

The “Habitat” for Entrepreneurship

William F. Miller

July 2000

The “Habitat” for Entrepreneurship

William F. Miller

Most economies today are interested in economic growth as a path to greater standards of living and quality of life for their citizens. To achieve economic growth, there are essentially three paths to follow:

- (1) to improve the factor inputs such as labor and capital
- (2) through trade and comparative advantage
- (3) through innovation and entrepreneurship.

Of course, these three means to growth are not mutually exclusive, and may reinforce each other. Recent emphasis on entrepreneurship comes from the recognition that it is through entrepreneurship—particularly high tech entrepreneurship—that economies participate in the development of new products, new markets, and new industries.

This paper focuses on the business environment—or “habitat,” as I call it—for high tech entrepreneurship. In particular, it describes a habitat for the creation of new companies and new industries. Large companies play an essential role in the economy and develop many new products and advances in technology. However, it is also generally acknowledged that they are less likely to develop radical or disruptive technologies that create sea changes in industries, or, indeed, to create whole new industries. The history of two of the fastest-moving new industries—biotechnology and information technologies—bear witness to this fact.

The process of starting up and building a company is a complex task that is extremely sensitive to the habitat. Most companies start with an idea for a successful product, but being present in a “cauldron of ideas about new technologies and markets” is a clear advantage.

There are many tests that an “idea” must pass before it becomes a product, and many hurdles a product development team must cross before they become a company. When I was active in the venture capital community (and still, in my work as an angel investor), I asked four basic questions about any new proposal.

First, does the idea work? Is the technology sound, and will it scale up to high volume use or production? Does success depend on further development of other technologies? Having a working model of the product before asking for financial support helps companies to answer this question.

Second, who wants the product? Does a market now exist for it, so the task is to sell into an existing market, or does the market have to be made? The answer impacts both the building of the management team and the amounts and uses of capital. Are there competitors? What are they doing? New entrepreneurs are often so enchanted with their new technology that they think the marketplace will immediately adopt their product(s). Having market evidence of the product's utility helps to cross this hurdle.

Third, is the right management and professional team in place to build the product and the company? If not, who needs to be added and when? Do the founders recognize the company's needs and evaluate the team well? Clearly, having a track record of previous company-building and management is a strong recommendation

Fourth, how much money, over what period of time, will the company require to become self-sufficient? Many founders say, "if I can just get \$500,000 [or some other number], I can get started." But what happens after that? How much money will it take to develop a prototype, put the product through beta tests, and get adoptions? At what stage will there be a convincing story to get additional financing? Outside advisors, angels, venture capitalists, lawyers, and consultants can help new entrepreneurs to understand their financial needs.

These tasks all seem daunting. Only the courageous and persistent will and should undertake them. However, getting this initial start is truly only the beginning. Once initial funding has been secured from friends, family, and/or angels, finding and motivating a team of professionals and managers is the next key task. Personnel search firms in Silicon Valley are well informed about those individuals who are ready to change employment, or to join a start-up. Such firms can assist with rapid recruitment, but the main task of "selling the company" to the recruit falls to the CEO. Having a clear, compelling vision, a sound operating plan, and a suitable incentive package are essential. High tech professionals still want to be involved in exciting work in an exciting company.

The role of professional services companies—lawyers, accountants, financial supporters, financial advisors, and consultants—is so important that they must be selected as carefully as the company's staff. To describe this situation, I often use a football analogy which states that "you can only win a Super Bowl if you have Super Bowl caliber players in every position." This "Super Bowl" team includes not only the management and professional staff, but also the professional services providers.

All of Silicon Valley's present "icon" companies began their lives, in the Valley, as start-ups. The importance of the business environment for *supporting entrepreneurship* is often overlooked by officials, scholars, and business executives who visit or study this part of the world. I personally meet with over four hundred such visitors each year, a number which is in turn only a small fraction of the total who come to the region. Most often these visiting individuals will meet with companies, universities, and venture capitalists to gain insight into what makes the Valley tick. These three entities are important, to be sure, but they by no means present the whole story.

