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**In 1972 big things were brewing in the** newly christened Silicon Valley. Intel introduced the 8008, an 8-bit central processing unit that paved the way for generations of later microprocessors. Nolan Bushnell founded Atari with hit game Pong and launched the video game industry. Two firms opened that evolved to define Silicon Valley-style venture capital. Kleiner Perkins subsequently invested in Amazon, Genentech, Google, Intuit, and more than 500 other ventures; Sequoia provided venture finance for Apple, Oracle, Cisco, Google, Instagram, and hundreds of other firms which now have an aggregate public market value of over \$1.4 trillion.

Less well known, 1972 also marked Sandra Kurtzig's founding of ASK Group, a software firm that eventually achieved \$400 million in annual sales. A math major from UCLA with a master's degree in aeronautical engineering from Stanford, Kurtzig used \$2,000 in savings to finance her foray into the uncharted waters of entrepreneurship. She later recalled that in that era "a woman starting her own company was considered a pariah, a piranha, or both." In 1981, ASK completed its initial public offering (IPO), making Kurtzig the first woman to take a Silicon Valley technology company public. Unfortunately, Kurtzig's actions did not trigger a spate of women as entrepreneurs to move center stage.





**DEBUGGING ENTREPRENEURSHIP  
FOR WOMEN IN SILICON VALLEY**



Tandem NonStop Systems advertisement.



Male executives in Tandem Incredible Hulk Contest.

For decades, men persisted as the poster boys for tech. Stories in Silicon Valley revolve around iconic men, starting in the formative years with Bob Noyce, Bill Hewlett, David Packard, and Gordon Moore. The early, commonly held script featured men as the principal stars and women as supporting cast. This has been a topic of ongoing—often heated—debate.

For example, when eccentric Texan Jimmy Treybig founded Tandem Computers in 1975, the firm catapulted to become the dominant manufacturer of fault-tolerant computer systems for banks, ATM networks, and stock exchanges. At the same time, Tandem deliberately built a forward-thinking corporate culture with annual stock options for every employee and weekly gatherings where executives mingled informally with employees. Yet, despite Tandem's innovations in technology and corporate culture, attitudes toward women lagged.

A print ad for Tandem's NonStop Systems featured two shapely blonde women dressed in revealing shorts while riding a tandem bicycle. Women in the company's marketing department were appalled. To protest, they staged a Tandem Incredible Hulk Contest: male executives shed their shirts and donned equally short shorts, so they could be rated by women in the company.

During subsequent decades, many women in Silicon Valley faced roadblocks on their path to become entrepreneurs. In 1984, Sandy Lerner and Len Bosack started Cisco Systems. Pitching unsuccessfully to more than 70 venture capitalists, Lerner recounted that “a number of them said, you're never going to get funding with [you as a woman] in the mix as a

