MINORITIES AND HIGH TECH EMPLOYMENT

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Foreword: High Tech Employment, First Class Citizenship and the
Transition from the Industrial Age to the Digital Age

By LaVonda Reed-Huff

Our country is in the early stages of an exciting and defining point in its history. As the United States transitions to the digital age, it is imperative that we position our country and each of its citizens to effectively compete in the global economy. Training and hiring a diverse work force are significant components in achieving such global competitiveness, and this competitiveness can only be achieved through meaningful and robust participation of all ethnic groups.

High tech career opportunities are expanding, and this sector is where we can expect largest job growth for years to come. Recent studies reveal dismal statistics for minority hiring in the high tech industry. Minorities must not be excluded from participation in the digital marketplace as a result of stereotypes, unlawful discrimination, or shortsighted industry or corporate practices that exclude all but a small group of participants. The report "Minorities and High Tech Employment" outlines a number of factors contributing to this employment gap and poses short- and long-term proposals for narrowing this gap.

In these early stages of this conversation, it is important that we recognize that narrowing the gap presents many significant challenges. Fortunately, these challenges are not insurmountable. Narrowing the current employment gap will require collaboration of many stakeholders in our nation. It will necessarily require efforts by the business industry, educators on all levels, parents, and government. It will require these leaders to encourage and inspire young people and those retraining for new careers to pursue mathematics and science education and to prepare for careers in the sciences and in the high tech industry. All of us are stakeholders in this effort, and we all must do our part toward achieving this goal.

The high tech industry must do more. The high tech business industry must recognize the benefits of cultivating, maintaining, and hiring a diverse workforce. Corporations must be forthcoming and transparent in reporting employment statistics. Corporations and employers in this industry should seek out and hire employees from a diverse pool of sources. They must convey to the public and to educators what skills are necessary to succeed in high tech careers. They need to engage with the communities in which they do business and fulfill the obligation to invest in these communities. Corporations and persons already employed in the sector must acknowledge the social responsibility they have to the communities they serve by way of investing in efforts to improve educational, mentoring, and employment opportunities available to children in grades K-12, as well as college, graduate, and professional students in higher education.

Educators must do more. Educational reform and a focus on science and mathematics education are necessary. Schools, teachers, and counselors must become more informed about the realities of the business world students are entering. They must become more familiar with and connected to the demands of the high tech industry, and they must make in-

class connections between the classroom and the workplace their students will enter. Schools must make greater investments in science, technology, engineering and mathematics courses, and schools must embrace education in entrepreneurism in a more meaningful way. They must encourage and reward creativity and innovation. They must stop teaching exclusively to mandated standardized tests where that is currently occurring. Students need to be given greater opportunities earlier on in their education to create, innovate, and share their ideas with the public.

All of us must and can do more. Americans of all colors and ethnicities need to completely revolutionize our relationship with math and science. We need to understand exactly what math and science are. We need to understand how the study of math and science leads to innovation, how math and science complement creativity, and how math and science lead to viable career paths.

The government also has a role in this. The federal government must carry out the Federal Communications Commission's *National Broadband Plan* and reform universal service obligations to ensure that all of America has access to affordable high-speed Internet service. Access to the Internet is one of the most significant free speech and economic issues of our time. The Internet is a great equalizer and has replaced the proverbial town square as the meeting place for the exchange of ideas and commerce. It is essential to democracy and commerce. Despite the fact that the rate of technology use by minorities exceeds that of Whites, minorities are not meaningful participants in the management and ownership of high tech companies.

The government also must regulate responsibly to assure the delivery of Internet content on a reasonable and nondiscriminatory basis. It must award contracts to minority businesses when possible, and it should consider requiring high tech companies to report employment data. Finally, it must study trends in the industry and act where appropriate.

The hiring practices of high tech companies must reflect the marketplace. As we transition to the digital age, Americans of all ethnicities must be given a fair opportunity to be true participants in the digital economy. We need not repeat the mistakes of the country's transition from an agricultural to an industrial economy, where African Americans were hard hit and disadvantaged by government, educational, and business practices. U.S. competitiveness requires removal of intentional barriers as well as the unintended consequences of otherwise well-intended laws, policies, and business practices. As this report demonstrates, minority participation in the high tech industry is not only necessary, but is achievable as the country embraces the global technological age.

I.   Introduction

The high tech industry[1] in the United States has emerged as one of the country's leading drivers of innovation, risk capital investment, job creation, and overall economic output.[2] Indeed, this sector has become a vital and relatively stable component of the U.S. economy over the last several decades. As a brief overview of the size and economic importance of this sector, consider that:

   ➢ The U.S. high tech industry employed 5.87 million individuals in 2009, comprising 5.5 percent of the private sector workforce in the United States.[3]

   ➢ The average salary of U.S. high tech workers was $84,400 in 2008, which is 86 percent higher than the average private sector wages of $45,400.[4]

   ➢ The high tech payroll totaled $516 billion in 2008, comprising 10 percent of total U.S. private sector payroll.[5]

   ➢ High tech establishments increased by 4 percent from 2007 to 2008, totaling 375,600 in 2008.[6]

   ➢ Although the overall U.S. unemployment rate rose to 9.4 percent by the end of 2010, the unemployment rate across the entire high tech sector was below the national rate and remained below five percent for computer and

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[1] For the purposes of this paper, high tech occupations include those requiring science, mathematics, and computer skills, and often postsecondary training or education. High-tech industries "include Chemical Manufacturing, Computer and Electronic Product Manufacturing, Broadcasting and Telecommunications, Information Services and Data Processing Services and Professional, Scientific and Technical Services." *See* Cecilia A. Conrad, *The Black Worker in the 21st Century* at 4, Joint Center for Political and Economic Studies (2006), *available at* http://www.iamsaam.org/userimages/NewConradJAN2006.pdf (last visited July 6, 2011).

[2] *See, e.g., Science and Engineering Indicators 2010,* National Science Board, National Science Foundation Chap. 6 at 7, (2010), *available at* http://www.nsf.gov/statistics/seind10/ (last visited July 6, 2011) (noting that "Innovation is closely associated with technologically led economic growth, and observers regard it as important for advancing living standards.") (*"NSF 2010"*).

[3] *See Cyberstates 2010,* TechAmerica Foundation at 6 (2010), *available at* http://www.techamericafoundation.org/cyberstates (last visited July 6, 2011) ("*Cyberstates 2010*").

[4] *Id.*

[5] *Id.* at 7.

[6] *Id.*

information systems managers, engineering managers, computer software engineers, database administrators, and aerospace engineers.[7]

The continued health of the U.S. high tech sector has been identified as a national priority by President Barack Obama, whose administration has begun to implement a variety of initiatives designed to assure that America is able to sustain current high levels of innovation and competition with international counterparts.[8] For example, the Federal Communications Commission (FCC) released its *National Broadband Plan* in March 2010, a Congressionally-mandated report that outlines myriad ways for government to "encourage more private innovation and investment" in broadband, which will be a vital platform for enabling "today's high-performance America – an America of universal opportunity and unceasing innovation."[9]

The President also launched two national initiatives focused on bolstering U.S. economic competitiveness. First, in early 2011, the White House launched StartUp America, an initiative that will bring together "an alliance of the country's most innovative entrepreneurs, corporations, universities, foundations, and other leaders, working in concert with a wide range of federal agencies to dramatically increase the prevalence and success of America's entrepreneurs."[10] Second, the President, in 2010, began a nationwide program aimed at bolstering educational opportunities for students in the fields of science, technology, engineering and mathematics (collectively known as STEM).[11] A core focus of these initiatives

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[7] *Id. See also* Press Release, *Employment Situation Summary: Dec. 2010,* Jan. 7, 2011, Bureau of Labor Statistics, *available at* http://www.bls.gov/news.release/archives/empsit_01072011.htm (last visited July 6, 2011).

[8] *See, e.g.,* The White House, Issues: Technology, http://www.whitehouse.gov/issues/technology (last visited July 6, 2011); *Remarks by the President in State of Union Address*, Office of the Press Secretary, The White House, Jan. 25, 2011, *available at* http://www.whitehouse.gov/the-press-office/2011/01/25/remarks-president-state-union-address (last visited July 6, 2011) ("*Obama State of the Union 2011*").

[9] *See Connecting America: The National Broadband Plan* at 3, 5 (rel. March 16, 2010), *available at* http://download.broadband.gov/plan/national-broadband-plan.pdf (last visited July 6, 2011) ("*FCC National Broadband Plan*").

[10] *See* The White House, Issues: Economy – Startup America, http://www.whitehouse.gov/issues/startup-america (last visited July 6, 2011) ("*Startup America*").

[11] Press Release, *President Obama Launches "Educate to Innovate" Campaign for Excellence in Science, Technology, Engineering & Math (Stem) Education*, Nov. 23, 2009, Office of the Press Secretary, The White House, *available at* http://www.whitehouse.gov/the-press-office/president-obama-launches-educate-innovate-campaign-excellence-science-technology-en (last visited July 6, 2011) (announcing the launch of "Educate to Innovate," a "nationwide effort to help reach the administration's goal of moving American students from the middle to

and several others at the federal level is assuring that women and minority groups – particularly Hispanics and African Americans – have equal access to educational and employment opportunities in the high tech sector.[12] As discussed at length in this paper, a key ingredient to continued innovative health and economic prosperity in U.S. high tech is ensuring a representative workforce across this sector.

A diverse workforce that is inclusive of women, Hispanics, and African Americans has direct and positive impacts on creativity and innovation. Moreover, companies that recruit workforces that reflect the diversity of the consumers who purchase their products and services have been found to have a competitive advantage over those that do not. And since many firms in the high tech sector are "startups" – small ventures that are run by a handful of innovators and backed by third-party investors – lowering the barriers to launching these companies by African Americans, Hispanics, and women could also improve their representation across the sector.[13]

However, as discussed in this paper, minorities, particularly African Americans, Hispanics, and women, remain sorely underrepresented across the high tech sector and in the ranks of some of the sector's biggest companies. An investigation conducted by the *San Jose Mercury News* in 2010 revealed significant disparities in the employment of African Americans, Hispanics, and women in ten of the 15 largest firms located in Silicon Valley, the leading high tech region in the country.[14] Similar data indicate that such disparities exist across the national high tech sector. Collecting and analyzing this type of data is essential to calibrating policies aimed at altering these trends, which, if left alone, could become intractable in a sector that thrives on secrecy, relative insularity, and non-transparent business practices. As such, the reluctance of some of the leading Silicon Valley technology companies to release data regarding the composition of their workforces only contributes to existing uncertainty regarding the true extent of minority underrepresentation in the high-tech sector.[15] This paper highlights these trends, analyzes their root causes, demonstrates why minority employment in high tech is important to the overall

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the top of the pack in science and math achievement over the next decade.") ("*Educate to Innovate*").

