

**Stanford and Spin-outs**  
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## Introduction

In August 25, 1997, *Business Week* magazine published an article highlighting start-ups and spin-out activity from Stanford University. Among those companies are such successes as Hewlett-Packard, Sun Microsystems, Cisco Systems, and Silicon Graphics. Hewlett-Packard people went on to start Apple Computer, Tandem Computers (now Compaq), and Rolm (now Siemens). One of the founders of Silicon Graphics was also a founder of Netscape, etc. etc.

But these famous Stanford progeny are not the entire story. In 1992, we did a study of technology-based companies that were founded by the Stanford community, not necessarily officially through a license agreement with the University. That is, we included companies founded by faculty members and Stanford graduates who may not have used Stanford resources or technology, to create a company. There were about 1,000 small companies, employing about 20,000 people. The revenue for those companies was about US\$2.8 billion. There also were 78 large companies, with about US\$28 billion in sales.

It is important to realize that there are many companies that spin out of Stanford that do not have a license through the University. This is true of most university spin-outs. Even if there is a licensing office dedicated to the commercialization of university technology, many more spin-outs are established without going through the formal process of licensing.

My focus, however, is on the licensing agreements that come through Stanford. Stanford's patent policy provides that Stanford owns inventions if inventors have made any substantive use of university facilities in developing those inventions, or if the invention was made during the course of their University responsibilities.

## **How We Look at the World**

In general, we are more interested in broad concept patents than in narrow patents. We think of potential licensees and technologies as divided into life sciences and physical sciences. Life science research results are generally more amenable to licensing because pharmaceutical and biotechnology companies recognize the value of patents. Because of the long development time that is required to bring a product to the marketplace, these companies are willing to consider a license from a university for a potential early stage product. Although they know that there is risk involved in university technology, university inventions may be a good investment in the long term because life sciences companies must have many potential products at various stages of development in their product pipeline. The situation is generally different in the physical sciences industries, such as electronics and communications, because their product lifecycle is much shorter and competition is fierce.. The physical science companies bring out new products every 18 months and they often feel that they cannot afford to take risks on early stage technology.. Therefore, physical science companies are usually less interested in obtaining licenses from universities.

We also see the world is divided up into small companies and large companies. The large companies generally are satisfied with their own R&D effort, and they do not look to the

universities for licensing. Most of our licensing activity is with small companies, which cannot afford to spend much money on their own R&D. They are willing to invest in early-stage technologies from a university in the hope that the technology will help them become big, successful companies.

### **Conflict of Interest**

Many universities, including Stanford, are interested in working with start-up companies, such as those founded by our faculty. We hope to share the “upside”, i.e., the higher potential that a small company might have. Also, many universities believe that small companies contribute to local and regional economic development.

However universities are concerned about managing conflicts of interest. We want our faculty to be dedicated to their university responsibilities, such as teaching and research, and not be distracted by their outside activities. In other words, the university faculty can be involved in start-up activity, but it should not distract them from their academic research and their teaching. At Stanford, we feel comfortable that we are able to manage perceived and actual conflicts of interest through a process of disclosure and review so that University interests are protected while still allowing entrepreneurial activity to occur.

### **Risks and Benefits of Involvement with a Start-Up**

Why should we license our University intellectual property to a start-up? After all, this is a very risky thing to do. Start-up companies have no or little experience. Usually, they have

very little money, and the company must make a particular technology work or it probably will fail. Many start-ups – perhaps most – do not succeed, and they will therefore not bring the licensed technology to market. That is why venture capital is considered a risky business.

So why would a university license its technology to an untested company? First, the entrepreneur is the champion of that technology. He or she wants to make this technology succeed, because the company has no choice if it intends to stay in business. This passionate effort to make the company succeed sometimes makes the risk of licensing a spin-out seem less significant. A second benefit of choosing a start-up as the licensee is that such companies can move much, much faster than large companies. They quickly evaluate inventions and make decisions on how a technology should be developed. A small company can make decisions in a day, whereas it would take a large company several months to make a similar decision. A third reason for licensing to a start-up company is that the start-up is willing to take technical and market risks. Usually, the entrepreneur is someone who is very involved in the licensed technology and thinks it can be made to work. Finally, as I said earlier, because the company must make the technology work or the company will probably fail, they focus all of their efforts on that one particular product/technology.

