

Our Growing Valley:

from orchards to high tech

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Originally, Santa Clara Valley was covered with orchards of cherry, apricot, apple, and plum trees. It was termed "The Valley of the Heart's Delight" for its beautiful land. Santa Clara Valley possessed fertile lands and a natural loveliness which melted the hearts of many. Gradually, the dirt roads were paved, the population grew, the orchards were demolished, and towering buildings were constructed. Today, Santa Clara Valley is a fast-growing and extremely prosperous technology center. It is the meeting place for successful business start-ups, adventurous entrepreneurs, and wealthy venture capitalists. Today, instead of having fertile soil, Santa Clara Valley has new ideas, talent, and energy. Santa Clara Valley is now conveniently termed Silicon Valley. Semiconductor chips, which were an essential part of the initial success of the area, have a silicon base. Thus, the term Silicon Valley.

Silicon Valley is an ideal place for industry. It is located just a few miles south of San Francisco, which allows for a major city to be nearby. Its location means that leisure activities, such as going to the beach and skiing, are just a few hours away and easily accessible. The location also provides for Stanford University. Having a university so close allows new and talented engineers and businessmen to be hired directly out of college. The weather is good all year round and the area is without slums.

By working and living in a nice environment, there tends to be less stress to the ordinary person. This permits for a more accurate and complete job to be accomplished. The Silicon Valley environment also encourages success and promotion. It enforces somewhat of an equality relationship between the boss and employee. By having a better

relationship, success seems more plausible and often gives employees more ambition to succeed.

With the gold rush of 1849, many individuals came to California. These men and women moved into unknown territory desiring to fulfill their dreams of happiness and fortune. The first gold miners had little technology. Most found gold and sold it to whomever offered to pay the most. The miners wanted to sell as much gold as they could at one time. This way, they would not need to work for a while. As time passed, more machinery and technology was used to find gold. The adventurous man who wanted to get rich quick and retire was replaced by more scientific and business-like men. However, the gold rush provided a method to increase the population of California. The miners started in temporary shelters. After the energy of the gold rush died down somewhat, they were the ones who made permanent settlements and ultimately, the communities of today.

The gold miners of the 1850's were similar to the entrepreneurs and venture capitalists of today. Today's active members of Silicon Valley are out for an adventurous ride which is designed so they can become wealthy and never have to work again. An estimated 15,000 people in Silicon Valley have retired as millionaires at a young age. Like the people who migrated to California for the gold rush, today's entrepreneurs come from all ages, races, religions, and social status'. Someone who graduated from Stanford University and started his or her own technology company may be very successful. However, a simple secretary or accountant working for the technology company could also make quite a bit of money through acquired stock. Just as gold was the main emphasis for wealth back then, technology is the right direction for today.

World War II was important towards the development of Silicon Valley. From 1929 through 1939, the Great Depression occurred after a post-war boom. The Great Depression and World War II were closely related. Since a gold standard could not be attained after 1919, international trade was interrupted. In the 1920's, the United States was prosperous. Businesses thought there would be profits coming soon. Since the future looked good, the banks gave much credit. Too much money was spent on production and more jobs were created. This made costs rise. When banks gave out too much credit, and prices were high and consumers bought less expensive goods from foreign countries. Credit from banks was severely controlled and everything was devastated. More unemployment occurred and prices greatly decreased. Then World War II came. The United States started economic planning to restore the economy. World War II allowed William R. Hewlett and David Packard to create their company. The war also enabled Russell and Sigurd Varian, a brother team with William W. Hansen, to make radar. They first invented the klystron tube. They were backed by Stanford University. With radar and the klystron tube, it was possible to make anti-radar devices, which confused enemy radar. The war made technology more valuable and increased its use and popularity.

Lee de Forest first created the three-element vacuum tube in Palo Alto in 1906. He named his new invention the audion. In 1913 the audion was later used as a sound amplifier. De Forest discovered that it generated electromagnetic waves. De Forest also used the audion to detect radio signals. Thomas Alva Edison made experiments on the light bulb in 1879. Although the idea had been toyed with before by other people, he was the first one to put it to practical use. De Forest used the design of Thomas Edison's light bulb for his audion. He added a grid and a plate, so the electrons could travel from the vacuum to the plate. De Forrest's audion was also effective as a loudspeaker. He was a magnificent inventor and by the time he died in 1961, at the age of 88, he managed to aquire an overwhelming 300 paténts.

