University-industry relations play a key role in technology development

The paradigm of the 20th century was a technology-driven economy, from railroads, air transportation, radio and television, to cell phones and the Web. In the 21st century we foresee a knowledge society sustaining the economy in balance with the environment on a global scale. Guidelines that recognize the special mission of universities, yet promote interactions with industry and government, will help to facilitate the evolving global economy. The co-evolution of Stanford University and Silicon Valley provides useful insights for developing successful collaborations.

Founded in 1891, Stanford University is a private research and teaching university modeled after Cambridge and Oxford but with a strong element of basic and applied research. From its earliest days, Stanford University faculty members were expected to provide a practical education for young men and women for the benefit of the economy of California. However, Senator Stanford modified his stance and observed that "a man will never construct anything that he cannot conceive" and extended the curriculum to the liberal arts. In the 1930s Fred Terman considered the university an organization of "technical scholars" and promoted interaction with industry. From this came the return of David Packard and Bill Hewlett to the West Coast to start a new company: Hewlett Packard (HP; Palo Alto, CA). Hewlett Packard set a new standard with an emphasis on service to the surrounding communities and Stanford University. Today, we consider HP the DNA of Silicon Valley.

The story of Silicon Valley—a term coined by Don Hoefler in 1971—began with an immigrant from Australia, Cyrus Elwell, who founded the first company in the area, Federal Telegraph, in 1911. It was rumored that investors included Stanford University faculty members and even the president. Today we can only marvel at the local economic miracle that led from HP to Google and to an annual revenue stream of $1.2 trillion for the region. Along the way Stanford invented the first Industrial Research Park and graduated students who started more than 3500 companies. The myth is that Stanford University contributed technology to Silicon Valley and thereby to its success. The fact is that Stanford University attracted and educated students—many decided to remain in the area. Of the companies spun out from Stanford, less than 1 in 20 used Stanford technology either directly or indirectly.

What factors led to the success of Silicon Valley? Among them were an entrepreneurial attitude, land availability, lawyers, venture capital, a diverse and mobile work force, R&D labs in the region, risk-taking by individuals, allowances for failure, and, of course, educated people. Today the Silicon Valley model has gone "global" and dozens of "valleys" have been created around the world. In each region the economic model has been adapted to reflect the regional strengths, history, local customs, and practices. The bottom line is that new valleys were built on risk-taking, a toleration of failure, and the celebration of success.

Managing conflicts

Stanford University is a partner in research with companies on a global scale. What guidelines govern these interactions that range from participation in industrial affiliates programs, to licensed intellectual property, to sponsored research? The early guidelines emphasized the need to keep the university free from all conflicts of interest and biases and influence from government and industry. These very restrictive pol-

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icies were reevaluated in the 1980s with the goal of managing conflicts of interest in such a way as to allow interactions with industry and even investments in private companies. The overriding principle was to recognize that the university is an institution of public trust and that it must maintain integrity in all aspects of its mission to educate students and to gain and apply knowledge through research and education.

Managing conflicts of interest led to a series of policy changes that allowed licensing technology to "start-up" companies for shares in lieu of cash, allowed investments in "start-up" companies under carefully prescribed conditions, and challenged faculty, staff, and students to manage conflicts through self-action rather than by policing. Conflicts of interest were recognized as being present in almost every interaction. The goal was to adopt guidelines that stated a clear purpose and a means of evaluation and consideration. Flexibility of interpretation was built into the guidelines such that decisions could take into account special circumstances in a timely and appropriate way.

The set of guidelines for technology licensing to "start-up" companies recognizes and manages conflict-of-interest questions and moves beyond the focus on exclusive or nonexclusive licensing. The Office of Technology Licensing (OTL) determines the technology to be licensed and informs the faculty member, chair, and dean of the potential deal. The faculty member prepares a written statement that addresses conflicts of interest. The department chair in collaboration with OTL makes a recommendation to the dean that leads to a decision.

The university may accept equity as one form of compensation for license rights, subject to a review if appropriate. One-third of the net equity will be issued to the inventors as shares. The remaining two-thirds of net equity will be issued to the university for use in support of graduate education and research. The Stanford Management Company receives and manages all equity on behalf of the university.

Stanford University may invest in "start-up" companies following an appropriate review and under carefully prescribed circumstances. Stanford may not invest if a faculty member has a line management role; if no management role exists, it can invest only if Stanford is a passive investor, has a limited investment, no officer or member of the board of trustees of Stanford has equity in the company, and the investment is reviewed and approved by the provost.

The Stanford faculty members subscribe to a "Conflict of Commitment and Interest" guideline that states that Stanford faculty members owe their primary professional allegiance to the university and that faculty members should conduct their affairs so as to avoid or minimize conflicts of interest. Faculty members must recognize that the university is an institution of public trust and conduct their affairs in ways that will not compromise the integrity of the university.

These guidelines are also available for public inspection on the Stanford Web site. ❑

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