[12] *Id.*

[13] Shane Greenstein has observed that a key contributing factor to "innovative health" is robust entrepreneurialism across the high tech space. These "firms are the 'participant' that makes the first intrepid attempts at deploying, distributing, or servicing a new good to a wide range of customers with the intent of making a profit…The presence of entrepreneurs [in a specific segment of the market] is the simplest benchmark" of innovative health. *See* Shane Greenstein, *Glimmers and Signs of Innovative Health in the Commercial Internet*, 8 J. Telecomm. & High Tech. L. 25, 55 (2010).

[14] *See* Mike Swift, *Blacks, Latinos and Women Lose Ground at Silicon Valley Tech Companies*, Feb. 13, 2010, San Jose Mercury News ("*Mercury News 2010*").

[15] *See* Mike Swift, *Five Silicon Valley Companies Fought Release Of Employment Data, And Won*, Feb. 14, 2010, San Jose Mercury News ("*Silicon Valley Companies*").

economic health of the United States, and articulates recommendations for bolstering diversity across the sector.

A. Paper Overview

Part II of this paper provides an overview of current data regarding minority employment in the U.S. high tech sector generally and employment in Silicon Valley specifically. This analysis reveals that Hispanics, African Americans, and women are underrepresented across the sector. In addition, these groups earn less than other minority groups working in the sector and are similarly underrepresented at the executive level. Moreover, these groups face significant barriers to launching small businesses and tech-focused startups, two critical alternative avenues for entering the high tech sector.

Part III assesses several interrelated trends that contribute to low levels of employment in this sector for African Americans, Hispanics, and women. These include: non-transparent hiring practices by certain companies that do not actively encourage applications from minorities and women; disparate levels of educational attainment in STEM fields; low levels of technology access and adoption among some minority groups; and a variety of attitudinal or perceptional obstacles that may discourage certain groups from pursuing a career in the high tech sector.

Part IV demonstrates why these trends are consequential to the high tech sector and the U.S. economy. In particular, this section focuses on the potential economic and social impacts of inadequate minority representation in the high tech space.

Part V articulates several recommendations for positioning African Americans, Hispanics, and women for success in the high tech sector in both the short-term and long-term. These recommendations center on creating incentives that could alter the hiring practices of companies in the sector as well as bolstering educational and entrepreneurial opportunities available to minorities interested in a career in high tech.

II. STATE OF MINORITY EMPLOYMENT IN HIGH TECH

Even though significant progress has been made over the past decade, African Americans, Hispanics, and women remain underrepresented across the high tech sector generally, and in Silicon Valley specifically. This section provides an overview of recent data on trends in minority hiring and compensation in the high tech sector.

This section also includes an analysis of entrepreneurial opportunities available to minorities. The ability to launch a startup and maintain a small business has proven to be essential to sustaining the innovative spirit evident throughout the high tech sector.[16] However, as noted

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[16] *See, e.g., Venture Capital Meets Hi-Tech*, Bureau of International Information Programs, U.S. Dept. of State, eJournal USA, Vol. 13, No. 5 at 5, *available at*

below, minority access to essential entrepreneurial tools (*e.g.*, venture capital) is low, which contributes to overall trends in underrepresentation of these groups in the sector.

A.   Minority Employment Across the U.S. High Tech Sector: An Overview

According to U.S. Census Bureau data, the proportion of African Americans employed in computer and mathematics occupations increased from 6.8 percent to 7.1 percent between 2000 and 2008.[17] Similarly, the proportion of Hispanics in these occupations rose from 4.4 percent to 5.3 percent over the same time period.[18] African Americans in computer manufacturing faced a 7.3 percent unemployment rate by August 2010, down from 23.6 percent in 2009 and 11.9 percent in 2008.[19] However, the percentage of women in computer and mathematical occupations declined from 30 percent to 27.4 percent across the nation.[20] When compared to the size of these groups as a percentage of overall U.S. population, these employment disparities are further heightened. Indeed, African Americans comprise nearly 13 percent of the U.S. population, while Hispanics comprise over 16 percent; women comprise a little more than half at 50.7 percent.[21]   By contrast, Asian Americans are generally over-represented in the U.S. high tech workforce.[22] Comprising just 4.8 percent of the total U.S. population,[23] this demographic group has secured 15.5 percent of computer and mathematics

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http://www.america.gov/media/pdf/ejs/0508_2.pdf#popup (last visited July 6, 2011); *see also* Greenstein, 8 J. Telecomm. & High Tech. L. at 55.

[17] *Mercury News 2010* (citing data from the U.S. Census Bureau).

[18] *Id.*

[19] *See* John William Templeton, *Silicon Ceiling 10: Equal Employment and High Technology*, at 9, eAccess Corp (2010) ("*Silicon Ceiling*"). African Americans in computer manufacturing were the only group of African American manufacturing employees to have single digit unemployment rates at that time. *Id.*

[20] *Mercury News 2010* (citing data from the U.S. Census Bureau).

[21]   *See   People   QuickFacts,*   U.S.   Census   Bureau,   *available   at* http://quickfacts.census.gov/qfd/states/00000.html (last visited July 6, 2011) ("*People QuickFacts*"); *FCC Investigation of Silicon Valley Giants that Discriminate Against Minorities and Women,* Black Economic Council, at 1, Feb. 24, 2010 (*"Black Economic Council"*).

[22] According to the U.S. Census Bureau, Asian Americans include any "person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam. It includes 'Asian Indian,' 'Chinese,' 'Filipino,' 'Korean,' 'Japanese,' 'Vietnamese,' and 'Other Asian.'" In light of this broad definition, it is difficult to assess high tech employment for specific sub-groups. *See Revisions to the Standards for the Classification of Federal Data on Race and Ethnicity*, 62 Fed. Reg. 58782 (Oct. 30, 1997).

[23] *People QuickFacts.*

jobs, up from 11.8 percent in 2000.[24] Similarly, Whites, who comprise 63.7 percent of the population, are also overrepresented in the high tech sector, representing 70.3 percent of jobs.[25] But this group's share of high tech employment decreased from 75.1 percent in 2000.[26] Table 1 provides an overview of this data.

Table 1: Workers in Computer and Mathematical Occupations by Demographic

	Nationwide: Share of U.S. Population (2008)	Nationwide: Computer & Mathematics Workers (2006-08)	Silicon Valley: Share of Working Age (18-64) Population (2006-08)	Silicon Valley: Computer & Mathematics Workers (2006-08)
White	65.6 %	70.3 %	39.9 %	37.6 %
Asian	4.5 %	15.5 %	30.4 %	53.9 %
Black	12.8 %	7.1 %	2.9 %	1.5 %
Hispanic	15.4 %	5.3 %	24.3 %	4.7 %
Female	50.7 %	27.4 %	n/a	23.8 %

Source: Mike Swift, *Blacks, Latinos and Women Lose Ground at Silicon Valley Tech Companies,* Feb. 13, 2010, The San Jose Mercury News. This analysis omitted American Indians.

These general trends are also evident across every level of employment at high tech firms. According to the Anita Borg Institute for Women and Technology, a think tank, women and underrepresented minorities, including African Americans and Hispanics, comprise just 8.3 percent of entry-level technical positions, 6.5 percent of mid-level positions, and 5.6 percent of high-level positions.[27] Among all Americans, 4.6 percent of entry-level positions are held by women and 0.4 percent by men, while 1.8 percent of high-level technical positions are held by African American men compared to 1.6 percent by African American women.[28] Hispanic women have even lower employment rates in such positions. Hispanic males comprise 5.3 percent of entry-level positions compared to 4.1 percent of Hispanic women, and 2.5 percent of high-level technical positions are held by Hispanic males compared to zero percent of Hispanic women.[29] These trends are significant because they contribute to a negative feedback loop, as a "lack of ethnic diversity at the top ranks of an organization leads to further difficulties in recruiting and retaining talent from ethnic minority backgrounds," which could further compound these

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[24] *Mercury News 2010.*

[25] *People QuickFacts*

[26] *Mercury News 2010.*

[27] *See* Caroline Simard, Ph.D., *Obstacles and Solutions for Underrepresented Minorities in Technology,* at 8, Anita Borg Institute for Women and Technology (2009), *available at* http://anitaborg.org/files/obstacles-and-solutions-for-underrepresented-minorities-in-technology.pdf (last visited July 6, 2011) ("*Obstacles and Solutions*").

[28] *Id.*

[29] *Id.*

problems.[30] As U.S. Senator Robert Menendez has observed, "corporations that have boards and senior management that are reflective of today's demographics will be better positioned to compete amid a changing market."[31]

In addition to occupying lower levels of employment in the high tech sector, women, African Americans, and Hispanics are typically underpaid. In 2006, the average salary for women working full-time with science and engineering bachelor's degrees was 36.2 percent less than that of their male counterparts.[32] Similarly, the full-time salary for African Americans and Hispanics, among others, with science and engineering bachelor's degrees was 25.8 percent lower than White and Asian American counterparts.[33] These differences further contribute to the negative employment trends noted above as they create disincentives for underrepresented minorities to apply for jobs that do not provide competitive wages.

However, there are pockets of high tech minority workers and entrepreneurs scattered across the country. A state-by-state analysis of minority high tech employment, conducted by John William Templeton in 2010, revealed an array of such pockets in numerous cities and counties across the country.[34] But, according to Templeton, a lack of visibility prevents these pockets from developing into hubs for innovation and venture funding like Silicon Valley.[35] Determining how best to publicize these areas and tap into these existing resources is one of the many challenges facing policymakers and industry executives (see Part V for additional discussion).

