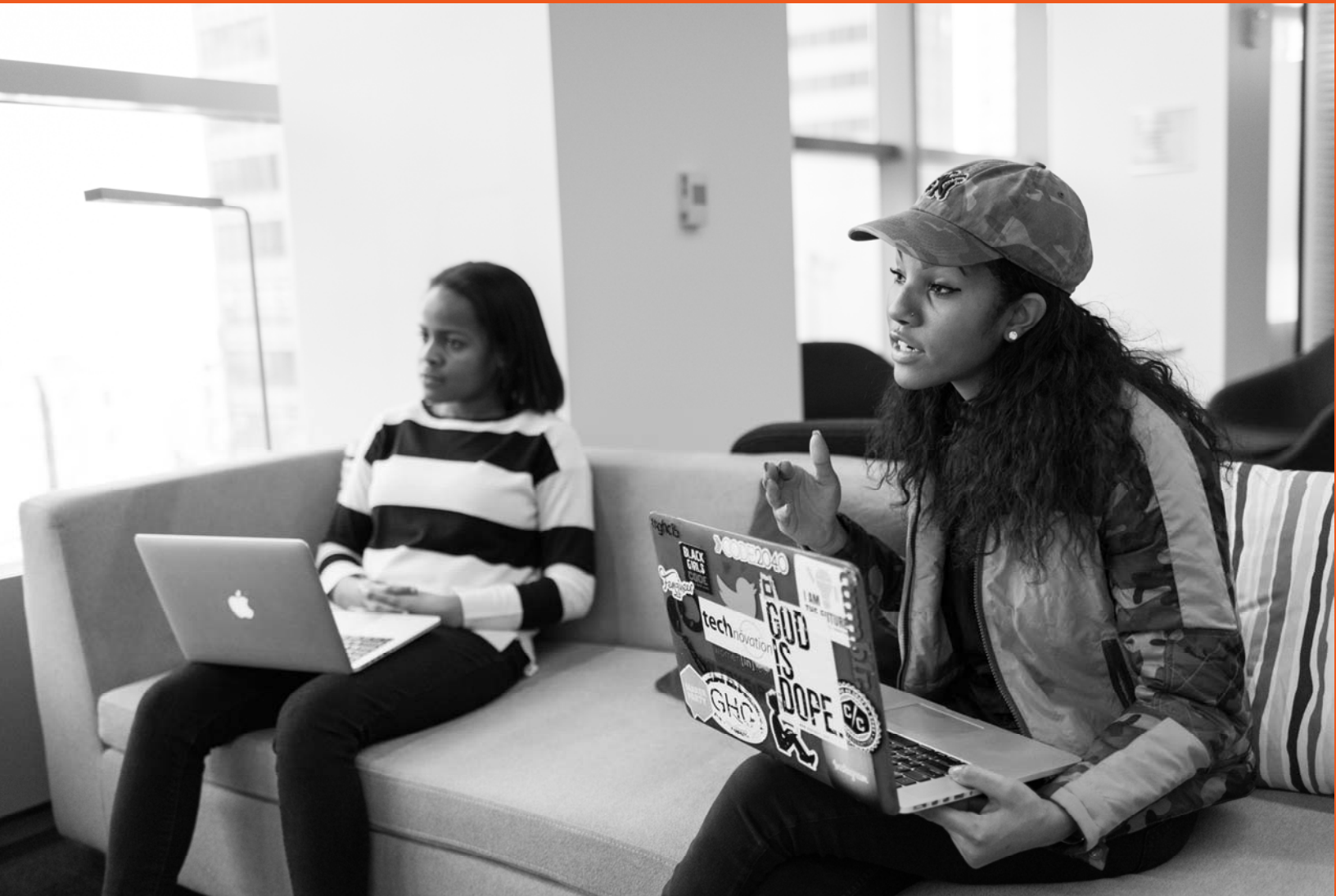
CHAIR, INNOVATION & TECHNOLOGY INCLUSION COUNCIL

Members of the Mayor’s Innovation and Technology Inclusion Council

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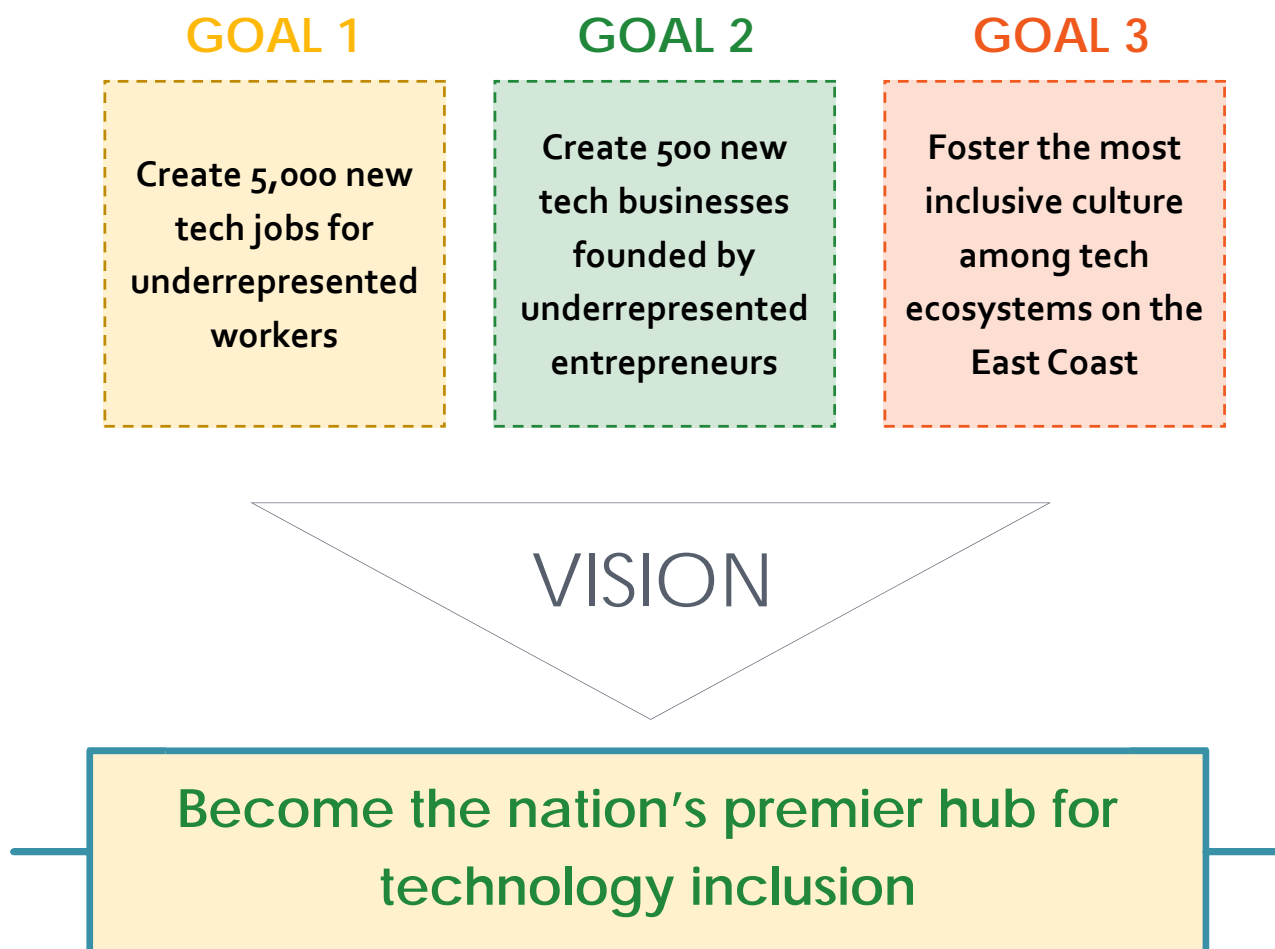
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Vision for DC's Pathways to Inclusion

The '*Pathways to Inclusion Report*' was cultivated from a commitment by Mayor Muriel Bowser and her Innovation Technology Inclusion Council (ITIC) to expand of the District's innovation economy in a way that will serve as a national model for inclusion and diversity. This report is the first of its kind for the District, providing a roadmap to create an inclusive ecosystem where the tech and innovation economy can grow.

Specific goals have been set to achieve our vision of **becoming the nation's premier hub for technology inclusion**; creating **5,000 new tech jobs** for underrepresented workers, creating **500 new tech businesses** founded by underrepresented entrepreneurs and fostering the most **inclusive culture among tech ecosystems** on the East Coast. The set of recommendations outlined in this report was designed to provide direction for the District and its partners to carry out specific goals and ultimately its vision of building a national model for tech inclusion and diversity. All stakeholders in the District, including government, private industry, universities, and non-profit organizations have a role to play in creating and sustaining an inclusive innovation ecosystem.



Technology Inclusion Scorecard

In its effort to assess the level of tech inclusion in DC, and thus inform strategies and recommendations, the District devised a Technology Inclusion Scorecard. The Scorecard summarizes the current state of inclusion within the District using 32 sets of data that show participation and success rates in the four key functional areas used in this report: innovation infrastructure, education, employment, and entrepreneurship. Each score is rated out of 5.

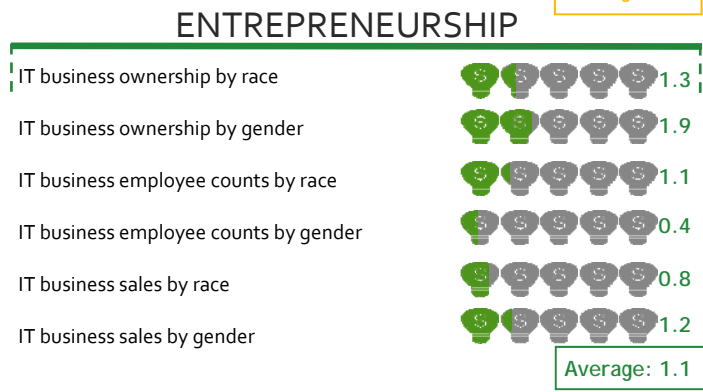
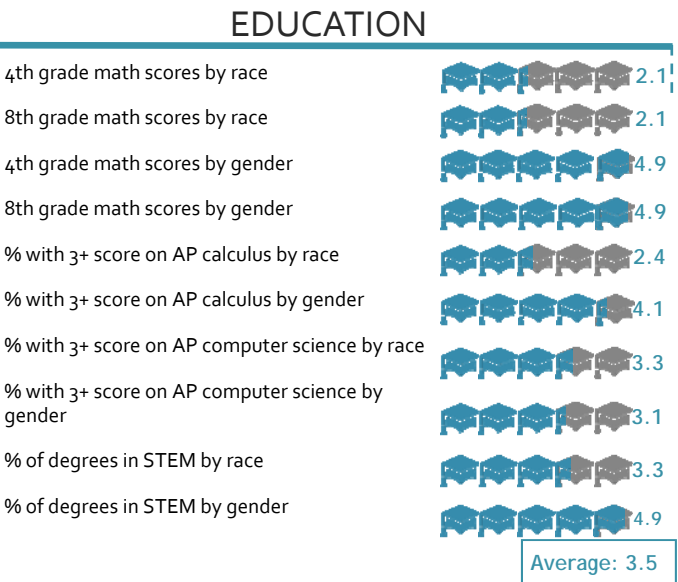
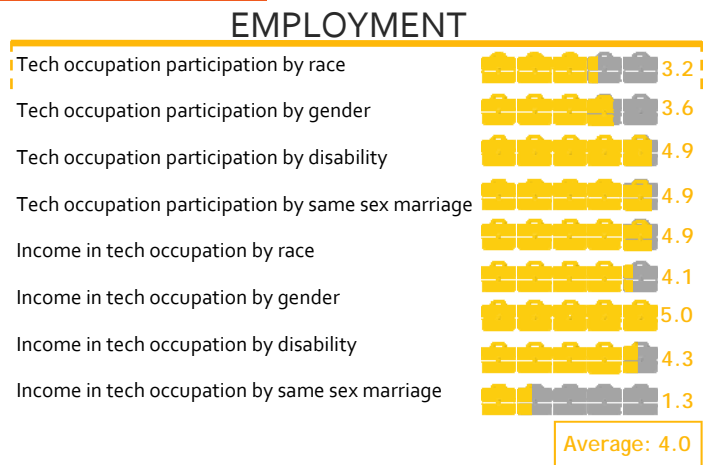
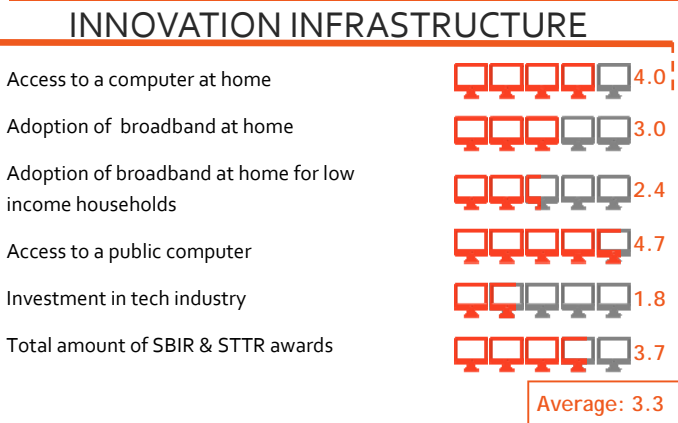
Among the four areas, entrepreneurship requires the most immediate attention and improvement. The average of the scores within this area is 1.1. Not only are diverse groups falling behind in the ownership of tech businesses, the success level of businesses owned by them is also below average.