Frederick E. Terman was the next and perhaps the most significant leader towards creating Silicon Valley. His father created the Stanford-Binet Intelligence Quotient test. Terman studied chemistry and electrical engineering at Stanford and Massachusetts Institute of Technology. Terman then returned to Stanford where he taught radio engineering and initiated a laboratory for radio communications. Many students came to study under him. Terman was very inspiring and encouraged his students to begin their own companies. He especially urged William R Hewlett and David Packard to start their own company and market the audio-oscillator, which William R. Hewlett had designed. Hewlett and Packard took Terman's advice and became the world's first enthusiastic start-up company. They based their work in Palo Alto in 1937 in Packard's garage. Their first major account was from Walt Disney, who purchased eight audio-oscillators. Today, Hewlett

Packard is an extremely successful company which manages 85,000 employees and has an approximate annual sales which has exceeded six billion dollars.

Terman also influenced Stanford University, as Vice President, to inaugurate a new idea. In 1885, Leland Stanford founded Leland Stanford, Jr. University. Although that is still the legal name, it has been shortened to a mere Stanford University since about 1916. Leland Stanford also donated 8,800 acres as a source of income to the school. If the school had enough money, Terman then wanted to hire good teachers. He did not believe in having ten mediocre teachers. He would rather have three really good teachers. With good teachers, an excellent reputation could be established. As a result, more bright and intelligent students would come. To raise the money to carry out this idea, he convinced Stanford University to build a research park with some of the land which they could not sell. This way, the students would also benefit because they would have access to the new facilities as well. Stanford University offered leases on the land. Many companies took the opportunity and it eventually became a successful technological center.

Fifty years ago, sun shone on apple and apricot orchards in Santa Clara County. After the evolution of high technology, Santa Clara Valley is better known as Silicon Valley, Sun and Apple as work stations, and apricot as software. How did this transition occur?

Research indicated that the start of the high tech transition occurred in the mid to late 1930 time frame at Stanford University. Dr. Frederick Terman wrote one of the most comprehensive textbooks about electronics, and taught such students as Dave Packard, Bill Hewlett, the Varian Brothers and several founding members of Fairchild Semiconductor. Dr. Shockley, the inventor of the transistor and eventual controversial geneticist, also instructed at Stanford. Many of the late blooming genetic engineering technologies emanated from Stanford.

As Stanford University served as the brainpower behind the technological revolution of Silicon Valley, World War II provided the financial stimulus for growth. Such companies as Varian Associates, who invented the Klystron electric table, which was the basis of original high powered radar technology. Radar is used in communications, tracking (satellites, missiles, etc.), and damaging enemy electronic communications. Hewlett-Packard, which began in 1939, invented all the early bay electronic instrumentation which was used for the design and test of most military electronic equipment utilized in World War II aircraft communication, missile tracking, etc.

During the 1940 and 1950 time periods, large electronic vacuum tubes were utilized as the primary amplification control for the emerging high tech industry. Because of their large size, resulting equipment was large and bulky. Dr. Shockley invented the transistor which reduced the size of vacuum technology by approximately one hundred times. This led to the

evolution of transistor radios versus large, bulky console radios and portable field-oriented military equipment versus bulky equipment that had to be carried into war by large trucks. Shockley received a Nobel Prize for his efforts.

In 1957, Fairchild Semiconductor was formed in Mountain View to begin development of the integrated circuit (IC). The integrated circuit chip allowed thousands of transistor equivalent devices to be available on a small silicon wafer. This led to the ability to shrink the size of computers, if built with vacuum tubes, from the size of a house to as small as the size of an office desk. In 1971, a young company called Intel, which was formed by ex-Fairchild people, created the micro-processor. The micro-processor is basically a computer-on-a-chip. Another Stanford PhD student, Ted Hoff, from Intel, put the computers brain, the central processing unit, on a single chip of silicon. To this chip he connected two memory chips. One was a read-write memory, which served as an electronic scratchpad. The second kind was a read-only memory, which served to furnish the program necessary to drive the central processing unit. This device eventually led to pocket calculators. For the first time in history, Intel and some other companies started somewhat of a revolution in microelectronics. New companies began to come into sight to effectively use the memory chips and less expensive computer-on-a-chip. Innovative ideas, which were just a few years before impossible dreams, became real and entirely possible.

Other companies soon began to take advantage of the myriad of microcomputer and memory chips. A young engineer, James Treybig, from Hewlett-Packard, had long been bothered by customer complaints regarding computer failures. Treybig created Tandem to make a computer that would keep going in a non-stop mode. Measurex was formed to provide computer-

based control systems for papermills and other energy conservation plants. Steve Wozniak, again from Hewlett-Packard, and Steven Jobs created Apple Computers. This brought a computer which is easy to learn how to operate both into the work place and into homes. Rome Corporation was created to bring semiconductor technology into telephone switching applications. Sun Microsystems was created by several young Stanford University graduate students to bring general purpose, graphics, and computational power to engineers at very economical costs. 3-Com Corporation began with a technical founder from Stanford University and a business manager from Hewlett-Packard to provide local area net-working. An example of networking might be connecting computers together in a plant to industry requiring communications between engineers and businessmen working on common problems and shared data. Silicon Graphics was again created by a combination of Stanford-based technologists and a Hewlett-Packard businessman to provide three-dimensional electronics graphics machines for sophisticated and high-resolution automotive and aeronautical design application.