B. The Silicon Valley Employment Gap

The disparities discussed above are even more pronounced in Silicon Valley, one of the nation's leading high tech centers. Silicon Valley is considered the nation's third largest "cybercity," home to 225,300 high tech jobs; the wider Bay Area would rank first in the nation with 386,000 high tech jobs.[36] However, Silicon Valley boasts the highest concentration of high tech workers

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[30] *Id.* at 9. It should also be noted that the FCC, in several reviews of broadcasting license applications over the past three decades, has found that "the heavy use of [word-of-mouth and staff referral] recruitment techniques has…been held to be an improper practice if it operates to the detriment of minority and women applicants." *Applications of Jacor Broadcasting Corporation*, 12 F.C.C.R. 7934, 7940 (1997).

[31] *See Corporate Diversity Report*, at 2, Office of Sen. Robert Menendez (Aug. 2010), *available at* http://menendez.senate.gov/imo/media/doc/CorporateDiversityReport2.pdf (last visited July 6, 2011).

[32] *NSF 2010,* Chap. 3 at 36.

[33] *Id.*

[34] *Silicon Ceiling.*

[35] *Id.* at 18.

[36] *NSF 2010,* Chap. 3 at 27.

of any U.S. metropolitan area[37] and the highest average high tech salary at $96,299.[38] Yet despite being settled amongst an ethnically diverse populace, Silicon Valley is home to the most significant gap in minority high tech employment.[39]

Companies in Silicon Valley have the lowest employment rate for African Americans and women among Fortune 500 corporations, and the lowest employment rates for Hispanics of Fortune 500 corporations doing significant business in California.[40] In 2008, just 1.5 percent of computer workers living in Silicon Valley were African American and only 4.7 percent were Hispanic – percentages that declined significantly since 2000.[41] The share of women employed in the Silicon Valley's computer workforce also fell during that time period from 25.5 percent to 23.8 percent.[42] In addition, despite being aggressive advocates of openness and transparency on the Web,[43] some firms based in Silicon Valley have resisted requests for access to their minority employment data.[44] Indeed, some of these firms have refused to file EEO-1 data since the mid-1990s.[45]

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[37] *Id.*

[38] *See* Galen Moore, *Boston IT Salaries Fall Behind Major Cities*, July 6, 2010, Mass. High Tech, *available at* http://www.masshightech.com/stories/2010/07/05/daily7-Boston-IT-salaries-fall-behind-major-cities.html (last visited July 6, 2011)*.*

[39] *Mercury News 2010.*

[40] *Black Economic Council.*

[41] *Mercury News 2010.*

[42] *Id.*

[43] For example, Google aggressively lobbied for the imposition of a number of transparency requirements for broadband service providers. *See, e.g. In the Matter of Preserving the Open Internet, Comments of Google*, at 64 (filed Jan. 14, 2010) (noting that "Markets rely on information in order to function properly. Giving market agents access to adequate information allows them to make informed choices, and to hold private actors accountable for their actions.").

[44] *Mercury News 2010.* According to a follow-up story published in the *San Jose Mercury News,* "Five companies waged an 18-month Freedom of Information battle with the Mercury News, convincing federal regulators who collect the data that its release would cause 'commercial harm' by potentially revealing the companies' business strategy to competitors." *See* Mike Swift, *Tech Firms Argue Race, Gender Data are Trade Secrets*, San Jose Mercury News, Feb. 18, 2010 ("*Tech Firms Argue*"). More specifically, "The Mercury News initially asked the Labor Department to release so-called EEO-1 race and gender data for the 15 largest companies ranked by sales in the newspaper's SV150 Index. Following an appeal lodged by the Mercury News against the six companies that objected, the Labor Department released Hewlett-Packard's data after the company failed, government lawyers said, to provide a detailed objection 'when we requested its views.' But the Labor Department accepted arguments filed by lawyers for Google, Apple, Yahoo, Oracle and Applied Materials that release of the

In its analysis of the combined workforces of ten of Silicon Valley's 15 largest companies, including Hewlett-Packard, Intel, Cisco Systems, eBay, and Advanced Micro Devices, the *San Jose Mercury News* found that, although their collective workforces had increased by 16 percent between 1999 and 2005, the share of jobs held by African Americans decreased by 16 percent and the share of Hispanic workers dropped by 11 percent.[46] Overall, only 2,200 of the 30,000 workers based at these companies in Silicon Valley were African American or Hispanic.[47] These data are startling, especially for Hispanics, who, as a group, comprise 37.6 percent of California's population[48] and 24 percent of the working age population in Silicon Valley.[49]

Likewise, the percentage of women employed at these ten companies decreased from 37 percent in 1999 to 33 percent in 2005.[50] The share of management-level jobs held by women also fell from 28 percent in 2000 to 26 percent in 2005.[51] Research conducted in 2009 by Caroline Simard and Andrea Henderson found that, even though men and women in the technical field in Silicon Valley are equally likely to hold mid-level jobs, men are 2.7 times more likely than women to be promoted to a high-ranking job such as vice president or senior manager.[52]

By contrast, Asian Americans have experienced significant improvement in employment levels over the last decade and now comprise the majority of computer workers in Silicon Valley. The number of Asian American computer workers in Silicon Valley increased from 43 percent in 2000 to a staggering 53.9 percent in 2006-2008.[53] Asian American computer workers in Silicon Valley significantly outnumber Whites, who comprised approximately 37 percent of the workforce in 2006-2008 and experienced a significant decline from the 2000 level of 47.1

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information would cause commercial harm. The department declined to share the text of the detailed arguments made by the companies." *Id.*

[45] *Silicon Ceiling* at 16 (discussing 1998 testimony detailing how, among 1,500 firms, 1,200 firms did not file EEO-1 data or VET-100 data to track minority or veterans' employment).

[46] *Mercury News 2010.*

[47] *Id.*

[48] *See* U.S. Census Bureau, Quick Facts: California, http://quickfacts.census.gov/qfd/states/06000.html (last visited July 6, 2011).

[49] *Mercury News 2010.*

[50] *Id.*

[51] *Id.*

[52] *Id.* (citing a 2009 study by Simard and Henderson).

[53] *Id.*

percent. [54] Some claim that this is likely due to a trend among Silicon Valley firms to hire technology workers from the Pacific Rim.[55]

Despite these disparate trends in minority hiring, many high tech firms based in Silicon Valley recognize that a problem exists and have begun to develop outreach and training programs to close these divides (specific examples of these efforts are discussed in Part III).

C.   Disparities in Entrepreneurship and Capital Access

Unlike many other sectors of the economy, the high tech space is characterized by high levels of entrepreneurship and populated by a large number of small businesses, many of which evolve from startup ventures. These firms, typically founded on an innovative idea or product, are encouraged to develop products and grow their businesses via capital contributions from a variety of third-party investors, *e.g.*, angel investors and venture capitalists.[56] Overall, the U.S. Small Business Administration estimates that small businesses – *i.e.*, those with fewer than 500 employees – hire 43 percent of high tech workers, such as scientists, engineers and computer programmers.[57] Thus, these types of companies represent a significant source of employment opportunities for workers in the high tech sector. However, the negative employment trends for minorities noted above are evident in the high tech entrepreneurial realm as well, creating additional barriers for African Americans, Hispanics, and women who wish to launch their own ventures.

A 2010 study by CB Insights found that venture capital firms are more likely to provide funding to Internet startup founders with high tech experience.[58] In a sample of early-stage Internet companies from California, Massachusetts, and New York that received venture capital funds during the first six months of 2010, only one percent of founding teams identified themselves

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[54] *Id.*

[55] *Id.* (quoting Vivek Wadhwa, a researcher at the University of California-Berkeley, Duke and Harvard, as noting that "This is like 'top gun' school for techies. Basically, that's one difference between Silicon Valley and the other tech centers." In addition, Wadhwa notes that the "intense premium on education 'inherently gives Asians an advantage, because they tend to be stronger in math and science.'").

[56] *See generally* Prepared Remarks of FCC Chairman Julius Genachowski, Minority Media and Telecommunications Council Access To Capital And Telecommunications Conference, Washington, D.C., at 3 (July 20, 2010), *available at* http://www.fcc.gov/Daily_Releases/Daily_Business/2010/db0720/DOC-299976A1.pdf (last visited July 6, 2011).

[57] *See* Frequently Asked Questions, Office of Advocacy, U.S. Small Business Administration http://web.sba.gov/faqs/faqIndexAll.cfm?areaid=24 (last visited July 6, 2011).

[58] *See Venture Capital Human Capital Report, Jan. – June 2010*, at 19 CB Insights ("*Venture Capital Report*").

as African American, and 11 percent indentified the team as African American plus at least one other race.[59] The study further indicated that all founding teams were former employees at high tech firms, with 39 percent who were former CEOs or founders of a previous company.[60] However, even with significant experience, some firms continue to face difficulty expanding due to barriers to accessing capital.[61]

With regard to the entrepreneurial opportunities available to women in the high tech sector, recent data indicate that just one percent of high tech firms and three percent of technology firms founded in 2004 were started by women.[62] The proportion of venture capital (VC) firms headed by women is also surprisingly low. Of the top 84 VCs recently identified by *The Funded*, a respected industry news source, only one was headed by a woman.[63] Moreover, women receive less than 10 percent of venture funding even though they comprise 27 percent of the national high tech workforce, hold 15 percent of CIO positions at Fortune 500 IT companies,[64] and have participated in about 15 percent of all recent patents in the computer software subgroup.[65] As a result, women are more likely than men to self-finance startups.[66] However, research also shows that women-owned businesses begin with lower levels of overall capitalization, lower debt finance ratios, and are much less likely to use equity capital than businesses founded by men.[67]

Ventures founded by African Americans and Hispanics have experienced great difficulty securing access to capital.[68] According to a study conducted for the U.S. Department of

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[59] *Id*. at 8.

[60] *Id*. at 19.

[61] *Silicon Ceiling* at 10, 13 (discussing George White, Ph.D., who obtained 29 patents, some for high-performance wireless products, but still could not raise money for his next venture).

[62] *See* Vivek Wadhwa, *Silicon Valley: You and Some of Your VC's Have a Gender Problem*, Feb. 7, 2010, TechCrunch, *available at* http://techcrunch.com/2010/02/07/silicon-valley-you%E2%80%99ve-got-a-gender-problem-and-some-of-your-vc%E2%80%99s-still-live-in-the-past/ (last visited July 6, 2011).