Within innovation infrastructure, with an average 3.3, investment in tech businesses when compared with other major US cities, yields a low score. This calls for action in building a critical mass of tech activity to attract investment.

Education scores 3.5, with room for improvement in building a strong pipeline and ensuring that the gaps in test scores and achievement levels among diverse groups narrow.

From the datasets, it is evident that the level of one's education plays an important role in entering the tech economy. Making STEM (science, technology, engineering and math) degree attainment more viable and catalyzing the growth of non-bachelor tech occupations will be vital to increasing inclusion at the employment level.

DC TECHNOLOGY INCLUSION SCORECARD

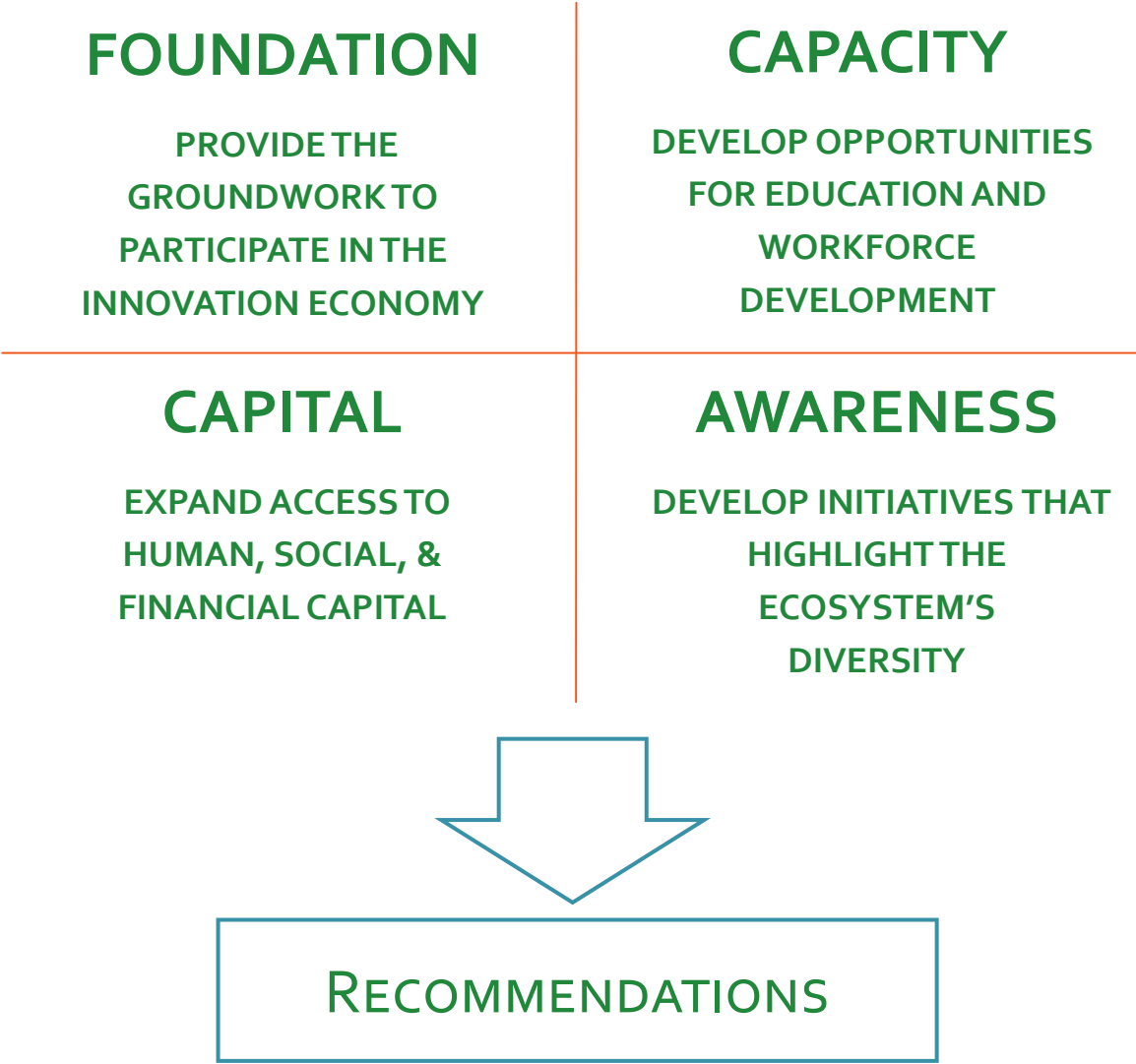


Inclusive Entrepreneurship Strategy

To transform into an inclusive tech hub, the District and key partners must embark on a strategy that addresses common barriers faced by underrepresented entrepreneurs. Scorecard data and stakeholder feedback reveal four significant barriers that will be combated during implementation of this strategy. Beginning with **foundational** tools that sow the seeds of future tech success and build educational and workforce **capacity**, the District and its partners must ensure that residents are prepared to embrace growing tech jobs and offer valuable skills.

Beyond foundational capacity, potential entrepreneurs should be inspired by seeing examples of successful entrepreneurs from diverse backgrounds. This **awareness** of their own potential can support underrepresented entrepreneurs during difficult times and shed light on a network of mentors, colleagues, and customers. Perhaps most critical to growing an inclusive entrepreneurial tech ecosystem is access to **capital** in various forms, including human, social, and financial. Companies nationwide and in the District struggle to find talent and financial capital necessary to grow. Often they lack inclusion in social networks that could connect them to these vital resources.

The District of Columbia will pursue a strategy that addresses these four barriers. Successfully tackling these challenges will enable the District to reach the ambitious tech inclusion goals.



Recommendations



F oundation

Provide the Groundwork to Participate in the Innovation Economy

Before considering an entrepreneurial path, District residents must have access to fundamental tools such as high speed internet service and devices as well as basic computer literacy skills. There is currently significant disparity in these areas for residents underrepresented in the tech economy.

Expand programs to offer low cost computers to low income residents



Without an internet enabled device, low income residents interested in entrepreneurship are unable to learn basic computer skills necessary for even entry level tech positions. Expanding programs such as EveryoneOn and Project Reboot, which provide low cost computer repair services and for sale computers, will equip residents with the required tools to participate in the tech economy.

Partner with internet service providers to offer affordable high speed broadband access to the District



The District has made great strides with its Connect.DC initiative to close the digital divide through advertisement of low cost internet options and computer literacy courses. To achieve universal and equitable adoption of high speed broadband, the District should partner with telecommunications firms that are willing to support residents and entrepreneurs who currently lack adequate internet service.

Introduce mandatory computer science and related STEM curricula for young children



Students without exposure to computer science at home or in the classroom have difficulty catching up to more savvy classmates in high school or college. Growing the next generation of coders, technologists, and tech entrepreneurs requires early exposure and training in computer science at the elementary or middle school level. Given the high degree of autonomy provided to principals in the District, a system wide requirement for computer science training offers the most effective method of ensuring a minimum level of STEM curricula.

Improve the quality of job training courses to meet employer standards



The quality of job training programs varies greatly by topic, provider, and location. Training courses could be better evaluated by accounting for student performance and job placement within training provider licensure requirements.

Note: Colored icons represent functional areas addressed by each recommendation. A low cost computer program addresses all four focus areas

Additionally, courses should be better aligned to meet industry needs by convening small and medium-sized businesses to collect their specific needs and to build a direct rapport to maintain current requirements in a fast-changing industry. Such improvement in job training courses will enable District residents to be qualified for tech jobs.

Support coding training and job experience for underrepresented residents



People of lower socio-economic status are less likely to participate in content creation due to disadvantages in education and lack of the necessary free time for the work involved in creating and maintaining blogs, websites and applications. Expanding the District's partnership with the Code for Progress fellowship program would multiply the number of low income residents with coding training and experience, growing a talent pipeline and creating role models within underrepresented communities.

BEST PRACTICE

Networking and Mentorship Opportunities

Wall Street Without Walls (WSWW) is a non-profit organization that connects capital market institutions to organizations involved in community development in low to moderate income communities. WSWW enlists the expertise of senior and retired investment banking executives who volunteer to help organizations think through their financial needs, develop a financial structure and identify sources of funding. WSWW also offers its services free of charge to organizations in need. WSWW receives funding through strategic partnerships with other organizations.

A similar model can be emulated to create an entity that connects tech investors to entrepreneurs and startups to provide networking and mentorship opportunities, which are often cited as the largest hurdle in entering the tech industry.

Capacity

Develop Opportunities for Education and Workforce Development

Growing the District's tech economy to generate more jobs is an essential component of creating a more inclusive tech entrepreneur ecosystem. Merely expanding available positions, however, will not support more diverse hiring if underrepresented workers are not prepared with the education and skills necessary to meet employers needs. Building DC residents' technical capacity is critical to realizing more diversity in tech firms.

Support entrepreneurship and job training organizations seeking to work with persons with disabilities



Though persons with disabilities are well represented as STEM workers, there remain barriers to succeeding as entrepreneurs. Organizations that offer job training and entrepreneurship programming would benefit from targeted and relevant interventions to support persons with disabilities. Examples include sign language interpreters at events, hardware in job training classrooms to accommodate physical disabilities, and training on accessible web design.

Offer unique and impactful professional development opportunities to STEM teachers



Professional development is vital to maintaining cutting edge, engaged STEM educators. Whether from limited funds, uninteresting courses, or the rapid changes in the tech sector, STEM educators could be better equipped with up-to-date industry or curriculum knowledge. Offering meaningful experiential learning opportunities, such as NASA SpaceCamp or Spring Break at Sea, which provide a 'learning by doing' approach to education, can preserve teacher curiosity and improve classroom curricula and student results.

Launch an 'Adopt a School' program



Private firms and individuals often want to support local schools but can't easily gain entry. An adopt a school program would create a volunteerism and donation marketplace to connect schools with specific, clearly defined, needs to companies and individuals. Examples include a company funding the launch of an afterschool STEM

BEST PRACTICE

Experiential Educator Learning

iPadpalooza is changing the dynamics of teacher professional development. It is a three day "learning-festival" held annually where attendees are encouraged to create teams and take part in a 36 hour challenge known as the APPmazing Race. Without any direct learning on tech or apps, teams have to complete the challenge that requires an understanding and use of tech. The experience not only gives teachers tech training, but it also teaches them a 'learning by doing' way of education for their own students.

program, tech professionals co-teaching a computer science course, or people volunteering at a STEM summer camp. A third party, such as the Carnegie Academy for Science Education, could act as an intermediary.

Launch a Tech Hire program for returning citizens



The growth of tech jobs presents a ripe opportunity for returning citizens. A Tech Hire program can close the skills gap between employer needs and residents' education by targeting training in occupational sectors projected to grow significantly. Because the District has an extremely limited pool of tech jobs requiring less than a four year degree, specialized training and structured work experience is required to prepare returning citizens for competitive tech positions.

