

***PRESENTATION:***

**THE UNIVERSITY OFFICE  
OF TECHNOLOGY TRANSFER:  
THE UNITED STATES**

**Robert C. Miller\***

Hi, my name is Bob Miller and I am the Director of Technology Transfer and the Associate Vice Provost for Research here at the University of Washington. I am also a professor of microbiology, so I come at tech transfer from the faculty side. I was a professor of microbiology at the University of British Columbia, then chair of the department, then Dean of Science, then Vice President of Research. I came to the University of Washington four years ago to manage the Office of Technology Transfer. I have patents, and I have equity in start-up companies started with my technology.

I would make only two observations to Rebecca's fine presentation. Although I agree that there is a problem, let me put it in perspective for you. First, the University of Washington does over 400 material transfer agreements per year, one person does them all, and they all get done within about 30 days. There have been some very contentious ones, but they get solved. Second, most of us do not really believe that we have a right to any research tool at any time. I was a part of the team at MIT that did the first gene synthesis, and I can tell you that rarely did anyone receive any oligonucleotides. The reason was that the people who made them had their eyes on their own grants and their own future prizes. So why should they give those oligonucleotides away. So there are a lot of mechanisms by which we can restrict the free transfer of material. This does not mean that it is right. This does not mean that it is optimal. I am just telling you these things have happened, to put the problem in perspective for you.

I am going to talk about the money and I am going to talk about start-up companies. First, let me emphasize that when you look at the results of this whole process you have a set of processes involved in the management

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of intellectual property. One needs to think about these offices and their responsibilities much more than licensing, even though we've focused on licensing and material transfer agreements today.

There are a set of processes that these offices have to deal with. There are industrial research agreements, material transfer agreements, which we have discussed in detail, and disclosures, which have a federal reporting requirement. There are legal appointments; in this state none of the legal work is done within the university, it all has to be done by special appointments at the Attorney General's Office. That involves about \$1.5 million per year of external appointments. There is distribution of the licensing revenue, so you have to have a very good accounting system which is not only accountable to the university, but to the state and to external agencies as well. Last, we manage the process with regard to start-up companies and taking equity, about which I will speak more in a minute.

At the University of Washington we have a set of organizations which work together to manage technology transfer and economic development. Economic development is now the second theme of most public universities. The theme comes under the topic of service. Teaching, research and service. Service to the community now includes economic development and most presidents of most big public universities are documenting, as well as they can, their impact on the community this way.

The office of technology transfer which I direct manages the intellectual property of the University. The Washington Technology Center is a state agency. It spends about \$2.5 million per year on research projects and collaborations between faculty and companies. The Washington Research Foundation used to be the licensing agent of the University. It manages three of the larger technologies, by larger I mean in revenue, but now it is a seed venture fund.

As part of the extend technology transfer effort, we are going to be establishing a research park on the east side of the lake, a multi-tenant facility down in south Lake Union, and a technology enterprise institute. The Technology Enterprise Institute will be an academic center of business research and development. It will conduct research, it will coordinate student internships, and it will manage executive programs. It will be the focus of a number of academic programs including: law, engineering, medicine, and the wider aspects of science at this university. It is a proposal under development at the moment.

So what are the financial consequences of all of this? The research budget at the University of Washington is around \$600 million per year from external sources. The budget from the state is around \$350

million. That's a lousy ratio. The total revenue from all technology transfer activities, including all of the processes that I showed you earlier, will be pushing \$100 million soon.

Let me show you how that money breaks down. The technology transfer budget is a small fraction of \$1.5 billion if you take the medical school budget out. However, when you compare it to state revenues, it is starting to be a significant number. In 1999 industrial research closed at \$52 million. The trend is clear: although there are fits and starts, industrial research agreements keep going up. All of them have intellectual property terms that have to be negotiated.

It just happens that, for the most part, we write off clinical trials. This simplifies, by and large, negotiations. We do a lot of clinical trials. We do not monitor intellectual property because we cannot find many examples anywhere in the United States where there have been any. This is not a pejorative statement about clinical trials as research.

Income from licensing at the University of Washington comes from three primary sources. This is instructive for those of you who are wondering how the licensing revenue breaks out. Historically, overwhelmingly, our office has been funded through one "jackpot," the Hall Technologies—that is the technology by which the world got human insulin and hepatitis B vaccine. It is genetically engineered yeast for the production of human proteins. Its importance as a source of licensing income has traditionally applied to all major universities.

The second take-home message is that everything else is increasing significantly. Through the early 1990's all of the non-Hall Technologies represented very little income. Since 1995, the other technologies have been coming up significantly. We just closed 1999 at around \$8.3 million. There are several hundred licensed technologies making up that \$8.3 million. The second thing of interest at the University of Washington, and this is relatively rare, is that over 50% of the non-jackpot technologies at the University of Washington are software; this is from all of the schools and colleges. There is very significant software coming out of the School of Medicine. This is, I believe, because we have some outstanding copyright/software licensing officers at this university, and we have a very interesting policy with regard to the way we share royalties and development costs with laboratories.

I have mentioned that one of the things that we have not discussed so far is start-up companies. I'd like to discuss the results of a research project by Professor Ken Walters of the University of Washington Business School concerning related start-up companies, looking at the period from 1969 to

1999. So what's a University of Washington-related start-up company? A UW related start-up is a company founded on technology licensed from the University. A second important sub-set is companies founded by UW faculty, staff, or students in relation to their UW research (and we take equity in these, also a minor set is a company reconstituted around UW technology); there are a couple of those. Then there have been a couple of companies that located near the University because they wanted to license technology and establish a research relationship here.