[63] *Id.*

[64] *See* Cindy Padnos, *High Performance Entrepreneurs: Women in High-Tech,* at 2-3, Feb. 1, 2010, Illuminate Ventures ("*High Performance Entrepreneurs*").

[65] *Id.* (citing a 2007 study by the National Center for Women and Information Technology).

[66] *Id.* at 5.

[67] *Id.* at 5.

[68] The FCC, via its Advisory Committee on Diversity for Communications in the Digital Age, has consistently recognized that the "inability to access capital is a primary market entry barrier" for women and minorities. *See Funding Acquisitions Recommendations*, FCC Advisory Committee on Diversity for Communications in the Digital Age, Adopted Recommendations, at

Commerce's Minority Business Development Agency, minority owned businesses pay higher interest rates on loans, are more likely to be denied credit, and are less likely to apply for loans for fear that their applications will be denied.[69] Research also shows that minority owned firms "have less than half the average amount of recent equity investments and loans than non-minority firms even among firms with $500,000 or more in annual gross receipts, and also invest substantially less capital at startup and in the first few years of existence than non-minority firms."[70] CB Insights reports that African American-led Internet startups received a median of $1.3 million dollars in venture capital funds in the first half of 2010, compared to $4 million and $2.3 million for Asian and White-led startups, respectively.[71] More generally, Hispanics and African Americans have significantly less wealth than Whites, which is a considerable barrier to entry for minority entrepreneurs since many are unable to self-finance a startup.[72]

D.   Conclusions

The preceding analysis highlights several worrying trends that presage a further widening of the employment gap for minorities in the high tech sector.

First, as the high tech sector has evolved and blossomed into an essential part of the U.S. economy, and as the number of people employed by this sector has increased, the percentage of African Americans, Hispanics, and women working in this space generally and in the nation's leading high tech center, Silicon Valley, has peaked and, in many cases, actually decreased. As a result, the high tech sector is at risk of becoming a homogenous and insular space that is either unwilling or unable to leverage the unique experiences and expertise possessed by underrepresented minority groups when developing and deploying innovative products and services.

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1   (rel. Dec. 3, 2009), *available at* http://www.fcc.gov/DiversityFAC/adopted-recommendations/funding-acquisitions-120309.doc (last visited July 6, 2011).

[69] *See* Robert W. Fairlie, Ph.D., *Disparities in Capital Access Between Minority and Non-Minority Owned Businesses: The Troubling Reality of Capital Limitations Faced by MBEs,* U.S. Department of Commerce, Minority Business Development Agency (Jan. 2010), *available at* http://people.ucsc.edu/~rfairlie/presentations/Disparities%20in%20Capital%20Access%20Report%202010.pdf (last visited July 6, 2011).

[70] *Id.* at 3.

[71] *Venture Capital Report* at 8.

[72] For example, a recent study found that "the wealth gap between white and African American families has more than quadrupled over the course of a generation." *See The Racial Wealth Gap Increases Fourfold*, at 1, Institute on Assets and Social Policy, Research and Policy Brief (May 2010), *available at* http://iasp.brandeis.edu/pdfs/Racial-Wealth-Gap-Brief.pdf (last visited July 6, 2011).

Second, the unwillingness of some corporations to release information regarding the composition of their workforces suggests that these companies do not take seriously the importance of diversity in the workforce. It would be of enormous import for the public and for policymakers to have access to more granular employment data of these culturally important institutions to assess whether and to what extent they are committed to a truly diverse workforce.[73]

Third, several factors have contributed to the creation of many obstacles that prevent African Americans, Hispanics, and women from launching a high tech startup or small business. Removing these barriers is essential to providing these groups with equal access to risk capital and other resources critical to supporting a new business in the high tech space. The existence of pockets of high tech minority workers and firms in a number of states, however, is promising and could undergird national policymaking efforts around these issues.

III. FACTORS CONTRIBUTING TO THE MINORITY EMPLOYMENT GAP IN HIGH TECH

Correcting the negative employment trends discussed in Part II will require nuanced policymaking targeted at rectifying the underlying factors that have contributed to the proliferation of these inequities. Understanding the root causes of these trends is essential to assuring that African Americans, Hispanics, and women are able to compete on equal terms and equal footing with others in the high tech sector. This section analyzes four of these factors: company hiring practices; disparities in STEM educational opportunities and achievement; gaps in technology access by minorities; and a variety of perceptual barriers.

A. Company Hiring Practices

As previously indicated, the *San Jose Mercury News* encountered resistance when seeking federal employment data from some of Silicon Valley's most notable companies.[74] Federal officials granted requests by these companies to keep this data private, agreeing that it is a trade secret that, if released, could cause commercial harm by revealing their business

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[73] In July 2010, the California Tri-Legislative Caucus, comprised of the Asian Pacific Islander Caucus, Latino Legislative Caucus, and Legislative Black Caucus called upon the California Attorney General to request this employment data from the U.S. Department of Labor, stating that such information is "a valuable tool in providing benchmarks and encouraging accountability and a continued focus on efforts to expand diversity." *See* Letter to Hon. Edmund G. Brown Jr., California Attorney General, from State Assemblymember Warren Furutani, State Senator Gil Cedillo, and Assemblymember Sandré Swanson, July 28, 2010 ("*Tri-Caucus Letter*").

[74] *Mercury News 2010*.

strategies to competitors.[75] However, a lack of such data prevents the public and policymakers from accurately gauging the efficacy and fairness of these companies' hiring practices.[76] As a result, some minority applicants will be discouraged from applying for work at these companies. More generally, such closed business practices could impede attempts by stakeholder groups to identify discriminatory work environments and to work with companies to adjust inefficacious hiring practices.

Some leading high tech firms, however, are working to bridge the minority employment gap. Cisco, for example, failed to release its most recent data upon request, but has stated that the number of African Americans and Hispanic workers it employs has "remained stable" since 2005, when these groups comprised a combined 6 percent of the company's Silicon Valley workforce.[77] Cisco has also committed to developing and deploying a number of educational programs focused on building "tomorrow's workforce."[78] These efforts include a number of programs in K-12 schools and in universities across the country. Many of these programs target STEM education and provide students of all races and backgrounds with an array of resources to prepare them for careers in the high tech sector.[79]

A number of other leading high tech companies are pursuing similar activities in an effort to bolster the next generation of high tech employees and eventually close the jobs gap. Recent efforts include:

> ➢ Apple has leveraged the popularity of online platforms like iTunes and the App Store to make available a wide variety of free educational content, accessible on the company's many computing devices.[80]

> ➢ Hewlett-Packard provides "Innovations in Education Grants" that support "innovative pilot initiatives that support the administrators and teachers responsible for student success in [STEM] in middle schools and/or high schools" across the country.[81]

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[75] *Tech Firms Argue.* Several "[e]xperts in the area of equal employment law scoffed at the idea that public disclosure of race and gender data…could really allow competitors to discern a big tech company's business strategy." *Id.*

[76] *Tri-Caucus Letter*.

[77] *Mercury News 2010*.

[78] *See Educating the Innovators of Tomorrow: A High-Tech Industry Blueprint*, at 27, Information Technology Industry Council (2010).

[79] *Id*. at 28-30.

[80] *Id.* at 19-20.

[81] *Id.* at 43.

> ➢ Intel is one of the leading sponsors of a number of prestigious science competitions that reward the best and the brightest in the STEM fields in the U.S. and abroad.[82] Intel is also a leading advocate for wider development of critical 21st century skills by, among other things, integrating these skills into a common set of educational standards for use by educators across the country.[83]

> ➢ Microsoft has also focused a significant amount of resources on enhancing STEM educational opportunities in K-12 and higher education settings. To this end, Microsoft provides educators and students with access to many technology tools designed to foster 21st century skill development.[84]

Another high tech company that has been relatively forthcoming with employment data is eBay. The company lost 15 percent of its female workforce between 2000 and 2005, and its percentage of Hispanic workers declined by half over that same period of time.[85] The firm's workforce is just two percent African American, four percent Latino, and 37 percent female.[86] Despite these statistics, eBay proclaims itself to be an equal opportunity employer and "encourage[s] a creative, diverse environment characterized by respect for the individual and their background."[87]

Numerous other stakeholders in this ecosystem of innovation, including many leading broadband service providers, are working to enhance diversity in their workforces. AT&T, for example, long a leader in "providing an inclusive work environment,"[88] has been recognized by *DiversityInc* as being one of the top companies in the country for diversity for its use of measurable diversity management best practices and results.[89] To this end, the company's employment data is openly available on its corporate website and is broken down by ethnicity

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[82] *Id.* at 51.

[83] *Id.* at 53.

[84] *Id.* at 61-63.

[85] *Black Economic Council.*

[86] *Id.*

[87] *See* eBay, Careers, http://www.ebaycareers.com/culture.html (last visited July 6, 2011).

[88] *See* AT&T, Diversity Management, http://www.att.com/gen/corporate-citizenship?pid=17725 (last visited July 6, 2011) ("*AT&T Diversity*").

[89] *See* Press Release, *AT&T Ranks No. 3 on the 2010 DiversityInc Top 50 Companies for Diversity List,* March 10, 2010, AT&T, *available at* http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=30626&mapcode=corporate (last visited July 6, 2011). In 2011, AT&T was ranked fourth on the DiversityInc Top 50 List. *See* DiversityInc, Top 50 Companies for Diversity: 2011, http://www.diversityinc.com/pages/DI_50_2011.shtml (last visited July 6, 2011).

and gender. The data reveal that African Americans comprise 20 percent of AT&T's workforce, Hispanics comprise 12 percent, and women make up 41 percent.[90] About 40 percent of AT&T's managers are women and 30 percent are people of color.[91] AT&T fosters its diverse work environment through initiatives like its Leadership Development Program, which provides recent college graduates with rotational job assignments, continuing education, and senior manager exposure to further build leadership skills and work experience. Forty percent of program participants are women and "nearly half" are people of color.[92]

Several other of the country's largest broadband service providers are also working aggressively to create a diverse work environment. For example:

➢ Comcast, the nation's largest cable company, reports that 44 percent of its workforce is comprised of minorities.[93] As of the end of 2008, African Americans comprised 26 percent of its workforce, Latinos comprised 9.5 percent, and women comprised more than half (50.5).[94] In addition, Comcast has received numerous awards for having a diverse workforce. These include being ranked as one of the best places to work for African Americans, Latinos, and women.[95] Moreover, as a result of its merger with NBC Universal, Comcast has committed to launching an array of minority-focused workforce development and small business programs.[96]

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[90] *AT&T Diversity*.