Some of the visitors to Silicon Valley want to start science or industrial parks in their home countries. However, if they fail to recruit visionary companies into the parks, the projects become mere real estate developments and do not contribute to developing entrepreneurial companies. Some visitors seek to establish university technology transfer programs.

But if they do not also create favorable conditions for effective interaction between the universities and industry, the programs grow moribund. Still other visitors wish to start venture capital (VC) industries. And yet, without the right regulatory regime, such VC companies are little more than banks.

Paradoxical though it may seem, globalism is currently fostering greater regionalism and localism. Globalism leads to seeking out regions of specialization, and regions in turn move toward specialization to establish their competitive position in the global economy. In a 1998 issue of the *Harvard Business Review*, Michael Porter emphasized the importance of *place*, observing that "...enduring competitive advantages in a global economy lie increasingly in local things—knowledge, relationships, motivation—that distant rivals cannot match."¹

One such region—Silicon Valley—has become a hotbed of innovation and entrepreneurship by virtue of its unique business environment, or habitat. In the business habitat of a high tech entrepreneurial community like Silicon Valley, as in the natural habitat for flora and fauna, there is a complex interrelationship between the various elements that contribute to its success. Locally, venture businesses grow robust by working with specialized business service firms, and these business service firms are strengthened by their work with venture businesses.

On a larger scale, the business habitat also includes the national system of regulation, security laws, accounting principles, research and education support, and, significantly, the business philosophy of the nation itself. For example, the governments of many countries maintain that only government regulation can protect private investors. In the United States, by contrast, the government believes that transparency and disclosure—not regulation—should serve as the primary protections.

Over the past one hundred years, Silicon Valley has developed in an organic way. The Valley did not start by attracting large, established companies (such as General Electric, RCA, or General Motors) to relocate, or to establish business activities in its back yard. Rather, Silicon Valley grew its own companies, and this remains one of its most characteristic features. During its long history as a region of innovation, Silicon Valley has passed through several stages of development. Although the exact dates are somewhat arbitrary, its evolution can be divided into five stages:

1890s–1920	Early beginnings
1920s–1960	Formation of “icon” companies, such as Hewlett-Packard and Varian Associates
1960–1985	Dynamic growth and development of specialized business infrastructure, such as law firms, specialized accounting firms, etc.
1985–1993	Stagnation, decline, and renewal: the period of “Civic Entrepreneurs,” and the formation of new nonprofits, such as Smart Valley and Joint Valley Silicon Valley (JVSV)
1993–present	New dynamism and new business models

In the early beginnings, and into the 1960s, companies started up without the benefit of the specialized business infrastructure that evolved in the era from 1960 to 1985. This latter period saw the development of specialized firms in areas as diverse as law, accounting, venture capital, personnel search, consulting, marketing, equipment leasing, support services for graphics and printing, engineering design, engineering construction, and land and building development. All of these businesses brought their expertise to bear on the problems

and services needed to support high tech venture businesses. Because these firms were specialized, they could deal more quickly with venture businesses, for which speed is so essential. Further, many of these business support firms have utilized business practices uncommon in other environments. For example, many firms, including law, personnel search, and others, will take a portion of their payment in equity in the companies they serve.

The ready availability of high tech-specialized business services permits venture businesses to act quickly. Personnel search firms can rapidly recruit workers because they maintain continuous contact with executives and professional staff in the region. Law firms can help speedily negotiate, develop, and review legal documents, both because they are local, and because they are so familiar with the issues for venture businesses. Understanding how and why this highly integrated system works will enable national and local governments and businesses to develop truly entrepreneurial high tech venture communities in other parts of the world.