Expand tech firm participation in the Summer Youth Employment Program



The Mayor's Summer Youth Employment Program (SYEP) has long been a prized initiative offering students work experience, wages, and an alternative to unproductive summer activities. Expanding the number of students placed in tech companies will increase exposure and demonstrate skills required to pursue careers in tech. Additionally, employers participating in SYEP could be more successful youth hosts if provided resources to support young, first time, employees such as a curriculum, goals, and student training options for the six week program term as well as cultural sensitivity training.

Launch a Program to Partner Local Tech Employers with Universities



Local students are not always aware of nearby employment opportunities that exist, resulting in a "brain drain" when they leave the District for opportunities elsewhere. To combat this, universities and employers could partner to build relationships that result in an employment pipeline for graduates. Local employers also could expand efforts to recruit interns from DC universities. Employers could have a greater on-campus presence through industry days and speaker series to introduce students in STEM-degree programs to local employment opportunities.

Access to talent, social networks, and investment funding are the most immediate and critical concerns cited by current and prospective entrepreneurs. The District offers numerous resources for founders to access capital, but few are focused on or utilized by underrepresented entrepreneurs. District government and its partners have many opportunities to offer equitable access to resources, mentors, welcoming workspaces, and likeminded founders in national ecosystems.

Create an inclusive hub for underrepresented entrepreneurs to launch and grow companies



Creating a safe, welcoming work and collaboration space for entrepreneurs from diverse backgrounds will remove several major barriers to success: unconscious bias; lack of visibility; and limited social networks. This physical hub could offer training to improve technical and business skills, as well as encourage collaboration with other diverse entrepreneurs, service providers, customers, and investors.

Support physical infrastructure needs of entrepreneurs



Growing companies require small office spaces with flexible lease terms to accommodate unpredictable growth. The District could use many policy levers to mitigate high cost, high demand space challenging entrepreneurs. Examples include collaboration with landlords to provide growth space for early stage companies through master lease agreements or required set asides at District sponsored projects as well as those progressing through a Planned Unit Development process.

Support and fund a robust capital program for underrepresented entrepreneurs



Local economic development agencies in many major centers of innovation host early stage capital investment programs. Regionally, Maryland's Technology Development Corporation (TEDCO) and Virginia's Center for Innovative Technology (CIT) are model programs. The District should consider launching a similar investment vehicle.

Funding programs, however, should not be limited to the public sector. A campaign to entice high net worth individuals to invest in DC's underrepresented entrepreneurs could effectively leverage an untapped market of funders seeking a unique investment that also supports the local community. The District is home to 220,000 high net worth individuals, fourth in US, presenting a significant opportunity for investment capital.

Connect diverse entrepreneurial ecosystems



Several meetups and networking organizations are focused on gathering diverse founders and tech economy participants, but there are many opportunities for improvement including:

- ◆ Host a pitch competition focused on underrepresented entrepreneurs;
- ◆ Launch a mentorship program for entrepreneurs from diverse backgrounds—similar to Wall Street Without Walls (described in page 11); and
- ◆ Create partnerships in other cities with diverse entrepreneurial ecosystems.

BEST PRACTICE

Leveraging High Net-Worth Individuals

For High Net-Worth Individuals (HNWIs), tech startups provide great investment opportunity. A 2015 survey by Morgan Stanley found that HNWIs see tech as a top favored sector for investment. Well-known actor and tech investor, Ashton Kutcher, has been an early investor in companies like Foursquare, Uber, Airbnb and Skype. In 2011, Kutcher saw substantial returns when Skype was purchased by Microsoft for \$8 billion.

There are a number of firms who cater to HNWIs. The Clubhouse Investment Club features celebrities who are able to use their network to promote startups of interest. Onevest conducts mixers with HNWIs and selected startups, connecting HNWIs directly to investors which allows them to make a connection with a startup, rather than working through fund managers. The District of Columbia is home to more than 220,000 HNWIs (fourth in US). This presents significant opportunities for HNWIs, specifically women and minorities, to invest in local tech startups.

Awareness

Develop Initiatives that Highlight the Ecosystem's Diversity

Awareness manifests in many forms. To enable or expedite their success, entrepreneurs should be aware of available resources and models or mentors. Tech employers should be aware of both the level of diversity in their firms and sources of diverse talent from which they can hire. Government should be aware of how it leverages its contracting relationships to meet tech inclusion goals. Some forms of visibility can be achieved through marketing, while others require policy. However, all are critical to transforming the District's tech ecosystem.

Create marketing strategy that spotlights diverse successful entrepreneurs and STEM professionals



A campaign centered around the stories of successful underrepresented technologists and entrepreneurs in DC will offer critical role models to youth and adult innovators alike. Spotlighting successful participants in DC's tech and innovation ecosystem offers the impact of encouraging more underrepresented innovators to pursue an idea; to continue to persevere despite challenges; as well as attracting likeminded entrepreneurs, investors, and corporations, who desire to be a part of an inclusive community. This can be done by showcasing successful underrepresented entrepreneurs and companies with inclusive hiring practices in place. Media outlets dedicated to diversity outreach could be potential partners.

Build a suite of resources for companies at all stages of development



Government agencies, universities, non-profit organizations, and industry associations offer a myriad of resources to DC tech entrepreneurs, including training, mentorship, networking events, pitch competitions, and pro bono professional services. These resources would be more helpful if they were centrally located and kept up to date. A central online repository of key resources updated regularly would provide a point of entry and tools necessary for success to underrepresented entrepreneurs without deep social networks in DC's tech ecosystem. The Detroit Bizgrid—an online directory that helps entrepreneurs navigate available resources in the city of Detroit, provides a model roadmap of resources.

Foster opportunity for diverse STEM professionals through blind, merit-based hiring, to reduce implicit bias



Tech employers can create more diverse workplaces by addressing unconscious hiring bias. Using a blind hiring mechanism such as a skills assessment, coding challenge or nameless resume, employers can open the door to

unexpected hires. This can diversify employee composition, helping to ensure that women, minorities and those individuals with unique backgrounds have the opportunity to contribute to a team. Several companies, such as Blendoor, offer online platforms for employers seeking to anonymize job applicants and hire based on skills and experience.

Encourage inclusive hiring among DC contractors, including subcontractors/CBEs that participate in inclusive job training programs



Governments have significant purchasing power to promote values-driven initiatives with vendors. DC currently has a robust small and local business program. This model can be extended to incentivize diverse hiring or funded training for underrepresented STEM workers.

Additionally, current employment barriers for returning citizens, such as stringent background investigations for District IT contractors, should be evaluated to consider their costs to ex-offenders compared to the benefits to the District.

BEST PRACTICE

Blind Hiring

Unconscious bias is often said to influence the hiring process of many organizations in the tech industry, leading to a disproportionate representation of diverse groups. As an effort to eliminate such bias, companies such as *Blendoor* and *Gapjumpers* have introduced a 'blind hiring' process where employers screen or employ job seekers based only on their skills and abilities.

Blendoor matches employers with potential employees that meet their qualifications without the disclosure of name, race or picture. The employer only meets the potential employee at the interview stage. *Gapjumpers* is another online service that allows employers to create tasks and choose potential employees based on the completion of these tasks, equivalent to a blind audition. By using such services and thus eliminating unconscious bias, firms are said to hire more diverse individuals they would not otherwise.

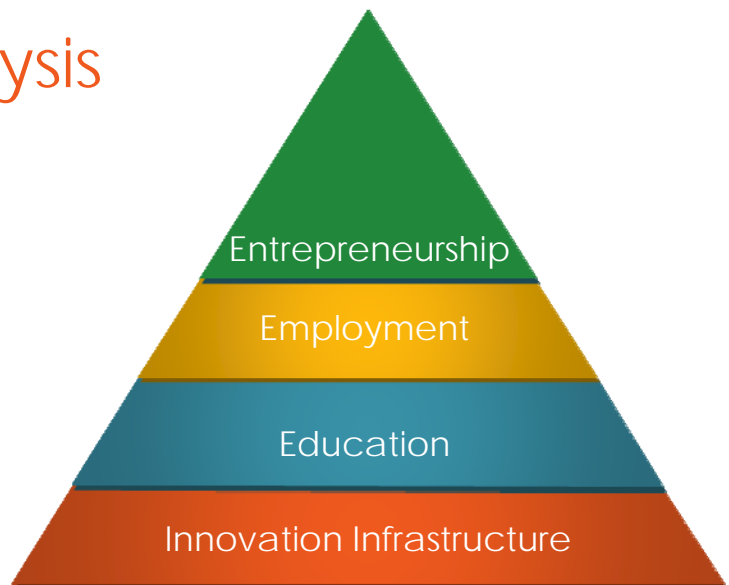
Data Analysis & Key Findings



Tech Inclusion Analysis

Effective, impactful strategies require a firm understanding of the current state of affairs to inform and support recommendations. With this in mind, the District dedicated much time to assessing the existing state of tech inclusion through quantitative measures and perceived barriers to entry and success. Data from four distinct and related focus areas illustrate the level of participation and success diverse residents achieve in DC's tech community and economy. As building blocks of a thriving and inclusive tech hub, innovation infrastructure, education, employment and entrepreneurship interrelate and frame DC's tech ecosystem.

Full inclusion in any of the four areas that form the pyramid is imperative in ensuring equal opportunity. Innovation infrastructure, such as broadband and devices, are the foundation that education, employment and entrepreneurship rely upon. With the fundamental base in place, education helps people take a step towards tech employment or entrepreneurship. Employment in the tech industry is founded upon the training and skills that build on one's education and foundation. With the resources, networks, education and skills from the other three steps, one is more likely to become a thriving entrepreneur.



industry experts and participants interested in increasing tech inclusion. Interview attendees were asked to share their experience and thoughts on the state of tech inclusion within the District, main challenges, and recommendations.

Ghost Note Agency, a digital communications firm based in DC, designed and conducted a survey to investigate the state of inclusion within the tech community in the District. A total of 37 respondents participated in the survey.

Inclusion Scorecard

Scores for metrics that measure participation levels by race, gender, disability and same-sex marriage status are calculated by taking the difference between the participation rate of a demographic group and the population ratio or ratio of all employment of the relevant group in DC. For metrics that measure success rates by various demographic groups, such as income and test scores, the difference is made between the average performance of all groups and each group's performance.

Access to a computer and broadband adoption at home were both calculated using the average of each racial group's accessibility and adoption rate. For the amount of investment in the tech industry and of Small Business Innovation Research (SBIR) & Small Business Technology Transfer (STTR) awards, DC's figures were compared to the average of 50 states.



Methodology

Data and tools

The District leveraged publicly available data, interviews, focus groups and a survey for this report. Quantitative research was conducted with the help of MBA candidates from the Howard University School of Business.

Data was primarily gathered from publicly available sources, such as U.S. Census Bureau, Integrated Public Use Microdata Series and the National Science Board. AP scores and venture capital investment data were requested from College Board and the National Venture Capital Association.

'Tech workers' and 'STEM degrees' refer to categories defined as 'STEM Occupations' and 'STEM Degrees' in a 2013 report published by the U.S. Census Bureau ("Disparities in STEM Employment by Sex, Race, and Hispanic Origin").

The MBA candidates also conducted best practice research, and featured models were selected based on cost-effectiveness and infrastructural feasibility.

A total of 25 interviews with industry experts and specialists took place. Focus groups on education, entrepreneurship and training/employment collected thoughts from 30

Innovation Infrastructure

Improving foundational tools, such as broadband adoption rate and access to devices, as well as increasing total capital invested in tech will enable residents to become more active participants in tech entrepreneurship.

Interview and Focus Group Findings

The importance of accessible and affordable computers and broadband for exposure and early learning was raised in every focus group conducted for this strategy, and by most interview participants, as critical to the success of tech inclusion efforts. Regardless of the primary discussion topic, education, employment, or entrepreneurship, consistent access and use of these foundational tools were cited as required ingredients to increase inclusion.

Insights

A Pew Research Center survey reported that 73% of teachers nationwide ask students to access assignments online and 76% require them to submit assignments in this manner. Without broadband at home, students' out of school time must balance the hours of publicly available computer labs and businesses with Wi-Fi with other obligations, such as part time work, extracurricular activities, and family responsibilities.