[91] *Id.*

[92] *Id.*

[93] *See* Comcast, Diversity Brochure, http://www.comcast.com/MediaLibrary/1/1/About/Diversity/documents/2009/Diversity%20Brochure_English_09.pdf (last visited July 6, 2011).

[94] *See* Comcast, Investor Relations: Corporate Responsibility Report, http://www.cmcsk.com/documentdisplay.cfm?DocumentID=6024 (last visited July 6, 2011).

[95] *See* Comcast, Diversity: Awards & Recognition, http://www.comcast.com/Corporate/About/Diversity/Awards.html (last visited July 6, 2011).

[96] These initiatives and commitments are outlined in several Memoranda of Understanding with leaders in the African America, Hispanic, and Asian communities. *See* Comcast, NBC Universal Transaction: Regulatory Information, http://www.comcast.com/nbcutransaction/regulatoryinfo.html (last visited July 6, 2011). As one example of how these initiatives will be implemented, DreamIt Ventures, a startup accelerator, is hosting an event in fall 2011 that will include a special track, the Minority Entrepreneur Accelerator Program, sponsored by Comcast. *See* DreamIt Ventures, Comcast Minority Media Accelerator Program, *available at* http://www.dreamitventures.com/about/Comcast-MEAP.php (last visited July 11, 2011).

➢ Cox Communications has established a corporate diversity council and local councils in each of its 14 markets to ensure that diversity and inclusion receive attention and action.[97] Cox also openly provides data on its workforce diversity. As of December 2008, 36.5 percent of Cox's full-time workforce, across all of its businesses, was comprised of people of color.[98]

➢ Time Warner Cable has been recognized as being among the Top 50 most diverse companies in America by *DiversityInc*.[99] According to recent data, 43.2 percent of the company's workforce is comprised of minorities, including significant numbers of African Americans and Hispanics.[100]

➢ Verizon has received several awards recognizing its commitment to a diverse workplace. For example, *Diversity MBA Magazine* ranked Verizon in the top ten on its list of "Top 50 Companies for Diverse Managers to Work."[101] In addition, Verizon makes its employment data readily available on its website as part of its annual *Corporate Social Responsibility Report*.[102] According to the most recent data, nearly 20 percent and 11 percent of its workforce is comprised of African Americans and Hispanics, respectively.[103] Women represented 40 percent of Verizon's workforce in 2010.[104] In addition, Verizon reported that, in 2010, people of color represented 24 percent of senior management positions.[105]

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[97] *See* Cox, Diversity Among Our People, http://ww2.cox.com/aboutus/diversity/people.cox (last visited July 6, 2011).

[98] *Id.*

[99] *See* DiversityInc, Top 50 List, http://www.diversityinc.com/pages/DI_50_2011.shtml (last visited July 6, 2011).

[100] This data also includes Asian Americans and Native Americans. *See* DiversityInc, Top 50 List: No. 23 – Time Warner Cable, http://www.diversityinc.com/article/7284/ (last visited July 6, 2011).

[101] *See Top 50 Companies for Diverse Managers to Work*, Diversity MBA Magazine, *available at* http://diversitymbamagazine.com/50-out-front (last visited July 6, 2011).

[102] *See generally 2010-2011 Corporate Social Responsibility Report*, Verizon, *available at* http://responsibility.verizon.com/images/vz_uploads/verizon_cr_report_2010-2011.pdf (last visited July 6, 2011).

[103] *Id.* at 64.

[104] *Id.*

[105] *Id.*

These efforts aimed at promoting a diverse workforce and enhancing the skills of the next generation of workers should serve as best practices for high tech firms across the country (see Part V for further discussion).

B. Minority STEM Education

Over the last several decades, underrepresented minorities have experienced low levels of educational achievement in STEM fields, resulting in a relatively small talent pool from which high tech firms can draw.[106] However, according to the Higher Education Research Institute at the University of California – Los Angeles (HERI), there has been an upward trend in interest in STEM fields among underrepresented minorities, including African Americans and Hispanics, over the last several years.[107] Even so, HERI also found that "underrepresented minority students who aspire to a STEM major as entering freshmen have a substantially lower likelihood of completing such a degree within five years than their White and Asian American peers."[108] More specifically, just 22 percent of Latinos and 18 percent of African Americans aspiring to a STEM degree as entering freshmen completed their bachelor's degree within five years, compared to 33 percent of White students and 42 percent of Asian Americans.[109] Nonetheless, the overall percentage of science and engineering bachelor degrees awarded to underrepresented minorities rose over the past decade from seven percent to eight percent among African American students, and from six percent to eight percent among Hispanic students.[110] During this same period of time, the proportion of science and engineering degrees awarded to White students fell from 73 percent to 64 percent.[111]

The low level of minorities completing degrees in STEM is due partly to disparate levels of access to advanced courses in math and science in high school and an overall lack of college readiness in these fields.[112] In 2005, for example, only six percent of African American high

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[106] John William Templeton's work is critical to identifying where pools of minority high tech employees are working. *See generally Silicon Ceiling.*

[107] *See Freshmen Show Gains in Aspirations for Science Degrees, But Not All Arrive at Finish Line,* Higher Education Research Institute (HERI), UCLA Graduate School of Education & Information Studies, *available at* http://www.heri.ucla.edu/pr-display.php?prQry=51 (last visited July 6, 2011).

[108] *Id.*

[109] *Id.*

[110] *NSF 2010,* Chap. 2 at 4.

[111] *Id.*

[112] *See* Catherine Hill, Christianne Corvett, Andresse St. Rose, *Why So Few? Women in Science, Technology, Engineering, and Mathematics,* at 5, AAUW, *available at* http://www.aauw.org/customcf/RequestForDownload/index_whysofew_download.cfm (last visited July 6, 2011) ("*Women in STEM*").

school graduates and seven percent of Hispanic high school graduates had completed calculus, compared to 31 percent of Asian Americans and 16 percent of White high school graduates.[113] Similarly, a 2006 study found that 33 percent of Asian Americans were adequately prepared to take college-level biology, compared to just five percent of African Americans and 12 percent of Hispanic Americans.[114] Moreover, according to the National Action Council for Minorities in Engineering, only four percent of underrepresented minorities, including Hispanics and African Americans, graduating from high school are "engineering eligible."[115] To this end, in 2002, 690,000 minority students graduated from high school, but only 28,000 of those students took the science and math courses needed for admission into engineering studies.[116]

Women also face disparate levels of educational attainment in STEM fields even though there have been notable advancements in recent years. The gender achievement gap in math and science has narrowed over the last several decades; high school girls now earn the same number of math and science credits as boys and are performing slightly better in these classes.[117] Likewise, the combined grade point average for girls in high school math and science totaled 2.76 in 2005, compared to 2.56 for boys in 2005.[118] However, fewer girls than boys take Advanced Placement exams in STEM subjects (*e.g.*, computer science, physics, calculus, and chemistry), and those who do take the exams tend to score lower than boys.[119] According to one study, this achievement gap is likely due in large part to the prevalence of stereotypes regarding women's abilities in math and science.[120] In particular, these stereotypes have been found to negatively influence the hiring decisions of some employers and to negatively impact the performance of some girls and women in STEM subjects.[121]

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[113] *Id.*

[114] *See* Gail Cassell and John Brooks, *BHEF 2006 Issue Brief, The Challenge of the New Demographics of Higher Education: Increasing Women and Minority Participation in the STEM Disciplines*, at 2, Business-Higher Education Form, Issue Brief (2006), *available at* http://www.bhef.com/publications/documents/brief2_w06.pdf (last visited July 6, 2011).

[115] *See Confronting the "New" American Dilemma: Underrepresented Minorities in Engineering: A Data-Based Look at Diversity,* at 5, National Action Council for Minorities in Engineering, Inc. (2008), *available at* http://www.nacme.org/user/docs/NACME%2008%20ResearchReport.pdf (last visited July 6, 2011) ("*New American Dilemma*").

[116] *Id.*

[117] *Women in STEM* at 4.

[118] *Id.*

[119] *Id.* at 5.

[120] *Id.* at 38.

[121] *Id*. at 38, 41.

Despite increasing high school achievements in math and science, many women choose not to pursue further study in college. Indeed, even though women comprise the majority of college students, they are much less likely than men to pursue a major in STEM fields.[122] With biological sciences excluded, only five percent of freshmen women planned to major in engineering, computer science, or physical sciences, compared to over 20 percent of male freshmen.[123] However, the percentage of bachelor degrees and doctorates earned by women has been significantly improving over the past several decades. In engineering, for example, women earned 19.5 percent of the bachelor's degrees in 2006, up from 14.5 percent in 1986.[124] But the number of computer science degrees earned by women has fallen over the past two decades, decreasing from 35.8 percent in 1986 to 20.5 in 2006.[125]

C. Minority Technology Access

Another major factor contributing to low levels of interest and achievement in STEM fields is a lack of adequate access to computing and Internet technologies at home and in school by minority students. Technology access at school is particularly important for minority students, as the home broadband adoption rates for African American and Hispanic families lags behind the national average. Only half of all African American households and 45 percent of Hispanic households have adopted broadband, compared to 68 percent of Whites and 77 percent of Asian Americans.[126] Unfortunately, technology access in schools is largely inadequate. During the 2005-06 school year, for example, there were 14.2 million computers available for classroom use, providing one computer for every four students.[127] A 2008 study by the National Education Association found that over 54 percent of public school teachers reported having two computers or less in their classrooms and observed that this number is inadequate to effectively use computers for instructional purposes.[128] In addition, "underrepresented [minority] students are more likely to be in school districts lacking the resources for a rigorous computer science curriculum. When schools in disadvantaged areas do have the equipment,

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[122] *Id.* at 5, 8 (citing the National Science Foundation 2009).