At Stanford, we are lucky to be in Silicon Valley, where entrepreneurship and risk-taking is a part of the culture. As an institution of higher learning in the midst of an entrepreneurial environment, we have the luxury — and I do consider it a luxury — to be somewhat neutral about start-ups. Our licensing office likes to work with start-ups, because we believe that technology transfer happens best when an entrepreneur is involved with a company. But, in general, from an institutional standpoint, we are neutral because we have

so many constituents to consider. Large companies have the resources to provide for research support through contracts or donations so we want to maintain good relationships with the large companies. We also want to maintain good relationships with our alumni, some of who start companies, which will someday become successful and will be able to support the University in the future. Some alumni now manage large companies and want to have a close research relationship with Stanford. We also want to work with start-ups. Some members of our faculty are interested in being involved in a start-up, but there are others who want nothing to do with start-up companies, or even industry. So we have to be able to juggle the interests of the faculty. We have the same issue with students. Some just want to do their research, and others want to start a company.

There are many conflicting views about Stanford's involvement with spinouts. One faculty lamented, "Four of our six faculty are on leaves of absences, because they are starting companies — who will teach all of these students?" Another faculty felt, "It is all right if our faculty start companies, because if they start the company and then come back to teaching, they gain valuable experience which can energize their students and their research program. If they are lucky, they made money, and then we don't have the worry about the high cost of housing for our faculty!" So, there's a very diverse view at Stanford.

## **Stanford's Equity Holdings**

Stanford University holds equity in about 70 companies. In total, we've taken equity in about 95 companies, but we sold our holdings in several, earning us approximately US\$20 million. In 30 years, the licensing office has brought in about US\$450 million in gross licensing revenue. So far, the statistics show that we can do better financially if we take

royalties rather than equity. The income from cash royalties goes to the inventor(s), the inventor's department and school, whereas income from liquidated equity goes to the inventor(s) and to a Fellowship and Research Fund.

Before I go into the details about equity, I would like to point out that we do license spinouts without equity. In the early years of biotechnology, we rarely gave companies an exclusive license to our technology. If we did grant an exclusive license, it was often in exchange for cash only because the university was ambivalent about holding equity. So in the early days of Cetus, GeneLabs, and Immunologic for example, we licensed our technology to them for cash only. Chiron eventually acquired Cetus, which brought the polymerase chain reaction to market. GeneLabs is still operating and recently filed a New Drug Application with the U.S. Food and Drug Administration for a drug for treating systemic lupus erythematosus. Immunologic ultimately failed, illustrating what I said earlier about the risk of licensing to start-up companies. Current spin-offs in which we did not take equity include Systemix, which was given an exclusive license for cash and was eventually acquired by a large pharmaceutical company, and Synteni, a DNA chip company, which is now part of Incyte.

An overview of licensing activity in recent years shows that there are many more licenses which involve equity today than in the past. In the early years, Stanford was ambivalent about equity. Once we became comfortable with the issues involved in acquiring equity and felt that we could manage conflicts of interest, we have been doing more equity deals, partly because there are probably more spin-offs. Not all of them are in biotechnology — many of them are in the physical sciences — but it is clear that there's a considerable interest from students and faculty in starting companies. As I mentioned earlier, the cash-out of our equity is erratic. We have a hard time predicting revenue flow from liquidation

of equity because a company's IPO or acquisition is not under our control. In 1995, we cashed out our equity in an earthquake prediction company and received almost \$1 million dollars. In 1996 and 1997, however, we made very little. In 1998, we earned almost \$8 million when Amati, which was started by one of our faculty members to develop DSL technology, was acquired by Texas Instruments. In 1999, we had nothing, but in 2000, we obtained about \$10 million from the liquidation of equity from six companies. The range of return was large among the three companies, depending on price per share as well as the number of shares we held: one company cashed out at about \$9.5 million and another only \$20,000.