Jobseekers are also challenged by a lack of broadband. A Pew Research Center study revealed that 79% of people

searching for a new position used internet resources for their job search. Experience with tech tools is particularly pivotal for those interested in a position within the tech economy. Increasingly, digital firms seek applicants who have specialized training and experience. Residents without exposure to and experience with computers, as well as internet navigation and search tools are at a disadvantage to apply for these positions.

Broadband Adoption Rates and Access to Devices

As of 2015, the District has a broadband adoption rate of 74%, up from 57.9% in 2008, but there is a significant level of disparity among races. Only 59% of Black residents have a computer with broadband at home, compared to 71% of Hispanic, 83% of Asian, and 96% of White residents (Exhibit 1). The gap in broadband adoption is also apparent along socioeconomic fault lines. Residents earning over \$75,000 have a 92% adoption rate compared to 61% earning less than \$35,000 (Exhibit 2).

Access to a computer in the home is equally important to engagement in the tech economy. Becoming a tech

Exhibit 1

PRESENCE OF COMPUTER AND BROADBAND SUBSCRIPTION IN A HOUSEHOLD BY RACE (2015)

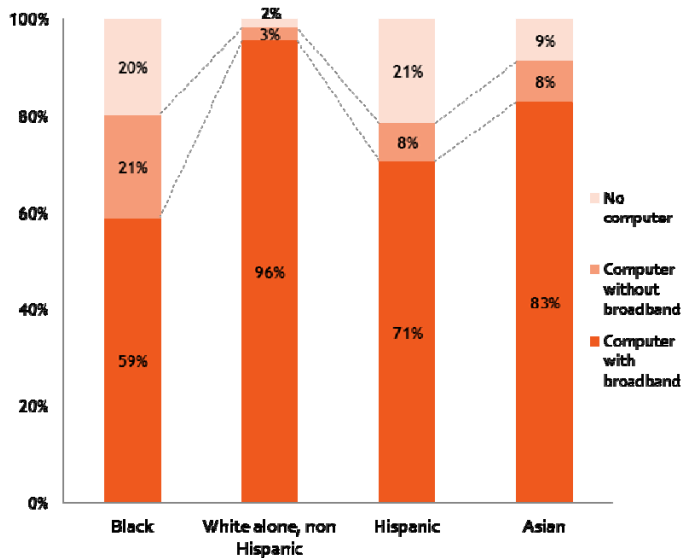
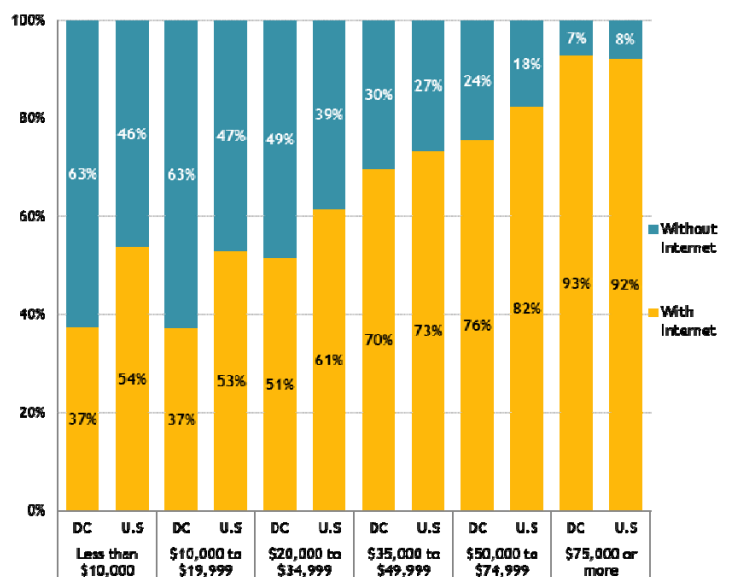


Exhibit 2

BROADBAND ADOPTION RATE BY INCOME LEVEL (2014)

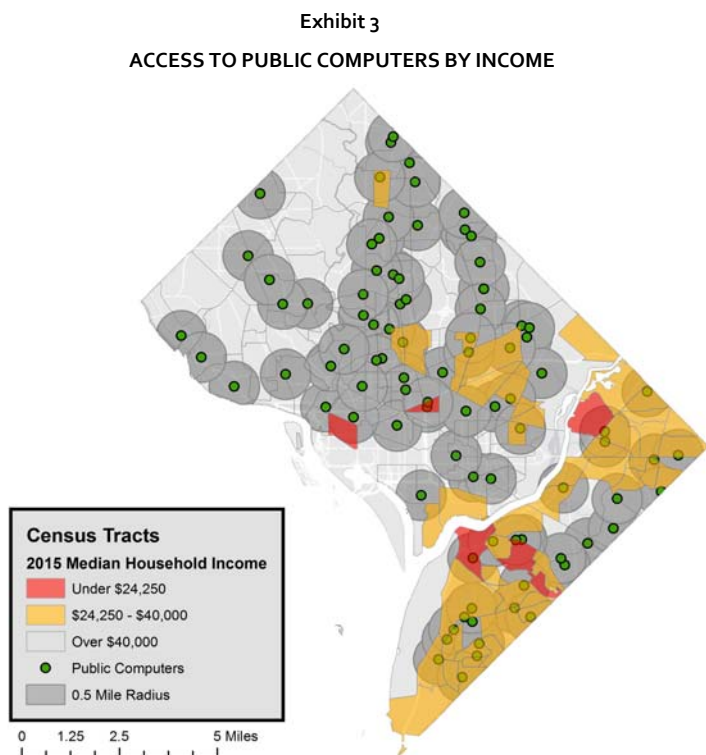


entrepreneur is challenging without a personal computer or broadband to work on long term coding projects, download unconventional software, store work in the cloud, or participate in social forums with likeminded technologists. Many of the greatest tech entrepreneurs learned to code and design applications as a hobby, outside structured classroom environments. This early and flexible exposure offered a head start for their formal training.

In the District, 98% of White households have a computer, compared to 91% of Asian, 79% of Hispanic, and 80% of Black households. Black homes have the greatest concentration of available computers without broadband access. In some cases these households continue to use dial-up service, while others maintain a siloed machine with limited functionality (Exhibit 1).

Households without computers often rely on public libraries and community development organizations with labs for homework, job hunting, and communication. There are currently 90 such locations in the District, but they do not provide complete coverage of the areas most in need.

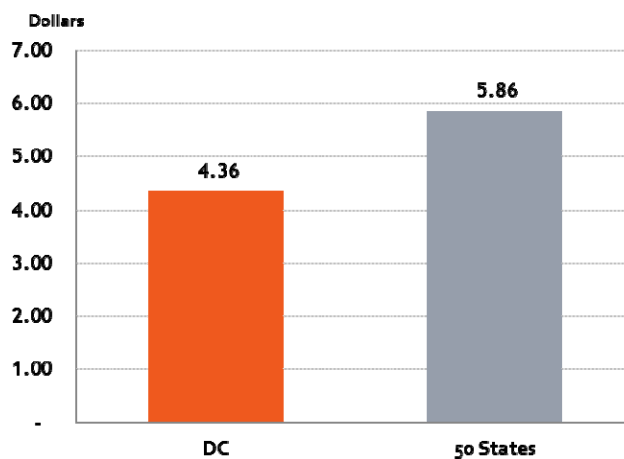
Exhibit 3 overlays census tracts by income level and publicly available computer labs with a 0.5 mile buffer. Median household income of between \$24,250 and \$40,000 is shown in yellow, and income of less than \$24,250, which is the federal poverty level threshold for a household of four, is red. Within the red and yellow areas, a total of 4.5 square miles of neighborhoods do not have access to a public computer within a half mile trip.



Investment in Small Tech Businesses

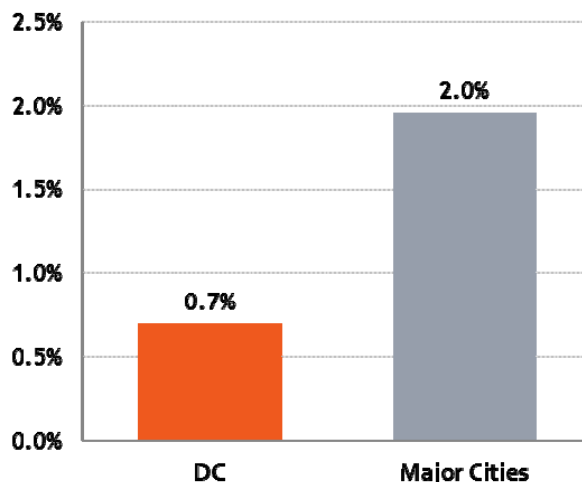
Investment in small tech businesses is foundational to building innovation infrastructure. The amount of investment in DC's small businesses, as shown by the total amount invested in the Small Business Innovation Research (SBIR) and Small Business Tech Transfer (STTR) programs, is more than a dollar per capita behind the average of 50 states (Exhibit 4). This is notable because DC is overrepresented by tech businesses, but is not leveraging a basic federal innovation tool. DC's unlocked capital ratio, calculated by the total tech investment divided by GDP in the last five years, is a mere 0.7%, compared to 2.0% of other major cities in the country (Exhibit 5).

Exhibit 4
SBIR/STTR AWARD AMOUNT PER CAPITA (2015)



Source: SBIR/STTR Award Database

Exhibit 5
UNLOCKED CAPITAL RATIO (TOTAL TECH INVESTMENT/GDP)



Source: PwC Moneytree, 1776 Innovation That Matters Index

Education

Early education and exposure to technology is critical in preparing residents to enter, advance and thrive in the tech industry.

Interview and Focus Group Findings

Participants overwhelmingly agreed on the importance of early education and exposure to tech tools as a strategy to improving inclusion. Many felt that students do not connect well with curriculum that is not culturally relevant to them nor with role models within tech who are not relatable.

Principals who are dedicated to improving STEM education often have limited resources in terms of computer science teachers, funding and personnel for out of school programming, and insufficient hardware to run impactful programs.

The high degree of school principals autonomy in curriculum development and after school programming also makes it difficult to offer students a consistent experience. This alone is not an adverse factor, given that programming must meet students at their current level or aptitude, however, it can be problematic if a school's leadership does not prioritize STEM exposure and education.

Insights

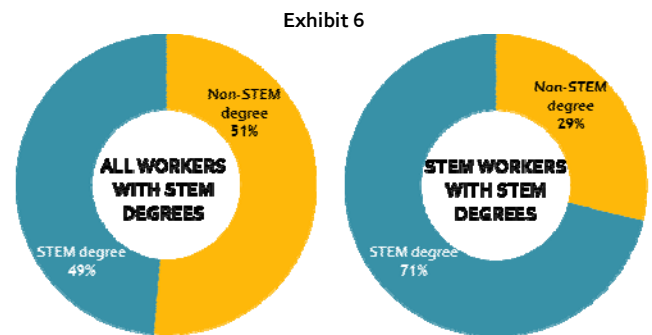
Education in STEM fields is at the core of future economic success in the tech industry. The majority (71%) of STEM occupations are held by employees with a STEM degree compared with 49% for non-STEM jobs. Additionally, STEM education offers higher salaries. Seventy-one percent and 38% of STEM degree holders earn over \$60,000 and \$100,000 respectively, compared to 63% and 29% of non-STEM degree holders (Exhibits 6,7). To track tech inclusion through education, and thus opportunities to become a tech entrepreneur or join a growing tech firm, this report analyzes key groups' participation and success across the elementary, middle, high school, and higher education levels.