[123] *Id.*

[124] *Id.* at 9.

[125] *Id.*

[126] *See Digital Nation: Expanding Internet Usage*, at 2, NTIA (Feb. 2011), *available at* http://www.ntia.doc.gov/reports/2011/NTIA_Internet_Use_Report_February_2011.pdf (last visited July 6, 2011).

[127] *See Fast Facts About Online Learning*, at 2, NACOL International Association for K-12 Online Learning (2008).

[128] *See Access, Adequacy, and Equity in Education Technology,* at 9, National Education Association (2008), *available at* http://www.edutopia.org/files/existing/pdfs/NEA-Access,Adequacy,andEquityinEdTech.pdf (last visited July 6, 2011).

they often lack the curriculum that will provide the technical skills necessary for college completion."[129]

As a result, minority students, particularly African Americans and Hispanics, are much more likely than White students to visit a public library to use a computer and access the Internet. One survey by the American Library Association found that African American households with children under the age of 18 were more likely to have used a public library in the past month for a school assignment than other ethnic households.[130] The same survey also found that African American and Hispanic households were more likely than White households to go to the library to use a computer and the Internet.[131] One explanation for these relatively high library usage rates is that African American and Hispanic households have lower computer ownership rates and broadband adoption rates than most other households.[132] A 2010 study by the Gates Foundation confirmed these general findings, but observed that public library technology access is often a poor substitute for access at home or in school because libraries often possess inadequate resources to provide minority students with a sufficiently robust online experience.[133] Thus, African American and Hispanic students are generally less likely than White and Asian American counterparts to be exposed to computers and the Internet throughout their K-12 education.

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[129] *Obstacles and Solutions* at 2-3.

[130] *See* American Library Association, Library Fact Sheet No. 6, http://www.ala.org/ala/aboutala/offices/library/libraryfactsheet/alalibraryfactsheet6.cfm (last visited July 6, 2011) (citing an analysis of 2002 data by the National Center for Education Statistics).

[131] *Id.*

[132] *See generally* Jon P. Gant et al., *National Minority Broadband Adoption: Comparative Trends in Adoption, Acceptance and Use*, Joint Center for Political and Economic Studies (Feb. 2010), *available at* http://www.jointcenter.org/sites/default/files/upload/research/files/MTI_BROADBAND_REPORT_WEB.pdf (observing low levels of broadband adoption and computer ownership among African Americans and Hispanics).

[133] *See* Samantha Becker et al*., Opportunity for All: How the American Public Benefits from Internet Access at U.S. Libraries*, at 17, Bill & Melinda Gates Foundation (March 2010), *available at* http://cis.washington.edu/usimpact/us-public-library-study.html (last visited July 6, 2011). These findings were confirmed in a follow up study. *See* Samantha Becker et al*., Opportunity for All: How the American Public Benefits from Internet Access at U.S. Libraries – Second Report*, at 12-18, Bill & Melinda Gates Foundation (June 2011), *available at* http://www.imls.gov/pdf/OppForAll2.pdf.

D.   Attitudinal and Perceptional Barriers

A variety of attitudinal and perceptional barriers impede more robust minority employment in the high tech sector. Oftentimes, these barriers stem from negative perceptions or stereotypes on behalf of employers and potential employees regarding a particular group's ability to thrive in a given job. Factors contributing to these barriers include general negative perceptions associated with the high tech workplace, gender bias or stereotypes, and family responsibilities, the latter of which is of interest to working parents, particularly women.[134]

One study of STEM professionals in the private sector found that many women face certain mid-career challenges that shape their decision to leave the high tech sector.[135] The National Center for Women and Information Technology, a think tank, found that 56 percent of women in technical fields leave their job midway through their career, which is double the turnover rate for men; 20 percent leave the workforce entirely, and 31 percent make the switch to nontechnical jobs.[136] A significant factor in these decisions is the perception that women must choose between having children or a career in a hypercompetitive business environment.[137] A recent study found that, although most of the women who left engineering reported an interest in another career as a reason for leaving, women were far more likely to cite time and family-related issues as a reason.[138]

Isolation and stereotyping are additional issues that contribute to negative perceptions about the high tech sector among minorities and women. Minorities and women are much more likely to experience isolation in high tech spaces (*e.g.,* workplaces and classrooms) since they are frequently only one of a handful in these settings. According to the Anita Borg Institute for Women and Technology, many minorities "feel isolated or left out, causing them to be less engaged and less motivated to continue studies or remain within their institutions. Women from underrepresented minority backgrounds are especially isolated."[139] In addition, gender bias or stereotypes also contribute to low levels of minority employment in high tech. Research shows that venture capital investors frequently stereotype or employ "pattern recognition" to

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[134] *Women in STEM* at 26.

[135] *Obstacles and Solutions* at 24.

[136] *See* Claire Cain Miller, *Out of the Loop in Silicon Valley,* April 16, 2010, N.Y. Times, *available at* http://www.nytimes.com/2010/04/18/technology/18women.html?ref=business (last visited July 6, 2011).

[137] *Id.*

[138] *Women in STEM* at 26.

[139] *Obstacles and Solutions* at 4.

determine the potential of investment opportunities.[140] This can be one of the most challenging barriers for women and non-White males to overcome[141] as the stereotypical successful high tech entrepreneur is often described as "young, White, and male."[142] Moreover, minorities are often excluded from social groups at work that are critical for the advancement of career opportunities, particularly in high tech fields.[143]

IV.   WHY MINORITY EMPLOYMENT IN HIGH TECH MATTERS

The inclusion of minorities is critical not only for ensuring social equality in the digital era, but also for facilitating creativity and innovation and enhancing profitability within the nation's high tech sector. With African Americans and Hispanics comprising nearly 30 percent of the total U.S. population, and with women representing more than half, high tech firms have both a considerable social responsibility and a viable economic rationale for actively incorporating minority groups into their workforce.

A.   Economic Reasons

Research shows that a diverse workforce impacts a firm's innovative health and profitability. With regard to innovative health, research has consistently found that, by actively fostering a diverse workforce, firms invite a wider range of attitudes, beliefs and ways of thinking, which can provide new and varied perspectives for creative tasks.[144] One study, for example, found that the most innovative organizations actively developed heterogeneous work teams to "create a marketplace of ideas, recognizing that a multiplicity of points of view needed to be

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[140] *See* Cindy Padnos, *High Performance Entrepreneurs: Women in High-Tech* at 8, Illuminate Ventures (Feb. 2010), *available at* http://www.illuminate.com/whitepaper/ (last visited July 6, 2011).

[141] *Id.*

[142] *See* Stacey Higginbotham, *Silicon Valley Has a Women Problem, but Women Still Have a Baby Problem,* Feb. 8, 2010, GigaOM, *available at* http://gigaom.com/2010/02/08/silicon-valley-has-a-woman-problem-but-women-still-have-a-baby-problem/ (last visited July 6, 2011) (citing comments made by John Doerr, a partner at Kleiner Perkins Caufield & Byers, a prominent venture capital firm, at a conference in 2009).

[143] *Obstacles and Solutions* at 4.

[144] *See* Gail Robinson and Kathleen Dechant, *Building a Business Case for Diversity,* at 27, Academy of Management Executive, Vol. 11, No.3 (Aug. 1997), *available at* www4.uwm.edu/libraries/ereserve/lermans/robuil.pdf   (last visited July 6, 2011) ("*Business Case for Diversity*").

brought to bear on a problem."[145] The study also found that the most innovative companies tended to employ more women and minorities than less innovative organizations.[146] Other research has shown that the various perspectives brought by minorities can stimulate the consideration of various alternatives in task groups.[147] One researcher concluded that task groups exposed to minority viewpoints were more creative than homogeneous groups and that creative thought processes can be stimulated through persistent exposure to minority perspectives.[148] The Anita Borg Institute for Women and Technology has observed that "[c]ompanies are losing on the benefits of gender and ethnic diversity in decision-making, as diverse teams tend to make better decisions and generate more innovation."[149]

In addition, a firm's profitability can be enhanced by developing a workforce that reflects its customer base.[150] To this end, African Americans, Hispanics, and women possess enormous spending power:

> ➢ Hispanic purchasing power exceeded $1 trillion per year in 2010.[151]

> ➢ African American purchasing power is projected to reach $1.1 trillion per year by 2012.[152]

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[145] *See* Taylor H. Cox and Stacy Blake, *Managing Cultural Diversity: Implications for Organizational Competitiveness,* at 50, Academy of Management Executive, Vol. 5, No. 3 (1991).

[146] *Id.*

[147] *Id.*

[148] *Id.* (citing Charlan Jeanne Nemeth, *Differential Contributions of Majority and Minority Influence*).

[149] *Obstacles and Solutions* at 9.

[150] *See* Thomas Kochran et al., *The Effects of Diversity on Business Performance: Report of the Diversity Research Network,* Wiley Periodicals at 5 (2003), *available at* http://www.rci.rutgers.edu/~sjacksox/Publications/effects.pdf (last visited July 6, 2011) (citing comments by Lew Platt, former CEO of Hewlett-Packard).

[151] *See* David Dodson, *Minority Groups' Share of $10 Trillion U.S. Consumer Market is Growing Steadily, According to Annual Buying Power Study from Terry College's Selig Center for Economic Growth,* July 31, 2007, Terry College of Business, University of Georgia, *available at* http://www.terry.uga.edu/news/releases/2007/minority_buying_power_report.html (last visited July 6, 2011). *See also* Press Release, *Hispanic purchasing power in U.S. is $1 trillion strong and growing*, March 18, 2010, MMD Newswire, *available at* http://www.mmdnewswire.com/press-release-7529.html (last visited July 6, 2011).

[152] *See* R. Thomas Umstead, *BET: African-Americans Grow in Numbers, Buying Power*, Jan. 26, 2010, Multichannel News, *available at* http://www.multichannel.com/article/446028-BET_African_Americans_Grow_in_Numbers_Buying_Power.php (last visited July 6, 2011).