The question that occurs to most universities is, "Should we be helping companies to start? Should we try to add value to our technologies?" At Stanford, we have been experimenting with several programs. We have a "Birdseed Fund," which provides as much as \$25,000 to support small proof-of-concept or prototype development of unlicensed inventions. We have funded about 15 projects, and 5 of them have resulted in a license. We think it is too early to tell whether this fund is worthwhile. For this small number of projects, we have spent about \$250,000. We also have established a Gap Fund, which is designed to speed the development of a particular technology to make it more licensable. This fund has about \$1.2 million and can make grants of as much as \$250,000. We had only one application for funds, and was subsequently withdrawn when the inventor decided to start a company.. We decided to keep this fund open for one more year, and if nobody is interested or we do not find a suitable value-added project to fund, we'll terminate the experiment. We have been involved in a major experiment, investing about \$1 million in a music technology and a trademark program. We hoped to develop the technology to a more licensable stage via technical consultants. We think that this investment was a success in that we helped to

advance the technology faster, but it has not been a big financial success to date. It is too early to judge the result since the experiment is only 7 years old. Again, one of our challenges is that our technology is generally very early stage, and we need to be patient in order for the invention to come to fruition.

## **Philosophies at Other Universities**

There are various philosophies at other universities. For example, Massachusetts Institute of Technology does not start companies by seeking venture capital funds or by forming the management team. However, MIT leans more toward licensing start-ups and taking equity. If the MIT faculty want to start a company, then they will usually license the technology to the faculty start-up. We are much more neutral. We try to find the best licensee, and if we find that the best licensee is not a start-up company, then we'll grant the license to another company.. The University of Chicago is starting a venture fund (ARCH). Baylor University, in Texas, also has a very strong proactive start-up commercialization philosophy.

## **Case Studies**

Our greatest success was the DNA cloning invention that led to what is known as the Cohen-Boyer patents, one of the foundation patents of the biotechnology industry. Early on, one company did want an exclusive license to this gene-splicing technology, but we thought this did not make sense for this technology, and we ended up licensing it to more



than 340 companies. Over their life, these patents generated more than \$250 million in gross royalties.

Synteni was started by a graduate student who came to Stanford because he wanted to start a company; Indeed, he started a company based on his microarray invention, which was eventually acquired by Incyte.

Cooke Pharma is based on the idea of using a nutraceutical product containing L-arginine to help patients with cardiovascular disease. L-arginine is the precursor of nitric oxide, which causes vasodilation. The ability of the blood vessels to produce nitric oxide is impaired in patients with atherosclerosis, so the idea was to provide more arginine to increase the production of nitric oxide. Our licensing team originally felt that the idea was not worth patenting for several good reasons, one being that L-arginine is a naturally occurring compound available in health food stores. We did not choose to file a patent application. Dr. John Cooke disagreed, and a year later, he again brought the idea to OTL to reconsider because he felt strongly that we should file a patent on his idea. Because he was so persistent, OTL agreed to go forward with a patent application. He subsequently started a pharmaceutical company, which licensed the technology from Stanford and is now selling HeartBar® to help people who have cardiovascular disease.

Rigel is a start-up company that uses cells from diseases of interest along with retroviral probes to study disease at the molecular level. They are involved in identifying and validating targets for drugs. Rigel has just gone public, so we hope that the equity that we hold will be worth something.

Protogene develops microarrays using patented surface tension technology that makes it possible to synthesize oligonucleotide sequences directly on a chip. The company's

customers can order custom arrays of sequences and have them delivered within days instead of the weeks required to produce custom chips by other methods. We originally licensed them technology to enable the synthesis of oligonucleotides much more efficiently than previously done before.

### **Concluding Remarks**

We have learned during our years of operation that flexibility is the key to success. Strong relations between universities and industry are crucial to innovation, successful high-technology companies, and economic development in today's world. Stanford's entrepreneurial faculty and students have created many Stanford spin-outs which have played an important role in the development of the Silicon Valley culture and economy.

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