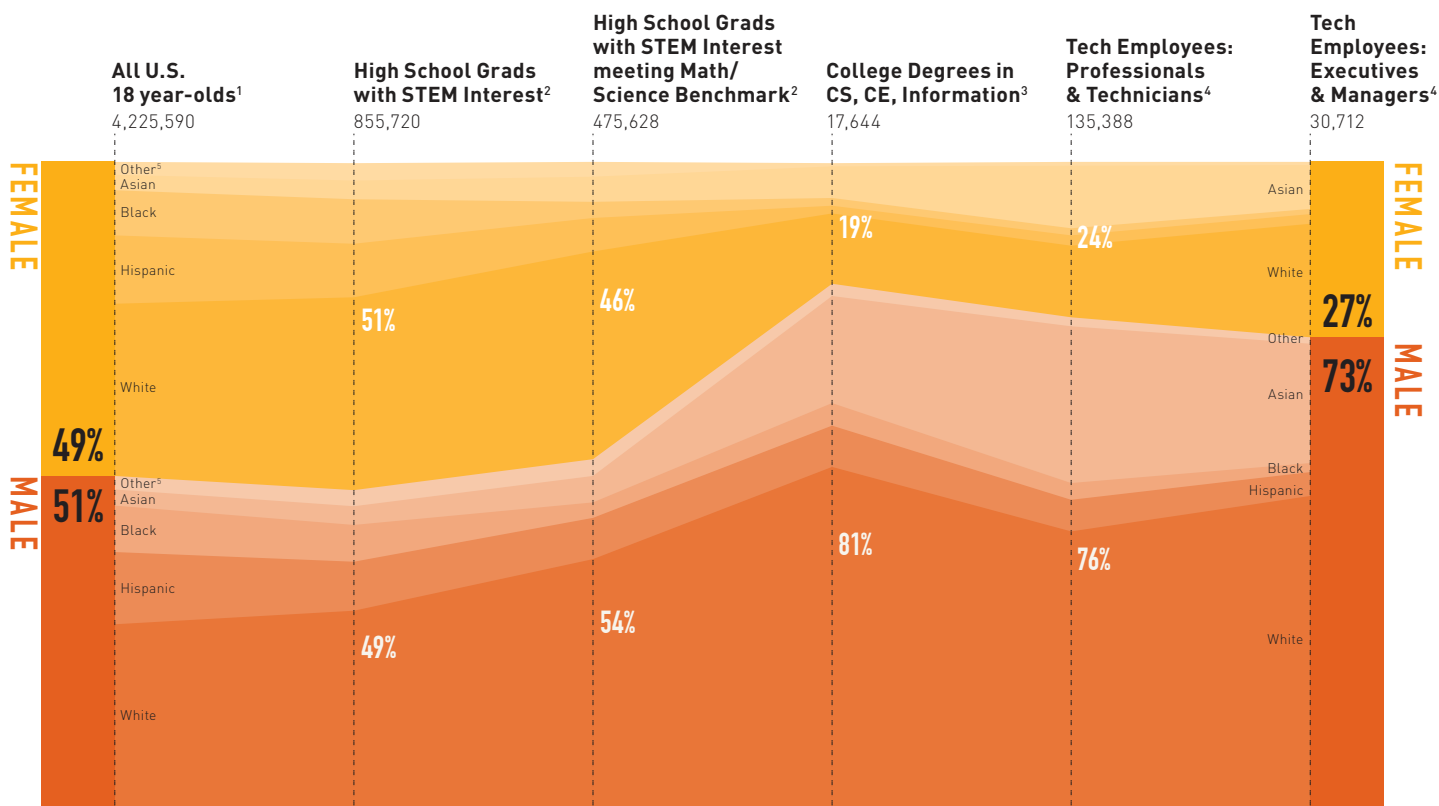
founder.” Commenting on the cultural milieu of the Valley in the mid-1990s, Anita Borg, a senior researcher at Digital Equipment Corporation in Palo Alto, cited the “invisible-woman syndrome,” where women's ideas were discounted or ignored. “It's like water torture. It wears you down.”

Many women entrepreneurs faced an uphill battle in how they were portrayed and evaluated. For example, self-described “girl geek” Kim Polese followed a successful stint at Sun Microsystems by founding Marimba, an Internet-based software management firm. Attracting media coverage, such as *Time* magazine's “25 Most Influential Americans” in 1997, she wrestled with the focus on her as a femme fatale instead of on her company, which she considered a double standard in judging women leaders.

Consider the business school case of Heidi Roizen, co-founder and CEO of T/Maker, an early personal computer software company. Frank Flynn, Stanford business school professor, tested MBA student attitudes toward gender with a simple exercise. One class section received a case study about “Howard” Roizen; the other received the identical case, with female pronouns for “Heidi” Roizen. When students rated the protagonists, they gave “Heidi” high marks for competence and leadership effectiveness. Whereas they gave “Howard” positive scores for being assertive, the more aggressive they perceived Heidi, the more they didn't like her, they wouldn't hire her, and they didn't want to work with her.

Despite serious challenges, these and other women in Silicon Valley succeeded as founders and tilled new ground as executives. In 1981, Judith Estrin co-founded Bridge Communications—a network communications firm that went public in 1985 then merged with 3Com in a deal worth more than \$200 million. Estrin went on as

# THE TECH WORKFORCE PIPELINE



Sources: <sup>1</sup>American Community Survey - July 2014, <sup>2</sup>ACT, Inc. "The Condition of STEM 2014", <sup>3</sup>CRA 2014 Taulbee Survey (does not include non-resident aliens), <sup>4</sup>EEO-1 Reports from 2014 for Apple, Cisco, Facebook, Google, Intel, LinkedIn, Twitter, Yahoo, and Yelp - note that EEO-1 reports include foreign nationals working in the U.S. <sup>5</sup>Other includes American Indian, Alaska Native, Native Hawaiian, Other Pacific Islander, and Two or More Races.  
 Research & Design: Threestory Studio - threestory.com

Current diversity data from nine Silicon Valley titans (Apple, Cisco, Facebook, Google, Intel, LinkedIn, Twitter, Yelp, and Yahoo) reveal that women are still significantly underrepresented in tech jobs, totaling 27 percent of executives and managers.