Disparities by Race

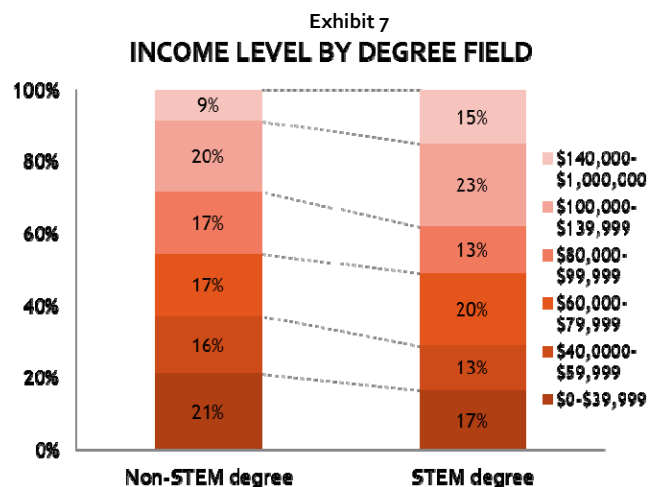
Black and Hispanic populations underperform in math compared to their White peers in 4th grade, and continue to fall behind throughout middle and high school. These students' academic achievement falls slightly behind the national averages for their peers at the elementary and middle school levels. White students' math scores in DC, conversely, far exceed the national average for their White peers. Additionally, White students in DC are the only group with an average score designated as "Proficient" by testing

standards. It is worth noting that these figures include both public and private school students (Exhibits 8,9,10,11). Having started on a similar footing, Hispanic students exceed Black student achievement in terms of AP Computer Science and Calculus testing success, but both fall behind their peers nationally. Just 30% of Hispanic students and 20% Black students in DC pass AP Computer Science with a score of 3 or higher compared to national rates of 42% and 38% respectively. The only group to exceed the national average of students scoring higher than a 3 on either the AP Computer Science (86%) or Calculus (75%) exams were White students in DC (Exhibits 12, 14).

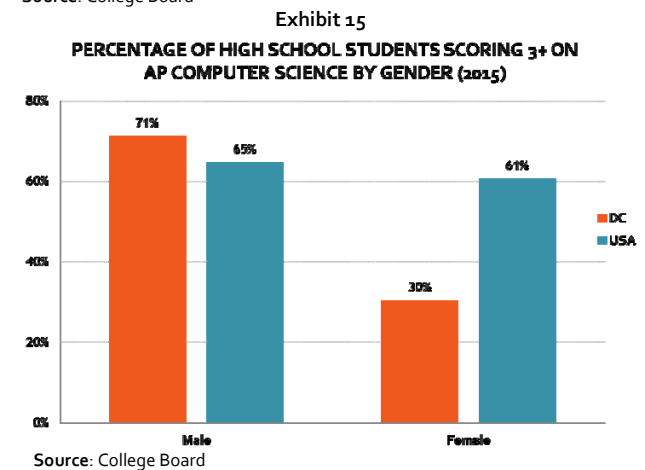
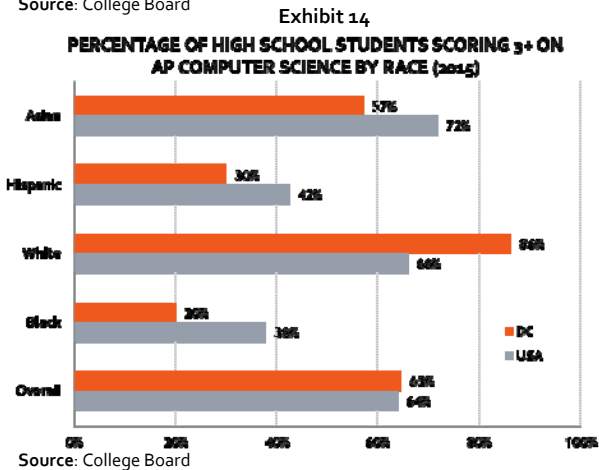
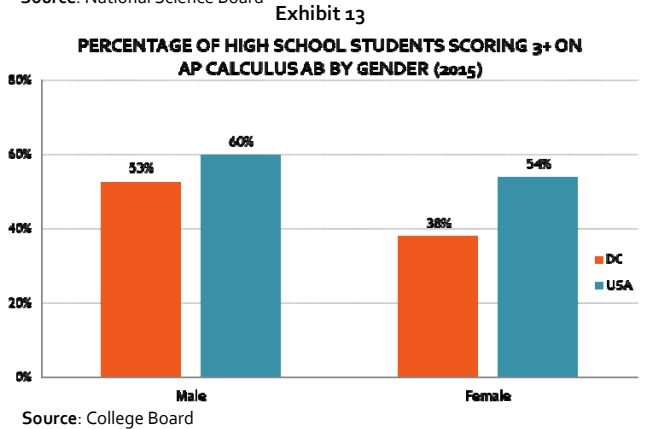
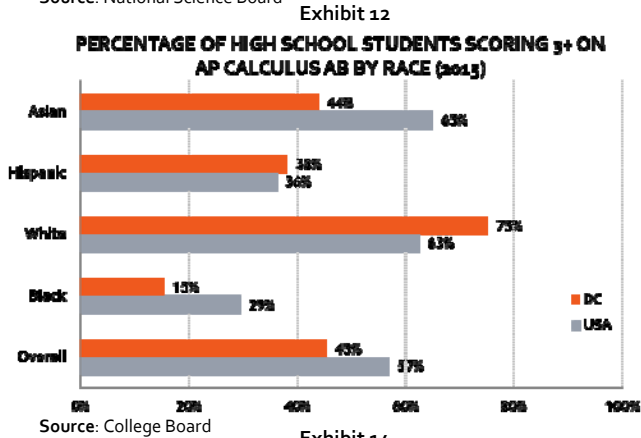
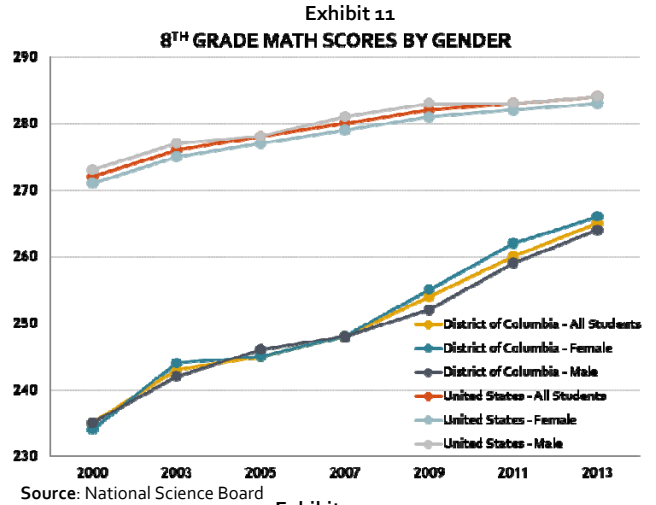
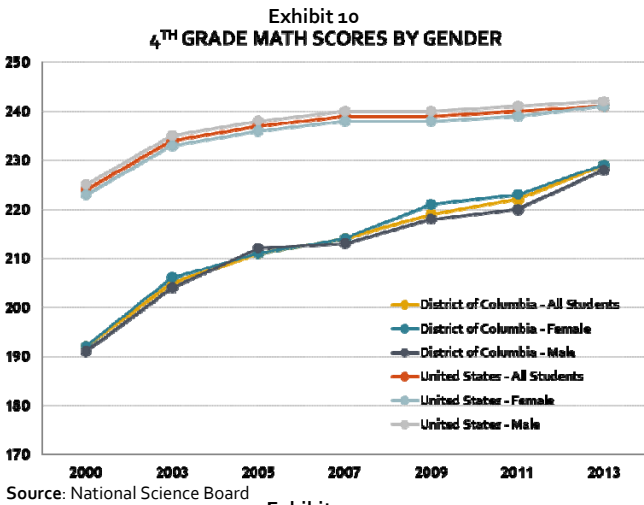
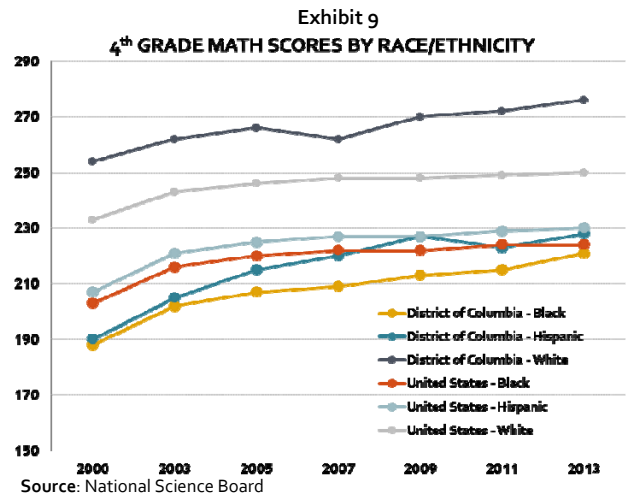
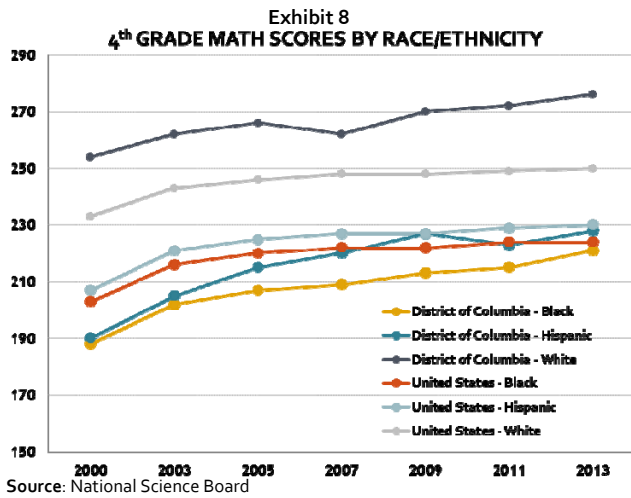
The disparity in STEM higher education degrees is less apparent. Forty one percent of Black degree holders have an undergraduate degree in a STEM field, compared with 45% of Non-white Hispanic and 49% of White neighbors. An impressive portion of Asian residents, 72%, have a STEM degree (Exhibit 17).

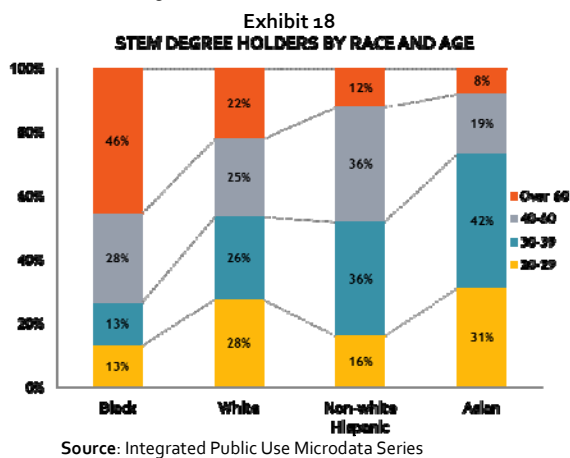
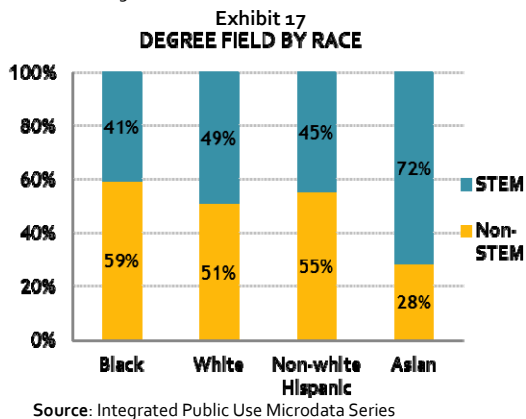
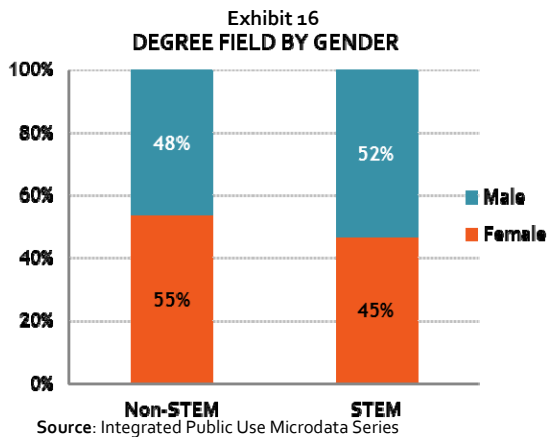


Source: Integrated Public Use Microdata Series



Source: Integrated Public Use Microdata Series





While this appears to exhibit a level of inclusion, further analysis reveals that over 70% of Black STEM degree holders are over age 40, suggesting a limited pipeline of talent to maintain this equity. Comparatively, only 54% of White, 48% of Non-White Hispanic, and 27% of Asian STEM degree holders are over age 40. This disparity suggests that students are unprepared for, or uninterested in studying STEM. Alternatively, STEM graduates may have relocated to the District for advanced jobs in tech companies or government, rather than being raised and educated locally (Exhibit 18).