- Technology consumption among Hispanics and African Americans is rapidly increasing and is outpacing most other demographic groups. In 2008, for example, "Hispanics outpaced the general population in accessing and downloading digital media."[153] In addition, the Pew Internet & American Life Project has observed that "African Americans are the most active users of the mobile Internet – and their use of it is…growing the fastest" relative to other demographic groups.[154]

- Women are currently responsible for 85 percent of all consumer purchases; 61 percent influence decisions regarding home electronics purchases.[155]

- Women spend approximately $5 trillion dollars annually, which is over half of U.S. GDP.[156]

By hiring a workforce that is representative of these consumer groups, firms are likely better positioned to develop and market their goods to these audiences. Researchers have noted that the "cultural understanding needed to market to [specific] demographic niches resides most naturally in marketers with the same cultural background."[157] Many firms have increased profitability as a result of a more diverse workforce. Avon Company, for example, increased the number of African American and Hispanic managers in its workforce in order to successfully enhance its "market understanding" and market share among these demographic groups.[158] Failure to integrate the viewpoints of a firm's customer base, however, has resulted in notable marketing blunders. For example, *The New York Times* examined the negative connotations many women associated with the name for Apple's iPad.[159] After the product was announced,

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[153] *See Hispanic Broadband Access,* at 2, The Hispanic Institute & Mobile Future (Sept. 2009), *available at* http://thehispanicinstitute.net/files/u2/Hispanics_and_Broadband_Access.pdf (last visited July 6, 2011).

[154] *See* John Horrigan, *Wireless Internet Use,* Pew Internet & American Life Project (2009), *available at* http://www.pewinternet.org/Reports/2009/12-Wireless-Internet-Use.aspx?r=1 (last visited July 6, 2011). For data from 2010, *see* Aaron Smith, *Mobile Access 2010*, Pew Internet & American Life Project (July 2010), *available at* http://www.pewinternet.org/Reports/2010/Mobile-Access-2010.aspx (last visited July 6, 2011).

[155] *See* She-conomy, Marketing to Women Quick Facts*,* http://she-conomy.com/report/marketing-to-women-quick-facts/ (last visited July 6, 2011).

[156] *Id.*

[157] *Business Case for Diversity* at 26.

[158] *Id.*

[159] *See The iPad's Name Makes Some Women Cringe,* Jan. 27, 2010, N.Y. Times Bits Blog, *available at* http://bits.blogs.nytimes.com/2010/01/27/the-ipads-name-makes-some-women-cringe/ (last visited July 6, 2011).

some wondered whether Apple had any female employees at all.[160] During the 2009 holiday shopping season, *CNN* reported that web cameras by certain manufacturers were only able to track, or follow, users with lighter complexions, making some question if the new technology was ever beta-tested on people of color.[161]

In light of the considerable purchasing power of African Americans, Hispanics, and women, and their high levels of technology consumption, high tech firms would be well served to fine-tune their workforce to reflect these consumer groups.

B.   Social Responsibility

Firms also have a considerable social responsibility to develop a representative workforce and ensure that the goods and services produced in the technological age are sufficiently targeted at a broad swath of minority groups. Former *Ebony* Editor-in-Chief Byron Monroe has highlighted the lack of diversity in digital media companies and warned that a lack of relevant products may leave minority groups out of the digital society.[162] To this end, some have argued that digital media organizations like AOL are failing to hire sufficiently diverse talent to ensure representative online content.[163] This is significant since some argue that a lack of minority-specific digital content is a barrier to more robust broadband adoption among certain under-adopting minority groups like African Americans.[164]

A lack of minority inclusion in the high tech sector could have broader implications for the future of America's economy and the overall wellbeing of underrepresented minority groups. With success in the world economy increasingly hinging on the production and export of knowledge- and technology-intensive goods and services, America's future successes will

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[160] *Id.*

[161] *See* Mallory Simon, *HP Looking Into Claim Webcams Can't See Black People*, Dec. 23, 2009, CNN, *available at* http://www.cnn.com/2009/TECH/12/22/hp.webcams/index.html (last visited July 6, 2011).

[162] *See* Bryan Monroe, *Why New Media Looks a Whole Lot Like Old Media,* Feb. 15, 2010, Huffington Post, *available at* http://www.huffingtonpost.com/bryan-monroe/why-new-media-looks-a-who_b_374626.html (last visited July 6, 2011).

[163] *Id.*

[164] *See Broadband Imperatives for African Americans: Policy Recommendations to Increase Digital Adoption for Minorities and Their Communities*, at 17, the National Black Caucus of State Legislators et al. (Sept. 2009), *available at* http://www.jointcenter.org/sites/default/files/upload/research/files/MTI_Broadband_Report_Print.pdf (last visited July 6, 2011) (arguing that enhancing online content targeted at African Americans could spur further adoption of broadband among this segment of the population).

depend on its ability to mobilize a sizeable and diverse workforce.[165] Experts note that the U.S. is facing a significant shortage of "homegrown" talent – *e.g.,* engineers and scientists – due to low levels of STEM educational attainment across the entire U.S. population and the retiring of the post-Sputnik generation of White male engineers and technology workers.[166] In order to truly become an "innovation society," the talent pool will have to be dramatically widened; minorities and women present considerable opportunities for such an expansion.[167]

Tapping into the nation's minority student population will not only increase the number of high tech workers available, it will also provide the diversity of thought and improved innovation necessary for continued economic prosperity and U.S. leadership in the high tech sector.[168] Moreover, these and other actions described in the following section will help to curtail the creation of a divide between those with adequate digital literacy skills and STEM education and those without.

V.   POSITIONING MINORITIES FOR SUCCESS IN HIGH TECH

In order to enhance the number of African Americans, Hispanics, and women in the U.S. high tech sector, stakeholders from the public and private sectors must collaborate in order to develop hiring practices, educational initiatives, and other policies targeted at bolstering diversity.   We must find ways to increase the number of women and underrepresented minorities who are ready to work in high tech now, as well as ensure that students and young entrepreneurs are being prepared to take advantage of future opportunities in high tech.   This section articulates several proposals for increasing minority high tech employment in both the short-term and long-term.

A.   Proposals for Short-Term Gains in Minority High Tech Employment

Policymakers at the local, state, and federal levels, along with stakeholder groups in the high tech sector, must pursue three interrelated avenues to spur minority employment in the near term.

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[165] *See, e.g.,* Greg Ip, *Export or Die*, in *A Special Report on American's Economy*, April 3, 2010, The Economist (arguing that "America's economic transformation will require businesses to rely less on selling to Americans and more on selling abroad…The emphasis will be on high-value products and services rather than on labor-intensive items such as furniture and clothing."); *Obama State of the Union 2011.*

[166] *New American Dilemma* at 4.

[167] *Id.* (citing comments by Nicholas Donofrio, former Executive Vice President of Innovation and Technology for IBM).

[168] *Id.*

First, policymakers should support the transparent reporting of minority employment data. Promoting awareness and accountability of current employment levels is a critical first step in improving the employment of minorities in the high tech sector. Firms should collect and analyze data on the current proportion of underrepresented minorities in their company and make such data publicly available on their website. Doing so will provide managers, policymakers, and other stakeholders with an opportunity to evaluate current employment levels and implement targeted measures for addressing obvious inequities. Moreover, making such data publicly available will send a positive signal to underrepresented minority groups like African Americans, Hispanics, and women that a given company is committed to fostering a diverse and inclusive workplace.

Best practices abound for making data available in a useful way. As previously noted, firms like AT&T, eBay, and Comcast currently share their employment data online and tout their records vis-à-vis minority employment. Such efforts should be the standard across the rapidly expanding high tech space.

Second, stakeholder groups should work with high tech firms to raise awareness of effective hiring practices aimed at bringing more minorities into the sector. Proactive recruitment and retention strategies are essential for securing and maintaining a high quality, diverse workforce. Firms should work with stakeholder groups to actively seek out promising prospects using a diverse array of resources, including partnerships with special interest groups, directories of minority degree recipients, participation in diversity-recruiting events, and advertising positions in media outlets targeted towards African Americans, Hispanics, and women.[169] Diversity-focused work teams can also provide valuable sources of best practice ideas and promote a company-wide commitment to supporting diversity.

Several companies that have successfully applied these practices illustrate their potential. Comcast, for example, has demonstrated a commitment to diversity through its employment practices and community outreach. The organization participates in over 100 diversity-recruiting events across the nation each year and the Comcast Recruiting Team has developed partnerships with diverse professional and community-based organizations to attract employees from a wide range of backgrounds. Comcast also makes significant investments in training, leadership, and career development programs to help their employees achieve their goals.[170] Leading high tech firms like Apple, Cisco, and Microsoft have deployed educational iniatives in an effort to diversify their workforces and to position the United States for continued economic and innovative success.

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[169] *See Recruiting and Retaining Minority and Female Faculty: Some Suggested Best Practices,* Faculty Diversity Committee, Northwestern University (May 2004), *available at* http://www.northwestern.edu/provost/faculty/hiring/best_practices.pdf (last visited July 6, 2011).

[170] *See Awards & Recognition, Diversity,* Comcast, *available at* http://www.comcast.com/Corporate/About/Diversity/Awards.html (last visited July 6, 2011).

Third, policymakers and other stakeholders should work together to promote high tech entrepreneurship among minorities by encouraging them to leverage communications tools to launch their own business. Despite lower levels of computer ownership and home broadband adoption among minorities, these communication tools enable nearly limitless ways in which to launch and sustain minority-owned businesses. For example, the Internet provides access to a significant number of resources for networking and business promotion. Minority-focused networking sites such as iHispano (www.ihispano.com) and the Minority Networking Exchange (www.minnetexch.com) help minority businesses connect with useful resources and promote themselves through online communities and other social media tools. Other programs, such as Work and Web Women (http://workandwebwomen.com) provide support for those seeking to establish an online company. The FCC, in its *National Broadband Plan,* called for the creation of a variety of similar resources at the federal level and has called on federal agencies to develop national clearinghouses of useful information for entrepreneurs.[171] Ultimately, promoting access to such communications tools and raising awareness of their value to small businesses will greatly benefit high tech entrepreneurship among minorities.