Why is speed so important today? Has it not always been important? Economists observe that what they call network externalities (or, alternatively, network effects, or increasing returns) are especially prevalent in network industries such as communications services, the Internet, and even the software industry. Network externalities give great advantage to first movers. For a telephone or Internet company, new subscribers add advantage to the old subscribers, offering them more people to whom they can connect. The more people or companies to which a subscriber can connect, the more valuable the network. For this reason, Internet companies are working very hard—and very fast—to increase their numbers of subscribers and visitors to their web sites. In the case of software, the marginal cost of producing and distributing an additional copy is extremely low. The more users there are of the software, the more individuals with whom each user is compatible. In turn, the more individuals that exist who can share a pool of knowledge about the software, the more new applications of the software will be developed. Because software distribution can be so rapid, this chain of events provides great advantage to the first mover.

Silicon Valley has evolved a local, network-based industrial system that encourages openness, learning, information-sharing, coevolution of ideas, flexibility of both labor and companies, and fast responses to opportunity and challenges. This unique environment is best characterized by AnnaLee Saxenian, in her 1994 book *Regional Advantage*:

Silicon Valley has a regional network-based industrial system that promotes collective learning and flexible adjustment among specialist producers of a complex of related technologies...The functional boundaries within firms are porous in a network system, as are the boundaries between firms themselves and between firms and local institutions such as trade associations and universities.²

Silicon Valley's "collective learning and flexible adjustment" enabled it to reinvent itself through the very substantial downturn of the late 1980s and early 1990s. During this period, Silicon Valley underwent a critical self-examination, and perhaps learned more about itself than in earlier periods of its development.

What are the features of the habitat that permit the collective learning and flexible adjustment so vital to growth? Ten characteristics, detailed below, have particular relevance to the habitat of Silicon Valley. Although they are especially evident in Silicon Valley, many, or most of these characteristics also manifest themselves in other entrepreneurial communities worldwide.

1. Knowledge intensity is the only path to high-quality job generation. Entrepreneurship and innovation in high technology are based on knowledge that is embedded in technology. Of special importance is the dynamic interaction between the creation of knowledge and its entrepreneurial exploitation. Every industry and every entrepreneurial region sets its sights on moving up the value-added scale by embodying more knowledge in its products and services.

It can be said that the application of knowledge to industry is not new. The first, industrial revolution applied tacit knowledge to raw materials, energy, and land. The second, scientific, revolution applied practical, learned knowledge to transform materials and sources of energy into new materials and forms of energy. The third revolution in which we now find ourselves—which might itself be called the knowledge revolution—differs in one key respect from the previous two. Now, knowledge is being applied to knowledge, to create new knowledge devices and software products.³ Much more than in previous revolutions, the current knowledge revolution calls for an even higher level of knowledge intensity.

What can be done to increase the knowledge intensity of a region and help “force the paradigm” of high tech entrepreneurship? Public policies that promote research and development (R&D) in companies (such as R&D tax credits), encourage those companies to develop higher value-added products. Government purchasing policies that accept or encourage advanced products in turn create a demand for those advanced products, thereby creating a market for the results of corporate R&D. As the government itself employs more knowledge-intensive practices, those companies that supply or utilize government services will respond. For example, when the government of Singapore created TradeNet (through which companies could obtain export permits and shipping schedules electronically), companies responded by automating their shipping and scheduling systems.

2. The presence of a high quality work force. It follows from knowledge intensity that a region can not service a knowledge economy and move up the value-added scale without a high quality workforce. For this reason, every region ought to place special emphasis on education and training. Teacher training, combined with higher salaries, greater recognition for teachers, excellent facilities, and adequate student support, are appropriate public policies for developing skilled and intelligent workers. The private sector, too, can play a role. In Silicon Valley, when it became apparent that the quality of primary and secondary schools had declined, the private sector led the entire community in a massive effort devoted to education and training. Large amounts of money, professional services, and executive leadership flowed to Joint Venture Silicon Valley Networks’ “21st Century Education Initiative,” and to Smart Valley, Inc.’s “Smart Schools Project.” Additionally, both companies and community organizations sponsored initiatives to improve workforce training.

Not all education and training should be directed toward entrepreneurship. However, in creating an entrepreneurial high tech economy, students—and particularly, advanced students—should be exposed to the opportunities, as well as the risks of entrepreneurship. Case studies of both successes and failures, combined with interactions with entrepreneurs, can help prepare students for entrepreneurial careers if they so choose. Programs that link schools, industry professionals, and executives play a vital role in perpetuating Silicon Valley’s entrepreneurial attitude.