Disparities by Gender

The success of female STEM students is equally nuanced. For every group except White residents, women hold a greater number of STEM degrees than men. Women’s STEM success begins early in their educational pathway. In both 4th and 8th grade math, girls’ performance slightly exceed boys’, though both hover near the District’s average score. Significantly, this average score falls far below the national average for math scores (Exhibits 10,11).

Women’s STEM education success breaks down at the AP level, where they perform at a far lower level than males in DC, as well as their female counterparts in the rest of the country. With the exception of AP scores, however, sex of student is not as stark a differentiator in STEM education as race and ethnicity. Women hold nearly as many STEM degrees as men. However, as shown in the Employment section, there is a disconnect between degree attainment and STEM workforce participation (Exhibits 13, 15, 16).

Barriers to Tech Inclusion in Education

| Professional development for STEM teachers is inadequate | STEM classroom curriculum is inconsistent and disconnected from students | Out of school time is a missed opportunity | Schools have limited and dated hardware | Students do not see relatable examples of technologists |
|--|---|--|---|---|
| <ul style="list-style-type: none"> Funding is limited Participation by teachers is low Principals are unaware of many STEM programs | <ul style="list-style-type: none"> Content is not culturally relevant Curriculum does not meet students where they are STEM teachers are a rare commodity Principals have significant autonomy in curriculum design | <ul style="list-style-type: none"> Schools are not adopting available after school programs Schools lack personnel to lead programs Schools do not have startup funds to launch programs Summer STEM programming is limited by funding | <ul style="list-style-type: none"> Hardware at schools inconsistent Schools lack sufficient number of computers Broadband connection is inconsistent | <ul style="list-style-type: none"> Students lack exposure to interesting tech professionals Students do not have sufficient exposure to internships in tech companies |

Employment

Preparing a diverse group of District residents to become tech workers provides a critical talent pipeline for growing businesses.

Interview and Focus Group Findings

To become the nation’s premier hub of tech inclusion, the District must increase opportunities for diverse workers and reduce barriers to entry and success. During interviews and focus groups, participants expressed concerns over basic needs, such as soft skills training, housing and childcare. Most agreed that the lack of basic needs plays a leading role in jobseekers choosing to quit training programs.

Additionally, networking plays an important role in tech employment. Stakeholders suggested that firms should be incentivized to provide networking opportunities to diverse populations. They also advocated for the important role of diverse leaders to inspire diverse people to join the industry.

Insights

The District’s working population is more diverse than those of other cities. Female workers (53%) outnumber males and Non-white workers make up 57% of the employed population. The diverse nature of the District is not reflected in the tech sector, however. The number of tech jobs in DC totals just under 30,000, of which over 17,000 are held by women and non-white professionals. Only 37% of tech workers in DC are women and the Non-white population comprise only 28% of the tech sector (Exhibit 19). Tech workers include

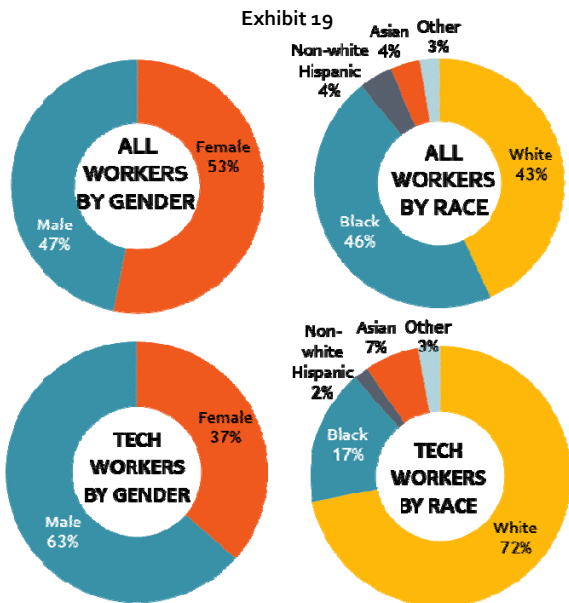
professionals in computer and information systems, engineers, and natural sciences. Healthcare workers and architects are excluded.

Participation of Diverse Groups in Tech Industry

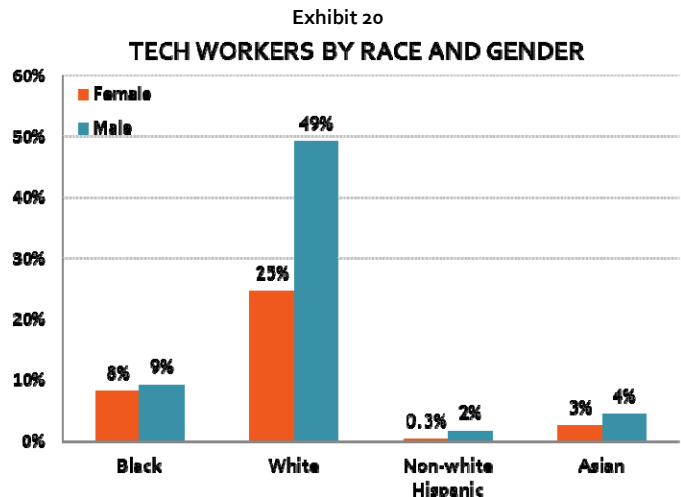
Despite the appearance of poor participation, female tech workers (37%) fare better in DC than the country as a whole. Representation of women in the District’s tech sector exceeds the national average of 26%. Conversely, representation of the Non-white population in DC requires attention. Given that the ratio of Non-white population nationally is much lower than that of the District, it is falling behind in diverse employment (Exhibit 19).

Forty nine percent of all tech workers in DC are White men and 25% are White women; nine percent are Black men, and 8% are Black women (Exhibit 20). This shows two trends. First, about half of the DC tech industry is dominated by White men. Second, within every racial/ethnic group, there are fewer female tech workers than male tech workers.

When broken further into age cohorts, there is concern for the future of diversity in DC, especially for the Black population. For White and Asian populations, the ratio of tech workers under age 60 is 87% and 100% respectively, while the figure is only 61% for both Blacks and Non-white Hispanics. The ratio of Black workers under the age of 30 is only 10%. This indicates that there are too few diverse workers in the pipeline to take leadership positions or found their firms in the future (Exhibit 21).

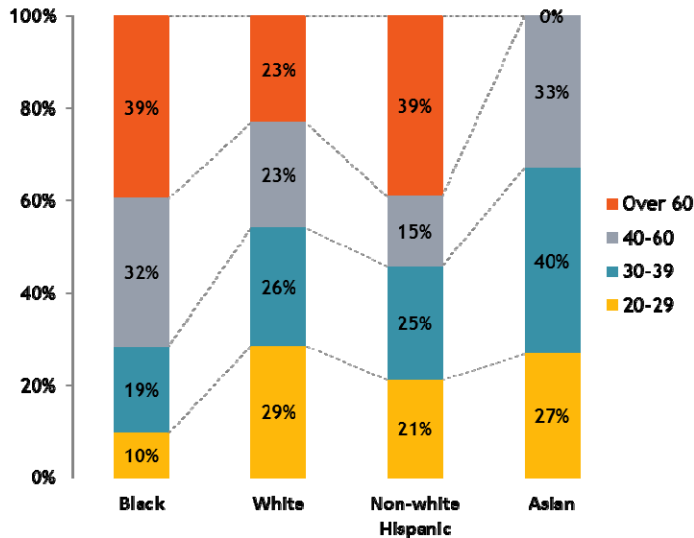


Source: Integrated Public Use Microdata Series



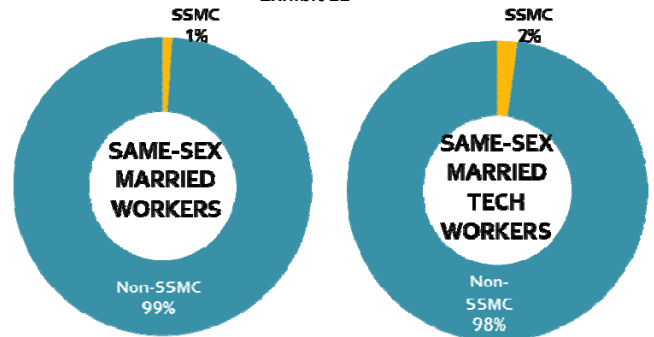
Source: Integrated Public Use Microdata Series

Exhibit 21
TECH WORKERS BY RACE AND AGE



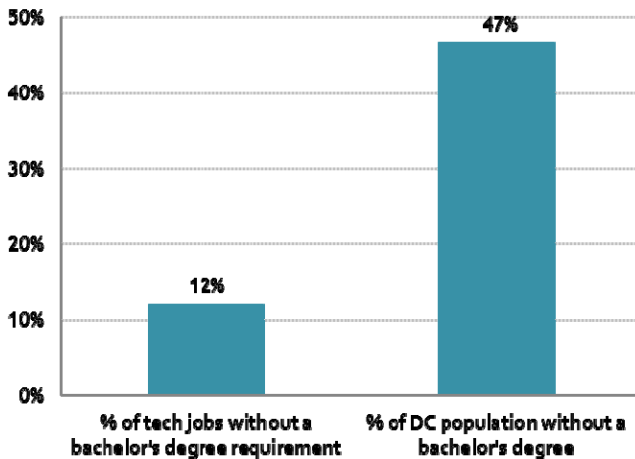
Source: Integrated Public Use Microdata Series

Exhibit 22



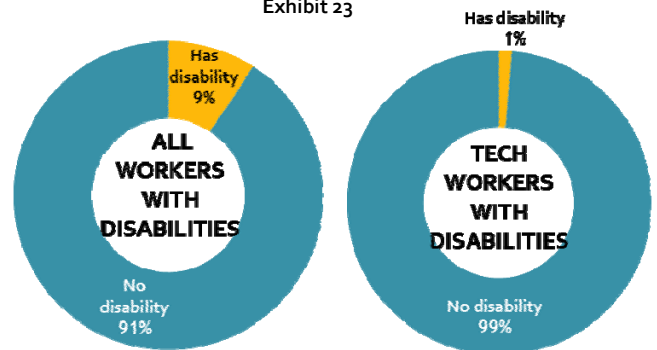
Source: Integrated Public Use Microdata Series

Exhibit 24
RATIO OF TECH JOBS WITHOUT A BACHELOR'S DEGREE REQUIREMENT



Source: Integrated Public Use Microdata Series

Exhibit 23



Source: Integrated Public Use Microdata Series

Barriers to Tech Inclusion in Employment

| Networking is lacking and unconscious bias is common | Many job training programs are inadequate | Training programs need to consider other basic needs of job seekers | DC Government programs do not promote inclusion | There are not enough diverse leaders in tech |
|--|--|---|---|--|
| <ul style="list-style-type: none"> • Networking and referrals in tech jobs play a big role • Tech industry tends to refrain from hiring outside the box • Training opportunities are not shared through relevant networks | <ul style="list-style-type: none"> • Too many programs are focused on entry level positions • Quality of community college workforce development training is inconsistent and poor • Employer training in SYEP programs is not provided | <ul style="list-style-type: none"> • Soft skills training is not offered • Housing problems and legal challenges discourage students from learning • Programs need to be supported with provision of broadband and device access | <ul style="list-style-type: none"> • DC Government IT contract background checks limit inclusion • There is a lack of skills training for SYEP youth • There are few options for youth skills training • Employer training in SYEP programs is not provided | <ul style="list-style-type: none"> • Lack of diverse leaders discourages job seekers from joining tech industry |

Same-sex married couples are well represented in comparison. Approximately 2% of DC tech workers are in same-sex marriages, whereas only 1% of the workers in the District overall self reported to be in a same-sex marriage (Exhibit 22).