To this end, a variety of grassroots and policy efforts are underway across the nation to improve minority entrepreneurship and inclusion in the high tech industry. For example, MMTC, a national advocacy organization, hosts an annual conference that focuses on the array of issues related to enhancing minority access to capital.[172] In addition, events like the NewMedia Entrepreneurship Conference, which has evolved into a small business accelerator – NewMeAccelerator.com – foster creativity, talent, and business acumen among the next generation of minority entrepreneurs in the emerging digital marketplace. Through numerous programs and events, participants are able to forge important relationships and potentially receive venture funding to support a fledgling business.[173] As more women and minorities seek opportunities in high tech entrepreneurship, there will be a greater need for business mentorship programs similar to the NewMe Accelerator, and the Comcast Minority Entrepreneurship Accelerator that is operated in partnership with DreamIt Ventures.[174]

With regard to policy options, several national initiatives focused on promoting minority owned business in the high tech space are in various stages of implementation. For example, the FCC's *National Broadband Plan* includes a number of proposals for enhancing technology access for minorities generally and minority-owned businesses specifically. Several are focused on ensuring that under-adopting demographic groups, including minorities, have robust access to

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[171] *FCC National Broadband Plan* at Ch. 13.

[172] *See, e.g.,* Minority Media and Telecommunications Council, Conference, http://mmtconline.org/mmtc25/ (last visited July 19, 2011).

[173] *See* NewMe Accelerator, About, http://newmeaccelerator.com/about/ (last visited July 6, 2011).

[174] *See* DreamIt Ventures *supra* note 96.

broadband connections at home and ample local resources for bolstering digital literacy skills.[175] Additional proposals center on leveraging existing federal resources and programs (*e.g.*, the U.S. Small Business Administration) to assure that minority owned businesses have similarly robust access to broadband, computers, and digital training.[176]

In addition, President Obama's StartUp America initiative holds much promise for supporting entrepreneurship among minorities and women. By partnering with leading private corporations, this initiative will enhance access to capital, "expand entrepreneurship education and mentorship programs," and "identify and remove unnecessary barriers to high-growth startups."[177] The ultimate goal of this program is to "dramatically increase the prevalence and success of America's entrepreneurs."[178] This represents a tremendous opportunity for minority entrepreneurs and will hopefully serve as a template for additional programs in cities and states across the country.

Leading private sector firms have also begun to focus on the importance of small businesses and startups to the overall health of the U.S. economy. To this end, Goldman Sachs has launched a "10,000 Small Businesses" program, the goal of which is to enhance "urban development by equipping promising small business owners with the tools they need to expand their businesses."[179] In particular, this program pairs promising small businesses with financial resources and expert guidance from Goldman employees. While this initiative does not have a specific high tech focus, it could serve as a model for other leading companies that wish to pair corporate social responsibility with tangible economic impacts in communities that truly need assistance. For example, similar initiatives launched at the local and state levels could draw upon existing pools of local minority talent that have been identified by John William Templeton.[180]

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[175] *See, e.g., FCC National Broadband Plan* at 174-176 (discussing a proposal to create a national Digital Literacy Corps that would "support locally based efforts to provide face-to-face" digital training and that would "target segments of the population that are less likely to have broadband at home, including…racial and ethnic minorities.").

[176] *Id.* at 267-268, 271-272.

[177] *Startup America.*

[178] *See* Aneesh Chopra, *StartUp America: A Campaign to Celebrate, Inspire and Accelerate Entrepreneurship*, Jan. 31, 2011, TechCrunch, *available at* http://techcrunch.com/2011/01/31/startup-america-a-campaign-to-celebrate-inspire-and-accelerate-entrepreneurship/ (last visited July 6, 2011).

[179] *See* Nicole Skibola, *Can Goldman Sachs Be Socially Responsible?,* Jan. 11, 2011, The CSR Blog, Forbes, *available at* http://blogs.forbes.com/csr/2011/01/11/can-goldman-sachs-be-socially-responsible/ (last visited July 6, 2011).

[180] *Silicon Ceiling.*

Other stakeholders have put forward an array of proposals for increasing minority entrepreneurship. For example, some have proposed a reduction or deferral of capital gains taxes for companies that invest in minority-owned firms.[181] In addition, President Obama has launched a major education initiative focused on enhancing STEM achievement across all demographic groups, particularly minorities and women.[182] The President's "Educate to Innovate" program leverages a variety of public-private partnerships that focus on "harnessing the power of media, interactive games, hands-on learning, and community volunteers to reach millions of students over the next four years, inspiring them to be the next generation of inventors and innovators."[183]

These national efforts, along with similar initiatives at the local and state levels, represent unique vehicles for forging partnerships with high tech firms in an effort to more directly connect minorities to real opportunities in the sector.[184]

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[181] *See* Press Release, *Bob Johnson Urges National Dialog Based on Recognition of Race to Address Alarming Increase in Wealth Gap Between Black and White Americans*, PR Newswire, July 25, 2010, *available at* http://www.prnewswire.com/news-releases/bob-johnson-urges-national-dialogue-based-on-recognition-of-race-to-address-alarming-increase-in-wealth-gap-between-black-and-white-americans-99191409.html (last visited July 6, 2011) ("RLJ News Release"). This proposal is similar to the Federal Communications Commission's 1978 "tax certificate policy" where owners of broadcast and cable properties were encouraged to sell these properties to minority-controlled purchasers. *See* Erwin Krasnow & Lisa Fowlkes, *The FCC's Minority Tax Certificate Program: A Proposal for Life After Death*, 51 Fed. Comm. LJ 665, 668 (1999). The policy also included tax certificates for investors who provided seed funds for minority-controlled companies. *Id*. Though largely successful in increasing the number of minority broadcasters, Congress abolished the tax certificate policy in 1995 amid concerns regarding abuse and improper administration of the program. *Id*. at 671-73.

[182] *Educate to Innovate.*

[183] *Id*.

[184] Stakeholders should also look to the efforts of cities and states across the country vis-à-vis attracting and retaining high tech firms. For example, Boulder, Colorado has successfully leveraged local resources to create a robust high tech community. As a result, several local initiatives have been developed to link high tech firms, innovators, VCs, and others in an effort to enhance the startup and small business culture in the region. These models could yield useful best practices for creating analogous efforts targeted specifically at enhancing minority employment in the high tech space. *See, e.g.,* Claire Cain Miller, *Boulder, Colo., a Magnet for High-Tech Start Ups,* May 14, 2010, N.Y. Times, *available at* http://www.nytimes.com/2010/05/14/business/14boulder.html (last visited July 6, 2011).

B. **Proposals for Sustainable Long-Term Gains in Minority High Tech Employment**

If successfully implemented via strong partnerships with policymakers and stakeholder groups from across the country, the proposals discussed above could result in significant short-term gains in minority high tech employment. However, in order to ensure that these gains are sustainable in the long-term, policymakers will have to focus on a variety of endemic problems facing minorities, foremost being STEM educational reform. Without more women and underrepresented minorities in the STEM pipeline, there is little chance there will be a qualified pool of candidates prepared for the high tech jobs of the future.

Policymakers at every level of government should work with stakeholder groups to ensure that African Americans, Hispanics, and women have robust access to adequate STEM educational resources. STEM education must be infused throughout K-12 curricula, and proactive measures must be undertaken to both attract and retain students in postsecondary institutions. In the K-12 setting, active, hands-on, project-based learning should be used to engage a larger and more diverse group of students.[185] President Obama's "Educate to Innovate" program focuses on these aspects. Similarly, in 2008, MMTC issued a "Road Map for Telecommunications Policy" that, among other things, recommended "universal, K-12 telecom, media and Internet literacy education" in an effort to assure "the complete eradication of racial discrimination and its present effects from the nation's most influential and important industries – mass media and telecommunications."[186] Moreover, specific action should be taken to encourage African Americans, Hispanics, and women to pursue and maintain careers in STEM fields beginning as early as middle school. Indeed, a recent survey found that "significant numbers" of today's women and minorities in STEM fields were discouraged from pursuing these subjects during high school and college.[187]

Similar efforts should be supported in higher educational settings as well. Schools should actively recruit minority students for STEM programs and support them throughout their career via special programs that provide peer groups, mentors, and role models.[188] Individual companies should also develop educational outreach programs – especially to historically Black colleges and universities – that expose students to careers in the high tech field. Programs such as AT&T's Leadership Development Program provide a viable model for engaging older students

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[185] *New American Dilemma* at 8.

[186] *See Road Map for Telecommunications Policy,* at v, MMTC (July 2008), *available at* http://mmtconline.org/lp-pdf/MMTC-Road-Map-for-TCM-Policy.pdf (last visited July 6, 2011).

[187] *See* Press Release, *U.S. Women and Minority Scientists Discouraged from Pursuing STEM Careers, National Survey Shows*, March 22, 2010, Bayer Corporation, *available at* http://www.sciencenewsline.com/physics/2010032201000018.html?continue=y (last visited July 6, 2011).

[188] *New American Dilemma* at 8.

and providing them with career-ready educational experiences.[189] The program provides many women and minority students with rotational job assignments, continuing education, and senior manager exposure to further build leadership skills and work experience.[190] Such efforts should be supported to encourage industry-wide minority inclusion.

VI.   CONCLUSION

This report has highlighted a number of factors that directly and indirectly impact minority employment in the high tech sector. Ineffective and non-transparent hiring practices by leading high tech companies has led to a sector that is riddled with firms that have not publicly committed themselves to hiring and developing a diverse and inclusive workforce. As a result, the number of African Americans, Hispanics, and women working at leading high tech companies is woefully inadequate. Combined with disparities in STEM education attainment, unequal levels of technology access and adoption, and a variety of other factors, African Americans, Hispanics, and women face a widening employment gap in the high tech sector. As the U.S. economy continues to become more knowledge- and technology-driven, these groups face rapidly increasing barriers to securing careers in a critical emerging space.

Despite these trends, there is much that can and should be done in the short-term and long-term to increase minority hiring and entrepreneurship in the sector. Reform efforts should address the lack of transparency regarding high tech industry employment data, improve hiring practices, promulgate proven best practices, tap into existing pools of minority talent across the country, and bolster minority access to capital and other critical inputs for launching a small business. Sustainable, long-term success will depend on enhancing STEM educational opportunities available to minorities and women. In combination with comprehensive and coordinated action among policymakers and stakeholders in the private sector, these efforts will ensure that minorities are well positioned for success in high tech.

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[189] *Id.*

[190] *Id.*