Over the years, UW start-up companies have increased. Through 1998 there were 120 that we could trace in this way. Now there are 131. There is something very interesting here: in the 60's there was one, in the 70's there were four, in the 80's there were four; then in the 90's, ninety-two have been formed. In other words, there is enormous interest on the part of our faculty, our staff and our students in forming start-ups. If you just look at the list of the companies spun out in 1997, you can see that not only was Cabernet Sauvignon good in the state of Washington in '97, but start-up company formation was also quite active. They cover an enormous spectrum of disciplines.

There are some interesting findings in Walters' studies. Of the twelve companies with sales over \$5 million, eleven of them are over ten years old. Of the sixty that have started since 95, twelve already have sales. There are some fast-track exceptions to sales, mainly software.

A good example is NetBot—a great example of how you never know what is going to come out of a university. There were two professors, Dan Weld and Orrin Etziona, working on expert systems. A company was formed with our inventors for about \$2 million. Etziona and Weld seemingly thought that someday, somebody might be interested in shopping on the Internet. They took that concept into NetBot, and 18 months later Excite! bought it because shopping on the Internet had become a reality. Then within a year At Home bought it; and the University's equity, which is a very small percentage, was \$10 million by that point. So these things are happening, and technology transfer offices now have to manage this type of process. That kind of fast track is rare but it is not unique.

Presidents of universities are now looking at the economic impacts and discussing these with the Legislature, and this is the first time in two decades or longer that the University of Washington has actually obtained faculty slots from the Legislature for work related to student demand. This is the first time that we have had any related to research.

If you look at these faculty slots in terms of employment.... their companies now hire more than 6,500 people. One of them, namely the

oldest, has several thousand employees; some others have over 100 each. There are also at least 50 others that have more than 10. These companies cover everything: advanced manufacturing, sensors, Alzheimer's, biochromatics here is very strong, and so forth. Sales revenues are still struggling—only three companies have greater than \$100 million, five companies have \$10 million to \$100 million, four have \$5 million to \$10 million, and twelve have \$1 million to \$5 million. It takes time for these companies to bear real fruit.

From an academic standpoint, however, over 300 faculty are involved in start-up companies. They tend to be stars in teaching and research, and they enjoy, of course, a workaholic lifestyle. They become role models to others, and that has been very important. Dr. Leroy Hood came in and has been an enormous inspiration to a large number of faculty who are interested in start-up companies. That's an auto-catalytic phenomenon around here. These people often start multiple companies, and are in high demand nationally.

Most important, they stay on the UW faculty after their business successes. Etzione and Weld have stayed on the faculty. Weld went out for a while, became Vice President of Development, took a leave of absence, came back, and became very interested in changing curriculum within computer science so that the graduating Ph.D.'s could have a greater impact sooner. That has been appreciated by other faculty and students alike. We have a wide range and number of student companies, and we have some "serial entrepreneurs." Dr. Hood has been involved in Darwin Molecular, Rosetta Engenics, Geospezia, and that has only been since he's been here.

Stock prices are very important in Seattle. In 1997, three of the top five stocks, in terms of percentage increases during the year, were UW start-ups. Terra Computer went up 293%, and Microvision was up over 250%. The number-five performer was Immunex, and we are delighted that Immunex stock has risen because of announcements of successful clinical trials.

Now I would like to discuss some policy issues. First, faculty must disclose intellectual property to the University of Washington. We do not necessarily have an ownership position in everything, but it is a state law that we must disclose and we are not greedy about that. We make honest evaluations about what our ownership position is. This is particularly important in software and copyrighting. The office discloses everything to the Washington Research Foundation by agreement, but we don't have an exclusive agreement with them. We can license the technology for a start-up with anyone. The Office of Technology Transfer approaches friends often, and we discuss start-ups whenever we have a technology and faculty which

we think will make it work. Faculty can hold equity and they can have a research agreement between the company to the lab. If they do, they cannot be an officer, cannot be on the board of directors, but can be on the scientific advisory board, and they do participate in royalty distribution.

We think that the relationship between the faculty member and the start-up is absolutely critical and we try to work hard to make those relationships work. We have to watch graduate students very carefully in the way we manage intellectual property. The majority of the faculty on a graduate student committee do not hold equity in the company. Graduate students can hold equity and share in royalty distributions.

Last, it is important to know that there really is a fundamental paradigm change about how start-up companies operate out of the University. This is the classic model: you have intellectual property to be transferred, a business plan is developed, venture capitalists get together and form a real company. That means that they have a product or process developed or close to developing, they develop product sales, marketing, manufacture, and develop a real profitable company from that.

That is really no longer the way it operates at the very early stages at the University. You have intellectual property as a vehicle. That allows you to develop a concept of what the company might do. Then you have pre-seed venture capital or other resources, and incorporate a company around rights. It may only be \$50,000 to \$100,000, but in some instances it has been as much as \$20 million. There is no product, therefore there is no true business plan, there is only a concept. That then leads to more funding when the concept is fully developed, which then allows you to develop your product or process and your business plan. This is happening at a much earlier stage now and, at least in Seattle, the money is there to do that.

So in terms of intellectual property management, it is crucial to understand what the potential is very early in the game. Most often it is the faculty, the principal investigators, who understand where a concept can go. It is our job to help them have their vision come to fruition. That is why it is so important, as we noted earlier, to understand what it is that they want, and to try to help them get it done.

For lawyers, this intellectual property management early in the game is critical because we, as a nation, are at a stage in intellectual property development where we don't know what the markets will do. However, we do have people who can see out there, and we need to protect around where their concept is. Then, of course, you are into a more traditional role, but if you miss it early, as you are aware, it can compromise later what you plan to do.