3. A highly mobile work force contributes to collective learning in a community. Although not allowed to transfer trade secrets, professional employees share tacit knowledge

as they move from one company to another. A single company's workforce turnover is seldom enough to destabilize the company, but too much turnover can, clearly, be a concern. Nonetheless, the positive effects of professional staff mobility seem to outweigh the negative effects. As knowledge spreads throughout the community and professional employees fit into positions that maximize their contributions, the whole community gains.

Government policy can facilitate mobility by establishing or mandating mobile retirement and health insurance plans. In California, noncompete clauses in employment contracts are not valid, thereby freeing employees to start competing companies, provided no trade secrets are stolen. In many other states, where noncompete clauses *are* legal, the difficulty of interpretation and the disinclination to sue ex-employees (because of the negative effect on current employees) means that courts often do not enforce them. For instance, when California-based Informix filed suit against Oracle for employing a large number of Informix employees, even more employees left the company, causing Informix to withdraw its suit.

4. A business climate that rewards risk-taking and does not punish failure is a prerequisite for an entrepreneurial high tech community. Most high tech ventures fail, so a climate in which the stigma of failure hangs over the unsuccessful entrepreneur serves as a powerful deterrent. This is especially true if the rewards for risk-taking are not sufficiently high. In Silicon Valley, there are many examples of entrepreneurs who have failed and successfully started over. These entrepreneurs view failure as a learning experience.

On the failure side, bankruptcy laws that provide limited liability—that is, laws that limit liability to the invested capital and do not permit creditors to “reach beyond” the company—permit entrepreneurs to be more venturesome. Similarly, the availability of limited partnerships for venture capital firms encourages their formation, and in turn, their capacity to engage in the high-risk business of high tech ventures. Japan, Korea, and India are moving in this direction, or have already done so.

On the success side, security laws that bestow equity credit for ideas, organization, and hard work give larger rewards to the entrepreneur. By contrast, a security law environment that requires company founders to pay the same amount as investors for each share of stock does not result in a large enough payoff for the former. This situation often results in large initial dilution of the founders' stock, making them reluctant to take further investment—and dilution—to grow the company quickly. In fast-growing markets and markets characterized by increasing returns to scale, rapid growth is essential to survival. Changes in these kind of securities laws are currently under consideration in Japan and India.

5. Open business environment. AnnaLee Saxenian describes the porous boundaries between firms, and between firms and local institutions, in a network system. Frequent meetings at seminars and conferences are mechanisms for exchange of tacit knowledge that can benefit all companies in the area. While companies in Silicon Valley fiercely compete, there also exists an attitude that all can gain from sharing tacit knowledge below the trade secret level. Ed McCracken, former Chairman and CEO of Silicon Graphics, once said that “some secrets are more valuable when shared,” meaning that all parties in a community, including the secret-holder, will gain from sharing certain knowledge. These ideas lead to open standards, which permit application developers to produce applications or products using other parties' platforms or products. Such openness ultimately provides a wider audience for the original platform or program than it previously enjoyed.

During the 1980s, there was a movement toward business alliances and joint ventures for technology and marketing. Reduced communications and transaction costs, due to lower equipment costs, led to the disaggregation of vertically integrated industries. Thus began the era of virtual companies, which substantially outsourced many functions. Companies learned to deal effectively with many alliance partners so that all parties gained. By providing opportunities for joint research and technical exchanges, trade associations, as well as government agencies, can also help to foster open business environments. As yet, however, most exchanges occur informally, through meetings of friends and colleagues from different companies.