What's next from Silicon Valley? The current desire is for the first optical computer. An optical computer is a computer which uses laser light rather than electrons running through a wire. The advantage of the optical computer will be that information would be processed tens of times faster and with lighter weight with less mass. As technologists learn how to mass produce this product, it will become a more accurate and less expensive beneficial tool in the world of technology.

Silicon Valley has the most millionaires in the world. High technology has provided many with a wealthy lifestyle. The valley has continued to expand despite the problems it has. This area continues to produce millionaires and advanced new technological discoveries. But can it take care of the less fortunate people in San Jose? In this part of the valley, living conditions are nowhere close to the multi-million dollar lifestyles of the successful entrepreneurs. Traffic is extremely time-consuming and housing is inadequate.

Although many wealthy people live in Silicon Valley, many people are very poor. The cost of housing is ridiculous. It is nearly 60% higher than the average house costs in the U.S. Since the housing and the price of the land are so high, building new housing developments is out of the question. The average man who earns the average salary cannot ever attempt to afford these expensive developments. Mobile home and trailer parks are scattered throughout the valley. Since housing costs are so high, it is hard to hire someone from another state to permanently work here. They just do not have the funds to move their family to such an expensive area. Now, corporate and high tech companies are realizing that housing is less expensive in Oregon and Texas. They are now establishing plants in those areas to help deter high land and housing costs.

With new technology has come new crime. Now, the art of chip stealing has become the newest crime to benefit from Santa Clara County Sheriffs have recovered thousands of dollars of stolen chips. Chips are stolen for resale and to retrieve the small amount of gold built into the little devices. The gold is used in the chip for electrical conductivity. Chips are available to the engineers and others who put the computers together. Unfortunately such easy access is often too tempting to many people.

Silicon Valley used to be covered with beautiful orchards of cherry, apple, and apricot trees. In the 1950's we had the chance to save our beautiful valley. Only a few people warned us of the consequences. But, no one listened. One man in particular, Karl Belser, a former county planning director, provided a plausible alternative. He proposed to have zoning. This would have made housing and factories to be built on the slopes of the hills which act as the borders to Silicon Valley. This would have saved the fertile lands as well as allow new technology and companies to inherit the area. His efforts were to no avail, as no one listened.

Another problem is the rapid increase of the valley's population. As soon as the valley realized that there were simply too many people living and working in it, it was too late. The lands which provided the beautiful orchards were assessed for real estate tax purposes. The assessments which were made were so high that the farmers could not continue to maintain their orchards. There are only two growers left in Silicon Valley. Traffic is another major complaint of Silicon Valley. There is not only congestion on highways, but also on simple backstreets. In 1984, an attempt to somewhat reduce traffic was made by San Jose. The city re-installed 20 miles of street-car lines with six trolleys. Traffic remains an aggravating car delay.

Many metal tanks which store chemicals have become a large problem for Silicon Valley. Local semiconductor companies often put the chemicals used for chip making into containers. These containers are then deposited into the ground. Officials have discovered that many of the containers have been leaking. Although leakages from the tanks have not penetrated deep enough to contaminate public water, the chemicals have been found in a few private wells.

Despite all of the problems in Silicon Valley, people still continue to come. Most new-comers are Vietnam refugees. They flock into Silicon Valley for the older housing. They are identified by their more affordable hard work. Many people think that Silicon Valley could expand forever.

Would the life of farmers, growers, and fertile lands have been better than today's entrepreneurs, venture capitalists, and technologies? Although the orchards served as Santa Clara Valley history, I feel that it was more important for this area to make a name for itself in technology.

Unfortunately, we had to choose between orchards and technology. If I could have been in charge of the project, I would have saved many more orchards than what remain today. I would have agreed with the idea of agricultural zoning. This way, we could preserve the wonderful heritage of the Santa Clara Valley, yet still progress with the technology on the hills and borders of the valley. Having a strong basis in technology is important for a growing, prestigious and wealthy area, such as Silicon Valley. Technology does not simply provide many jobs, it also creates many significant changes for society. It provides excellent research and development for medicine. The improvements in medicine are due to the new ways that have been developed through technology, in which we can perform with more accuracy and precision. Technology has provided Santa Clara Valley with a more financially secure background. It has enabled the area to become acknowledged for hard work and much success. Where will technology lead us to in the future?

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