

THE SILICON BOYS AND THEIR VALLEY OF DREAMS

The meek didn't inherit the earth.
The geeks did.

DAVID KAPLAN

1. The Dream of Silicon Valley

"If Silicon Valley were a nation, it would rank among the world's twelve largest economies."

– David Kaplan

Silicon Valley actually had its first start-up company in 1909 when Cyril Elwell formed the Federal Telegraph Company with two assistants. The company's backers included David Starr Jordan, the first president of Stanford University, who invested \$500 in the new venture. The most well-known employee of Federal Telegraph was Dr. Lee de Forest who developed the first vacuum tube amplifier and oscillator in 1911.

Within a short period of time, two employees broke away to form their own company -- in this case the company that developed Magnavox loudspeakers -- using employees recruited from Stanford University's electrical engineering school. That basic concept of breaking away from one company to start-up a new company to commercialize new technology is the business model around which Silicon Valley continues to be built today.

By the mid-1920s, the most highly sought Stanford students were those from the radio communications lab tutored by Frederick Terman -- who is today considered to be the "Father of Silicon Valley". It was in one of Terman's graduate courses that David Packard and Bill Hewlett met and became friends. Terman encouraged Packard and Hewlett to go into business, which they did commencing on January 1, 1939 in a one-car unpainted garage at 367 Addison Avenue, Palo Alto. Packard and Hewlett had \$538 in the bank and no real business plan except to do anything they could.

While Packard and Hewlett busied themselves building HP, William Shockley, John Bardeen and Walter Brattain were developing the transistor at Bell Laboratories in New York. The transistor was announced on June 30, 1948, and by early 1956 Shockley had decided to leave Bell Labs and set up his own company to manufacture transistors and other semiconductor devices. The new company, Shockley Semiconductor Laboratory, would be located in the 650-acre industrial park next to Stanford University, and two of the new company's key employees were Robert Noyce who had earned a Ph.D. at MIT and Gordon Moore, a 27-year old chemist from CalTech.

Shockley turned out to be a difficult person to work for, and his company failed to make any headway. While he was on vacation in the summer of 1957, eight of his key employees (including Noyce and Moore) decided to leave and form their own company. They sought start-up funding from Hayden Stone & Co., a New York investment bank, who sent a senior partner and a junior associate, Arthur Rock, out to meet the eight.

Arthur Rock talked to Sherman Mills Fairchild, one of the great industrialists of the age, about providing start-up funding for the eight ex-Shockley employees to go into business for themselves. Fairchild, who was one of the largest shareholders in IBM, had built his company Fairchild Camera and Instrument on the strength of his inventions such as the aerial camera and hydraulic brakes for aircraft, and he was then planning on diversifying into missile and satellite systems. He realized that transistors would be important to his future business, and he agreed to provide \$1.5 million in start-up funding for a new subsidiary company. Each of the eight were offered a shareholding in the company for \$500 each, with the proviso that Fairchild would have the right to buy them out of their shareholding for about \$250,000 each within 5-years if the new

company was successful. (This is widely considered to be the first venture capital investment made in Silicon Valley -- effectively marrying the money of the East Coast of the United States with the electronic frontier of the West Coast).

Fairchild Semiconductor was launched in late 1957 with 29-year old Robert Noyce as the business leader and Gordon Moore as the technical leader.

"Because of personality and job history, Noyce ran a loose ship. Hierarchy was an enemy: There were no reserved parking spots, no mahogany-paneled dining room, no private offices (not even for Noyce), no multilayered array of middle managers. At sales meetings, they served brownies and whiskey, which probably helped since early on many on the sales force had no inkling what a transistor actually was. Management strategy was an oxymoron, because Noyce didn't do a lot of managing. But California casualness masked another part of the emerging tech lifestyle: Everybody worked like beavers. Fairchild Semiconductor was the first of the nerd-driven companies that embodied the Silicon Valley culture."

– David Kaplan

By the end of 1958, Fairchild Semiconductor had achieved \$500,000 in sales revenue -- no small feat considering the price of transistors had fallen from \$45 each in 1950 to \$2 in 1957 (and would continue to drop to milli-fractions of a cent by the 1990s). The great production restraint of the era was the time it took to connect scores of transistors together to build anything useful. The breakthrough invention that would solve this manufacturing bottleneck was the integrated circuit -- which had everything (transistors, connecting wires and other components) constructed on the same thin wafer of semiconductor material.

In January 1959, Fairchild announced the developed of the first integrated circuit -- which had layers of different materials built on top of a silicon base. Photolithography was used to engrave circuit patterns on the surface and extremely fine layers of aluminum were deposited to make electrical contact between the layers. Within time, millions and millions of transistors would come to be fitted within a single silicon chip.

"It was a kind of latter-day alchemy, converting worthless elements into something precious. As manufacturing technology improved, the parts got smaller and the etched lines got finer. This made the integrated circuit -- a "chip" the size of a fingernail -- more and more powerful, and ushered in the "minicomputers" of the 1960s that took computing power away from the technoids in the white lab coats."

– David Kaplan

Within a short period of time, it was cheaper to buy an integrated circuit than it was to buy the individual components and build your own. It was clear semiconductors would rapidly become a multibillion dollar industry with the potential to usher in a second industrial revolution. This did not escape the notice of Sherman Fairchild, who decided to exercise his option and buy out the original eight ex-Shockley employees for \$250,000 each less than two years after Fairchild Semiconductor had been set up.

While a return of \$250,000 on an investment of \$500 seemed impressive, the lack of equity, combined with the introduction of East Coast style management, provided an incentive for people to start leaving Fairchild and set up their own companies. Four of the original eight left in 1961 to form Teledyne. Over time, around 100 Silicon Valley companies would ultimately be formed the same way.

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