6. Presence of research institutions and universities that interact effectively with industry. Research institutions and universities offer such a rich source of advanced research, and produce so many well trained, experienced scientists and engineers, that high tech companies located near them enjoy a powerful advantage. It is vital that these institutions interact effectively with industry. There are many great universities that produce outstanding and valuable academic research, but do not interact effectively with industry. Ideas and tacit knowledge must pass *between* universities and industry, mutually reinforcing each other. True intellectual engagement must exist between the two, so that ideas and concepts coevolve in a healthy two-way exchange. Interactions with research organizations at a distance is becoming easier, but the informality of exchanges and the tacit nature of the knowledge exchanged make personal communication very important, and proximity a clear advantage.

Universities can foster these exchanges by allowing faculty to participate in industry as consultants and advisors to companies. Companies, in turn, can further exchanges by sponsoring research at universities. At Stanford University, as well as at the University of California, Berkeley, lively interactions routinely occur among industry professionals, executives, faculty, and students. At the seminars hosted by A/PARC's Silicon Valley Networks Research Project—which typically explore facets of the high tech of entrepreneurial business activities—at least half of the attendees at any given presentation will be from industry.

7. Presence of a VC industry that understands high tech. The risk profile for high tech ventures is very different from that of leverage buy-outs and other development efforts which involve significant real assets. In high tech ventures, the principal assets are ideas, human resources, and knowledge of technology and markets. On the one hand, a failed high tech venture has virtually no residual assets, in contrast to a real estate or manufacturing venture, where there may be a considerable (albeit reduced) residual assets. On the other hand, the rewards for success in high tech ventures are very great, and the variance between success and failure is much greater than in more conventional undertakings. It is essential, therefore, that venture capitalists structure their deals and their portfolios so that successes more than compensate for their failures. Silicon Valley venture capitalists possess a keen understanding of how best to motivate the entrepreneurs and employees in their venture companies, and how to share the risks and rewards in the most effective way.

In many countries, security and tax laws do not recognize the nature of high tech venture capital, shortcomings that can result in risk aversion and emphasis on debt financing. Angel investors (individuals who invest their own money in start-up ventures) are consequently very important to new companies, helping them to grow aggressively at an

early stage. Since most ventures fail, however, individual investors should be able to protect themselves by taking tax deductions for losses against their gains, and to carry forward the deductions until they can be most conveniently applied. The significance of angel investors in entrepreneurial economies has been widely recognized, and Japan, Korea, and India in particular are considering changes in respective tax laws to encourage such investments.

8. Community dynamics—collaboration among business, government, and the independent sector. In addition to collaboration between universities and industry, collaboration between industry and trade associations, labor councils, and human service organizations builds coherence of purpose in the community. Through independent sector and nonprofit organizations, business leaders can undertake civic responsibilities (as in the case of JVSV and Smart Valley, Inc. in Silicon Valley); build a stronger, healthier workforce; and improve the quality of life in the community. To facilitate community and industry participation in civic undertakings, favorable laws for establishing nonprofit organizations, as well as tax laws that permit deduction of nonprofit contributions, must be firmly in place.

Private sector leadership in loaning executives and professionals to nonprofit organizations can also give such groups a big boost. In the United States in general, and in Silicon Valley in particular, many companies maintain matching programs for employee contributions to nonprofit educational institutions, museums, human service, and environmental organizations.

9. Ready acceptance of diversity and youth. Silicon Valley boasts a large number of very young entrepreneurs, as well as many immigrant entrepreneurs. The Valley's social and economic system emphasizes merit, so talented young people and immigrants are readily accepted. Flexibility, agility, and speed are crucial, and the young are especially agile. Further, they are less risk-averse—though not necessarily less thoughtful in their risk-taking—because they have a lifetime to recover from a failure. In October 1999, the *Economist* reported that:

This cult of individual effort, completely detached from the old hierarchical or social structures, can be found everywhere in Silicon Valley. The place is full of bright immigrants willing to sacrifice their ancestral ties for a seat at the table—for example, almost 30 percent of the 4,000 companies started between 1995 and 1998 were founded by Chinese or Indians. The Valley takes the idea of individual merit extremely seriously. People are judged on their brainpower, rather than their sex or seniority; many of the new Internet firms are headed by people in their mid-20s.⁴