COURTESY OF ERIK JACOBSEN OF THREESTORY STUDIO



Google Doodle in honor of the 177th birthday of Ada Lovelace (December 10, 2012).

serial entrepreneur to co-found eight technology companies. In 1992, Carol Bartz was named chief executive of Autodesk Inc. and subsequently recruited to lead Yahoo. Donna Dubinsky joined Palm Computing as CEO just after its founding in 1992 and then was co-founder and CEO of Handspring starting in 1998. Both companies played leadership roles in the emergence of the handheld computing and smartphone industries.

By the 1990s, some of the most experienced leaders and team members in operational roles in technical companies were women. Helen Bradley, vice president of engineering at NetApp from 1995 to 1999 recalled: “NetApp actually had a lot of senior women in the company—Carol Bartz was a board member, the executive engineering team was 40 percent women, and if you looked at every functional organization, there were senior women in it.” This talented cluster of women rose within NetApp or moved to help

grow other companies, including Cisco, Citrix, Dell, Hitachi, Ironport, Parascale, VMware, and others.

Bradley emphasized the importance of a strong pipeline of women with STEM education. The percentage of all computer-science degrees that went to women rose from less than 5 percent in 1970 to nearly 40 percent in the early to mid-1980s, though it has sunk below 20 percent in recent years. Recent data shows the vulnerability of losing girls along the pipeline, from high school through college to the tech work force. It is not surprising that current diversity data from nine Silicon Valley titans (Apple, Cisco, Facebook, Google, Intel, LinkedIn, Twitter, Yelp, and Yahoo) show that women are still significantly underrepresented in tech jobs, totaling 27 percent of executives and managers.

Lagging diversity is far more than a STEM pipeline issue. Silicon Valley likes to portray itself as the embodiment of meritocracy. But studies show that it is harder for the existing pool of qualified female than male entrepreneurs to gain funding, mentors, and networks of connections. Less than 5 percent of venture funds go to women founders. And the current tally of executives is highly imbalanced: for 2014, the S&P 100 has 16 percent women executives, while the Valley counts only 11 percent female executives within the Silicon Valley 150, the Bay Area’s top tech companies.

Another contributing factor is gender bias, albeit often unconscious. Consider Google’s home page. People from around the globe visit the site every day; it serves as a kind of virtual town square. In honor of the 177th birthday of Ada Lovelace on December 10, 2012, the Google Doodle featured Ada as computer pioneer, engaged

in calculations on paper that looped to connect generations of computing machines down to the modern laptop.

However, for years the presence of women in Google Doodles was literally nonexistent. Analysis revealed that between 2000 and 2007, 100 percent of the Google Doodles featured men. And until 2014 the majority of Google Doodles echoed the demographics of Silicon Valley tech companies: male and white. Between 2010 and 2013, of the 445 people honored by special Google logos world-wide, 82.7 percent were men and 62 percent were white men. By 2013, the presence of women in Google Doodles rose to 23 percent. And in 2014, Google Doodles used their world stage to highlight women's contributions with 50 percent women: 56 men and 56 women. Changes like these may seem small but are emblematic of significant progress in deep attitudes and constructive behavior.

Silicon Valley's tech arena has come a long way from the days of Tandem's bicycle ad. The Valley's high-profile women executives include Marissa Mayer at Yahoo, Safra Catz at Oracle, Meg Whitman at eBay and now HP Enterprise, Susan Wojcicki at YouTube, and Sheryl Sandberg at Facebook. Generations of women entrepreneurs are building companies side by side, from Weili Dai, co-founder and president of Marvell, a \$4 billion fabless semiconductor firm, to Diane Greene, co-founder and former CEO of VMware, now senior vice president for Google's cloud business. For rising star companies, Julia Hartz (Eventbrite), Sarah Leary (Nextdoor), Holly Liu (Kabam), Amy Pressman (Medallia), Adi Tatarko (Houzz), Anne Wojcicki (23 & Me), Michelle Zatlyn (CloudFlare), and others (co-)founders have earned their place in the exclusive unicorn club of private valuations above \$1 billion.

From 1972 and Kurtzig to today's unicorn founders, Silicon Valley's women entrepreneurs have also impacted the way people work, live, and play. Yet frequently they have been unheralded. There is still much work to do. Individuals and organizations are committing resources, mindshare, and energy to continue progress. On this front, Megan Smith, former Google vice president and now chief technology officer of the United States, identified a pressing need and issued a challenge: "Women, especially those in science, technology, and mathematics, and entrepreneurship are often missing from history's major canons. Even if you didn't create the problem, once you become aware of it you can debug it and solve it. You can become part of the solution." ○

Helen Bradley,  
vice president of  
engineering, NetApp,  
1995–1999.



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