Conversely, 9% of the working population under age 60 in DC reported having one or more disabilities, but only 1% of the tech workers have the same attribute (Exhibit 23).

Education is a major hurdle for individuals hoping to enter the tech industry in DC, as tech jobs that do not require a bachelor's degree are scarce. Eighty eight percent of tech jobs in DC require a bachelor's degree, though nearly half of DC's population do not have one (Exhibit 24).

Success of Diverse Groups in Tech Industry

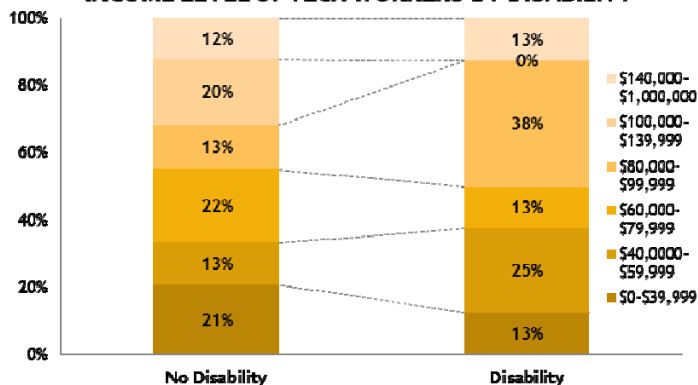
The level of tech worker success, as measured by income in this report, does not show great disparity. The percentage of Black tech workers earning over \$80,000 is 29%, while that of White workers is 33%. For Asians and Non-white Hispanics, the ratio is slightly higher than that of the White population, at 37% and 34%, respectively (Exhibit 25).

There is a larger ratio of tech workers with one or more disabilities (51%) that earn more than \$80,000, than those without disability (45%) (Exhibit 26). Similarly, income levels of same-sex married tech workers in DC are higher than non same-sex married workers. Fifty seven percent of same-sex married tech workers make over \$80,000, while the figure is 45% for non same-sex married workers (Exhibit 28).

Income disparity between gender groups is noticeably higher than it is for other demographics. Only 35% of female workers earn more than \$80,000 compared to 51% of males (Exhibit 27). As might be expected, income levels correlate with age; older tech workers earn higher salaries (Exhibit 29).

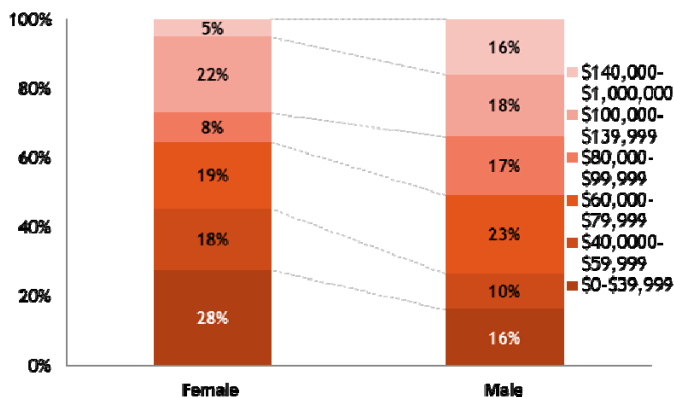
The data reveals that once one has entered the tech industry, success is not distinctly affected by individual characteristics. Barriers to entry, however, are high, especially the barrier of education.

Exhibit 26
INCOME LEVEL OF TECH WORKERS BY DISABILITY



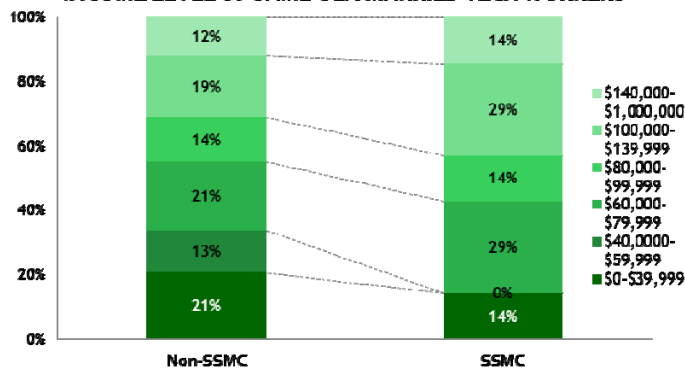
Source: Integrated Public Use Microdata Series

Exhibit 27
INCOME LEVEL OF TECH WORKERS BY GENDER



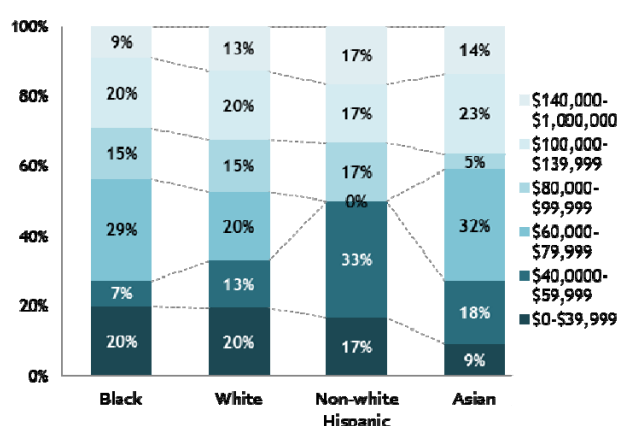
Source: Integrated Public Use Microdata Series

Exhibit 28
INCOME LEVEL OF SAME-SEX MARRIED TECH WORKERS



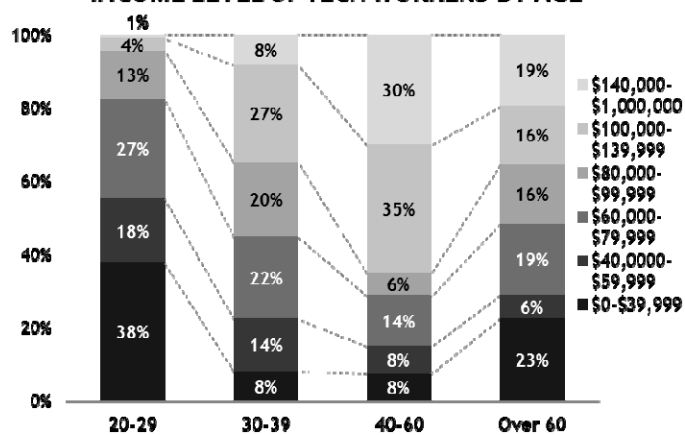
Source: Integrated Public Use Microdata Series

Exhibit 25
INCOME LEVEL OF TECH WORKERS BY RACE



Source: Integrated Public Use Microdata Series

Exhibit 29
INCOME LEVEL OF TECH WORKERS BY AGE



Source: Integrated Public Use Microdata Series

Entrepreneurship

Growing an ecosystem where diverse entrepreneurs can thrive will help the District attract talent, enable entrepreneurial residents, and establish itself as a premier hub for tech inclusion.

Interview and Focus Group Findings

Access to social, human, and financial capital comprise the most significant barriers to entry and success for underrepresented entrepreneurs. The District was described by participants as less collaborative than major west coast centers of innovation. Though many resources are available for entrepreneurs, they are diffuse and difficult to locate without access to a myriad of social networks.

Survey participants, most of whom are diverse entrepreneurs, policy advocates and professionals in the District, rated DC's inclusiveness at an average 5.2 out of 10 (Exhibit 30). DC is a more inclusive city in the eyes of newcomers. Those with over 7 years of residence in DC rated its inclusiveness at an average 4.8, whereas those with shorter tenures gave a higher rating on average (Exhibit 31). As the majority of the participants in the survey were long term residents, this lowered the overall rating. Moreover, out of those that expressed an opinion, 69% said that DC is on par with, or marginally better than other cities.

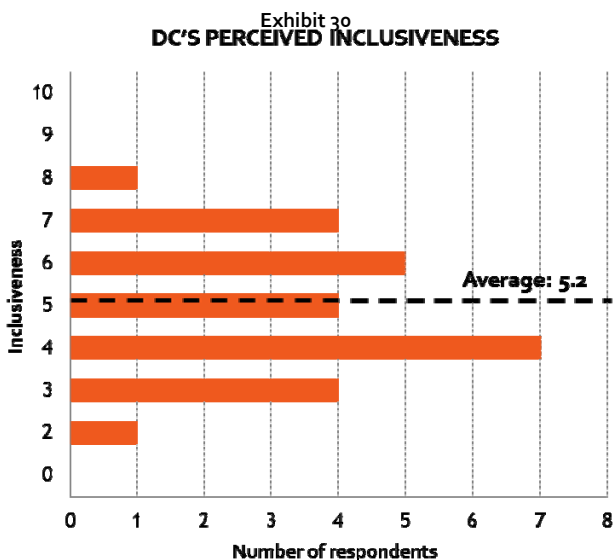
Access to capital was identified most frequently by surveyed entrepreneurs (58%) as a barrier to inclusiveness in DC, followed by implicit bias (48%), access to networks (48%), and access to talent enablement programs (23%). Venture capitalists tend to invest in companies founded by people

like themselves or those who match the profile of previously successful founders, thus perpetuating a lack of diversity among funded companies. Those entrepreneurs who arrange meetings with investors are often unequipped to pitch their ideas effectively.

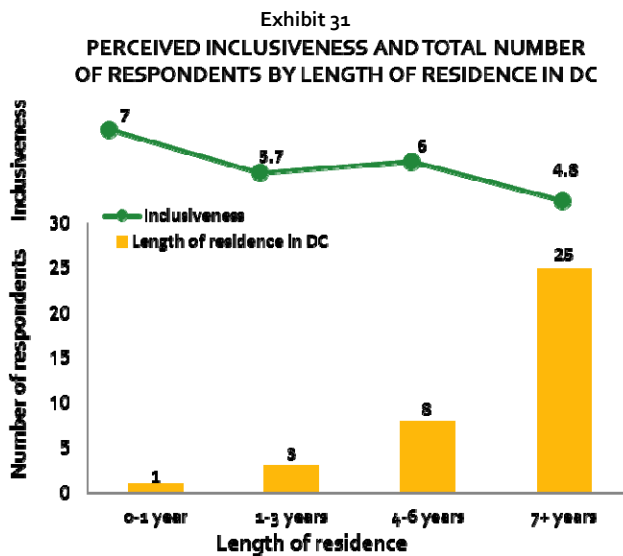
Though the District offers an impressive suite of tax incentives to mature tech firms, they offer limited incentives for early stage startups, that are most in need. The District has found success with many of its investments in the tech industry and there is an opportunity to expand upon this by dispersing resources to businesses at various stages of growth.

A significant barrier to entry in the District's ecosystem by diverse founders is the lack of role models. There are few examples of successful technologists or entrepreneurs from underrepresented communities. This lack of visibility discourages would-be entrepreneurs from pursuing their ideas entirely, or persevering through inevitable challenges.

The District needs to improve its culture of inclusion. Many entrepreneurs feel uncomfortable or unwelcome at the District's largest hubs of innovation, major tech entrepreneurship events, and even in programs designed to improve their success.