In addition to their contributions *in* Silicon Valley, immigrant entrepreneurs build connections to centers of excellence and specialization in the countries from which they came. These networks give Silicon Valley companies access to skills, technologies, and markets in other regions of the world. But capital also flows from other countries into Silicon Valley, since these networks often provide two-way exchange, leading to outsourcing, co-investments, technology exchanges, and networked based innovation.⁵

10. High quality of life in the community. High tech workers are in such high demand all over the world that they have many opportunities, and many choices, about where to work. They can go anywhere, but naturally seek a high quality of life—good schools for their children, good health and recreation facilities, and comfortable housing.

Because different people have different tastes and views about what constitutes a high quality of life, variety is essential in living conditions.

The Silicon Valley habitat has developed slowly over time. Not only has the specialized business infrastructure evolved, but so too have the attitudes and “entrepreneurial culture.” Collaboration among companies—a more recent development—has followed on from the movement to alliances that began among companies in the 1980s. Recent studies of the IT industry have shown that the most successful companies in the last decade maintain about three times as many alliances as the less successful ones. As the business models changed to vertically disaggregated firms, alliances became necessary between different contributors to the final product. Companies learned how to work with their partners and, in many cases, with their competitors, and these skills enabled them, in turn, to collaborate more effectively with local governments and civic organizations.

An important question arises as to whether the current habitat of Silicon Valley is sustainable, and appropriate for all stages of industrial development. To be sure, the collective learning and flexible adjustment that Saxenian emphasizes are key attributes that the habitat must continue to support. A habitat that encourages a learning, experimental, and merit-based culture has the best chance of being sustainable.

Notes

¹ Michael E. Porter and Mark R. Kramer, “Philanthropy's New Agenda: Creative Value,” *Harvard Business Review*, November–December 1998, vol. 77, pp. 121-130.

² AnnaLee Saxenian, *Regional Advantage: Culture and Competition in Silicon Valley and Route 128* (Cambridge, MA: Harvard University Press, 1994), pp. 2-3.

³ Manuel Castells, *The Rise of the Network Society*. (Oxford: Blackwell Publishers, 1996), p. 32.

⁴ *The Economist*, “Politics and Silicon Valley”, 30 October–5 November 1999. p. 28.

⁵ For more information on Silicon Valley immigrant entrepreneurs see Saxenian's chapter, “Networks of Immigrant Entrepreneurs”, in *The Silicon Valley Edge: A Habitat for Innovation and Entrepreneurship*, Chong-Moon Lee, William F. Miller, Marguerite Gong Hancock, and Henry S. Rowen, eds. (Stanford, CA: Stanford University Press, forthcoming October 2000).

About the Author

William F. Miller is Herbert Hoover Professor of Public and Private Management emeritus at Stanford University's Graduate School of Business, where he also co-directs two executive education programs on strategy and entrepreneurship in the high technology sector. Formerly Stanford's vice president and provost, he also served as president and CEO of SRI International, as well as chairman of the board, CEO, and a founder of the David Sarnoff Research Center (now the Sarnoff Corporation). He has served on many government commissions, directed several nonprofit organizations, and is currently actively involved, through speaking engagements and research, in developing new information infrastructures, both in Silicon Valley and internationally. He serves on several boards of directors of Silicon Valley companies. He studied at Purdue University, where he received the B.S., M.S., Ph.D., and D.Sc., *honoris causa*.

The Silicon Valley Networks Project

Project Discussion Papers

Katsuhiro Nakagawa. *Japanese Entrepreneurship: Can the Silicon Valley Model Be Applied to Japan?* December 1999.

Ordering Information

Occasional Papers currently in print may be ordered at \$10.00 per copy (excluding postage and handling) and Working Papers and Discussion Papers at \$7.50 per copy (excluding postage and handling) through the Asia/Pacific Research Center. For further information, call (650) 723-9741 or fax (650) 723-6530.

Many of A/PARC's papers are also available for free in Adobe PDF format on the A/PARC website, at <http://aparc.stanford.edu>.