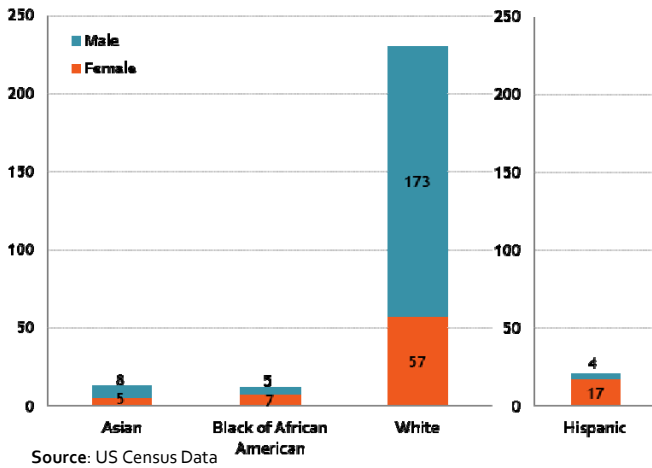
Source: Ghost Note Media



Source: Ghost Note Media

Exhibit 32

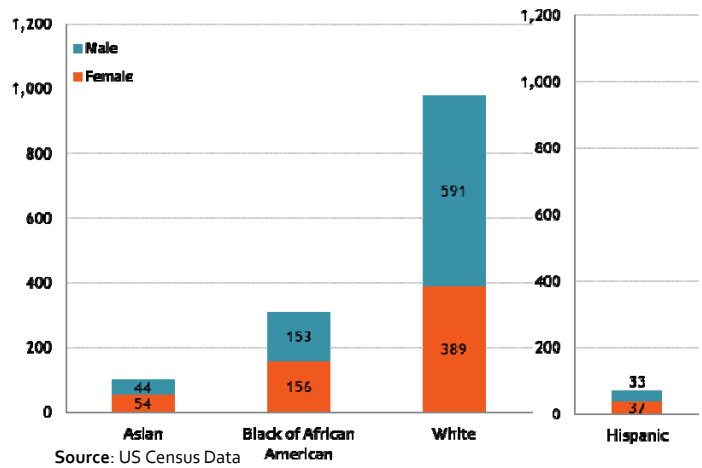
NUMBER OF IT BUSINESSES WITH PAID EMPLOYEES



Source: US Census Data

Exhibit 33

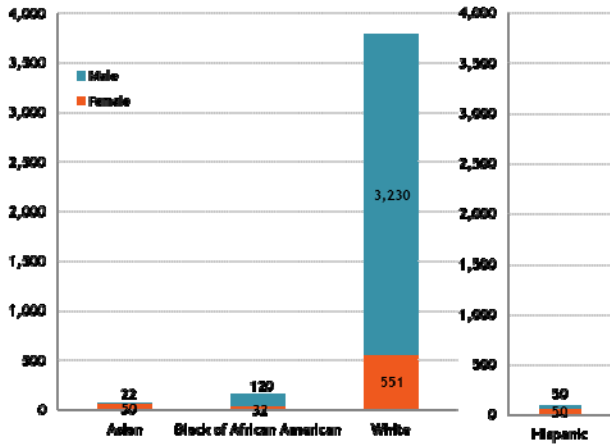
NUMBER OF IT BUSINESSES WITHOUT PAID EMPLOYEES



Source: US Census Data

Exhibit 34

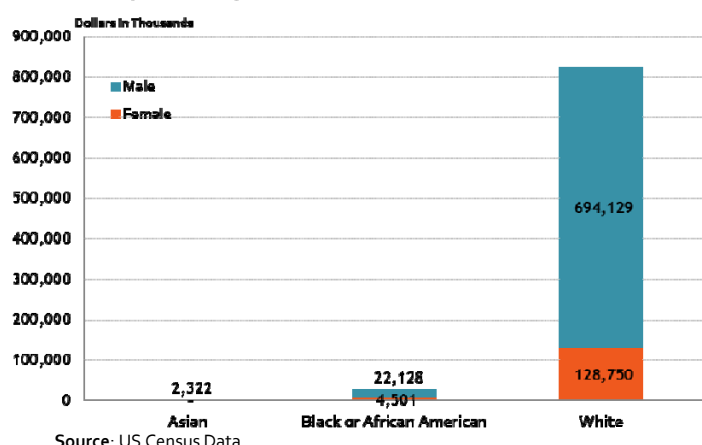
NUMBER OF PAID EMPLOYEES IN IT BUSINESSES BY RACE



Source: US Census Data

Exhibit 35

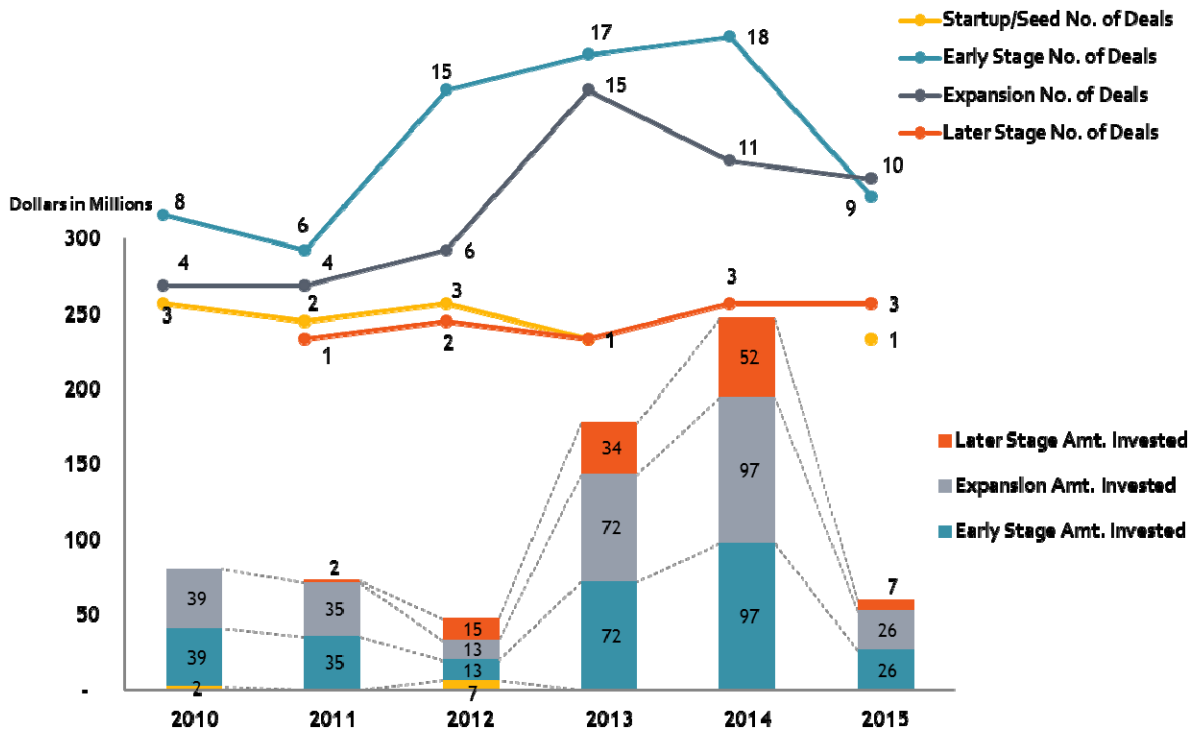
SALES, RECEIPTS, OR VALUE OF SHIPMENTS OF IT BUSINESSES



Source: US Census Data

Exhibit 36

DEALS AND AMOUNT OF INVESTMENT BY STAGE



Source: Analysis of the National Venture Capital Association

Insights

The District has a significant amount of startup activity, but little of this is occurring within diverse communities. Tech startup activity is challenging to track as ideas and companies rise and fall quickly, often without official documentation. To gauge the level of inclusion within DC’s tech entrepreneur community, this study tracks a sampling of established tech business, as well as results of a survey conducted by Ghost Note Media—a respected digital media firm dedicated to the growth of diverse innovation companies. Exhibits offer representative business activity, but not the total population of firms.

Participation of Diverse Groups as Entrepreneurs

Based on a sampling of businesses, White men dominate the Information Tech industry in the District. Of businesses surveyed, White male-owned IT firms with paid employees outnumber similar Black male-owned firms at a rate of 34:1. Though White women are represented, White male-owned IT firms with paid employees outnumber White women-owned firms at a rate of 3:1. There are similar counts of Asian - and Black-owned firms with employees, however, for firms without employees, Black entrepreneurs are present at three times the rate of Asian owners (Exhibit 32, 33).

Specific demographics show interesting features that can be built upon as the District and its partners work to grow a more inclusive ecosystem. Among surveyed firms, Black and Hispanic women own more IT businesses than their male counterparts. Black women-owned firms with and without employees slightly outnumber Black men-owned firms. Firms with employees that are owned by Hispanic women are represented at four times the rate of those owned by

Hispanic men. There is a significant ownership imbalance. This area of inclusion offers a considerable opportunity for partnership, intervention and growth (Exhibit 34).

Success of Diverse Groups as Entrepreneurs

In addition to higher levels of participation in the entrepreneurial community, White entrepreneurs in this sampling of firms demonstrate significantly more success in terms of staff size and total sales compared to other races and ethnicities. Even among White-owned firms, there is disparity between men- and women-owned companies in terms of sales volume and number of employees; men’s firms employ nearly six times the employees and yield five times the sales of women’s businesses (Exhibit 35).

Access to Capital

Access to capital at all stages of a company’s lifecycle is a critical ingredient to grow a successful entrepreneurial ecosystem. While the District has seen capital peaks and valleys, there is typically limited startup and early stage funding available to entrepreneurs (Exhibit 36). This issue is compounded for innovators from diverse backgrounds who often lack the business network and social capital to fundraise effectively. A survey of diverse members of DC’s tech entrepreneurship ecosystem showed that less than half of the entrepreneurs had been able to obtain funding for their companies. Interestingly, those who did, received between \$100,000 and \$1 million, suggesting that their ideas and companies were perceived to be good investments. None of these entrepreneurs obtained funding from venture capital firms. Half received funding from angel investors and philanthropic giving, and the remaining founders relied on friends and family or their personal savings and credit cards.

Barriers to Tech Inclusion for Entrepreneurs

| Social networks offering critical success factors are not frequented by underrepresented entrepreneurs | Underrepresented entrepreneurs have limited access to capital | Underrepresented entrepreneurs lack visibility | DC Government programs do not promote inclusion |
|--|---|--|--|
| <ul style="list-style-type: none"> Limited mentorship for Black entrepreneurs No definitive source for resources – people rely on their networks DC is not collaborative DC is risk averse | <ul style="list-style-type: none"> Vcs invest in people like themselves; few firms have diversity Incentives are not available at the angel/seed level Entrepreneurs are unprepared for investor pitches | <ul style="list-style-type: none"> Few models of successful entrepreneurs at events or in media Few models of success in tech at events or in media Limited media coverage of Black entrepreneurs obtaining funding | <ul style="list-style-type: none"> Resources are misallocated – should be spread to many companies, not focused on few Government does not partner with entrepreneurs in the marketplace |



A Call to Action

Implementation defined by Collaboration and Inclusion

The Pathways to Inclusion Report seeks to build upon the District of Columbia’s dynamic and growing economy, rich in talent and diverse industries. The District also embodies a rich and diverse set of cultures and traditions established by long-term residents and a growing influx of new residents, all of whom infuse our tech ecosystem with big and bold ideas. *For the District of Columbia to remain on the cutting edge of tech entrepreneurship, it is critical to grow an inclusive ecosystem that welcomes and leverages diverse ideas and taps into new markets.*

The preceding recommendations require varying degrees of effort, time and resources. For the coming months and years, the Mayor’s Innovation and Technology Inclusion Council, together with the District government, will lead the implementation of the recommendations. For some initiatives, strategic partners have already been identified. *From start to finish, the implementation will be a collaborative, and also an inclusive endeavor.* The responsibility falls on every part of the District to realize the vision of growing the most inclusive, fast-growing tech ecosystem in the country.

“ Given the strength of our diversity, I firmly believe the District is uniquely positioned to be a national model for technology inclusion and entrepreneurship.”

Mayor Muriel Bowser

Acknowledgements

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Institute for Education Resources

George Williams
DC Public Library

Marullus Willams
Limbic Systems

Consultants

Jay Brown
Alvarez & Marsal

Jennifer Boss
Alvarez & Marsal

Sooji Im
Alvarez & Marsal

Special Advisors

Barron H. Harvey
Howard University
School of Business

Anthony Wilson
Howard University
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Diversity Advisors

Brandon Ellis
Ghost Note

Steven Jumper
Ghost Note

Adeleke Omitowoju
Ghost Note

Reggie Snowden
Ghost Note

Student Advisors

Victor Adimoraegbu
Howard University
School of Business

“Internet Access
Training Access
Device Access”

“A comprehensive approach to use tech to close the digital divide; to ensure that all underrepresented groups are full and active participants”

“Everyone involved in understanding of and access to the tech industry”

“The creation of an environment that includes a variety of tech skill sets and experiences”

“Visible role models that others can follow”

“Ensuring that programs that are offered respect everyone’s voice and provide them something useful”

“Everyone being on and connected to opportunities that tech presents; age, ethnicity, gender, digitally literate or not”

