

The University of Virginia Patent Foundation: A Midsized Technology Transfer Foundation Focused on Faculty Service, Operated Using a Deal-Based Business Model

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The University of Virginia Patent Foundation was started in 1978 by a group of alumni who felt that the University of Virginia should actively protect and license its own inventions. Initially modeled on the Wisconsin Alumni Research Foundation, the Patent Foundation is a not-for-profit corporation that is not part of the university. However, it is one of twenty-six officially recognized UVA-related foundations that provide support for UVA's research, real estate management, fund raising, and other UVA needs. The Patent Foundation's relationship with UVA is contractual; UVA has agreed to assign its inventions to the foundation, in exchange for our agreement to evaluate, protect, and license them and to distribute revenues according to the royalty-distribution schedule set forth in the UVA Patent Policy. As an officially recognized UVA-related foundation, we also adhere to a set of requirements set out in the UVA Policy on Related Foundations. This policy requires the foundation to, among other things, provide UVA with an annual independent auditor's report, reserve one seat on the board of directors for a representative of the UVA president, and reserve another board seat for a member of the UVA board of visitors.

Throughout most of its history, the Patent Foundation was a small operation, with a director, a business manager, and an administrative assistant; it typically handled about 25 to 35 inventions per year. However, the financial success of one licensed product considerably changed the magnitude of the Patent Foundation's operational needs. That product, marketed by the Fujisawa Pharmaceutical Co. as Adenocard, is a solution of adenosine for the emergency treatment of certain types of heart fibrillations. A combination of the growing UVA research budget and inspiration from the multimillion-dollar

royalty stream from Adenocard appears to have had a big effect on the invention disclosure rate. This ultimately led the Patent Foundation in 1997 to undertake a broad expansion of its program and staff. The number of invention disclosures has continued to grow, and the Patent Foundation received 150 invention disclosures in FY2004.

As of February 2005, the Patent Foundation has fifteen full-time employees: a director/ chief executive officer, six frontline licensing professionals (an associate director, an assistant director, two senior licensing associates, and two licensing associates), two full-time patent attorneys (who exclusively handle preparation and prosecution of patent applications), a chief financial officer, a business manager, two paralegals, and two administrative assistants.

The Patent Foundation focuses its attention primarily on faculty service rather than on making money. The philosophy here is that strong faculty service leads to strong deal flow, which, in turn, leads to increased revenues over the long run. At present, faculty satisfaction with the Patent Foundation is extremely good: the university rarely hears of any faculty complaints, but hears many compliments. Deal flow is also quite high. Over 50 option and license transactions were completed by the Patent Foundation in each of the five fiscal years from 1999 to 2004.

Advantages of the Foundation Structure

The belief here is that a technology transfer organization that is a separate corporate entity, as the Patent Foundation is, has enormous operational and managerial advantages over an internal university technology transfer office. These are: segregation of legal risk, freedom from requirements imposed by state bureaucracy, independent and timely decision making, flexibility in hiring and personnel management, collaborative decision making by board members having both academic and business backgrounds, clear financial profit-and-loss responsibilities, and independent accountability.

Segregation of Legal Risk

Anyone who has been in the technology transfer business for a while recognizes that there are many legal risks that come with the territory. As technology transfer professionals,

we sometimes interact with litigious companies; we negotiate complex, long-term legal agreements, the interpretation and enforcement of which may lead to disputes; we make decisions about protecting valuable intellectual property assets; and we face the prospect of having our patents challenged in court or having to sue to protect the value of those assets.

Universities are generally considered to be risk-averse, and for good reason. All universities seek to maintain and build their reputations among their peer institutions, faculty, students, and the public. These sensitivities may be heightened in public universities that are more dependent upon governmental good will, but they are very important in the life of private universities too, as they are just as dependent on recruiting faculty and students, fund raising, and obtaining federal and state research funding. It is largely for these reasons that the unavoidable legal risks from technology transfer activities are a considerable concern for some universities.

In addition, universities often wish to limit the possibility that a patent-related lawsuit would place the university's endowment funds at risk. One of the primary reasons that people start companies is to segregate risks, as a corporation can generally only be held liable to the extent of its own assets. If a company gets sued, it can lose everything, but the employees and officers of the company generally don't lose their personal money or property. Similarly, transferring inventions to a separate technology transfer corporation may help protect a university's assets, since any lawsuit liability of the foundation would generally be limited to the foundation's own assets.

Lack of State Bureaucratic Requirements

A public university such as UVA must follow the statutory and regulatory requirements of state agencies in general. Procurement must go through the state bidding process; the university attorneys are employees of the attorney general's office and must get the AG's approval for substantial matters. Moreover, there are restrictions on what the university itself can agree to, e.g., it cannot agree to an arbitration provision or an out-of-state dispute resolution venue; it is subject to disclosures under the Freedom of Information Act; salaries must be set in accordance with state guidelines; and there are many other requirements as well. The Patent Foundation is not subject to these because it is a separate corporate entity with no direct relationship to the state.

Independent and Timely Decision Making

The corporate structure of the Patent Foundation allows us to make decisions on a corporate time scale. Offices that are part of the university sometimes find that the time scale for approval by the university administration is considerably longer. One of the reasons for this disparity is that corporate decisions often require fewer internal approvals than are needed in an academic administration.

The foundation structure allows the Patent Foundation to complete licensing transactions more quickly than some other technology transfer programs. An analysis of the transaction times for the 50 licenses and options executed in FY2004 showed it took an average of 2.7 months to complete a deal, and the median transaction time was 2.2 months—which reflects the fact that there were a few outliers that took significantly longer than average. (Of course, some of the deals were big and some were small, and bigger deals tend to take a bit longer.)

Flexibility in Hiring and Personnel Management

Salary competitiveness is one of the biggest challenges for many internal academic technology transfer offices. Especially for those in public universities, human resource offices often equate the position of licensing associate with that of grants manager, and set the salary at a very modest level. Salary increases are also tightly managed, in lock step with other academic administrative positions. Neither of these is conducive to recruiting and retaining talented licensing professionals. Recruiting can be more difficult, since experienced professional job applicants usually want a higher salary in their new job, and the office's ability to satisfy this wish may be limited by academic salary ranges and steps. Existing staff may know that there are jobs out there that pay better than their current salary, and if the office can't keep pace, it can wind up losing valuable, experienced staff members. And, since entry-level associates are learning to negotiate, it is not long before they start to apply those new skills on their own behalf.

The foundation structure avoids these impediments because the only limitations on salary, raises, or advancement are those set by the foundation itself. It can set salaries at levels calculated to allow for the recruitment and retention of top-performing technology

transfer professionals. It can also provide for competitive salary advancement with increasing experience, so that newly trained staff members have less incentive to look for positions elsewhere.

Academic and Business Input in Making Decisions

There are few substantial technology transfer issues that don't involve both business concerns (e.g., operational, financial, and contractual needs) and also academic concerns (e.g., faculty satisfaction, conflicts of interest/commitment, and core academic values such as the right to publish). Bringing together academic and business leaders on the board of directors allows for a very healthy discussion of management decisions and allows those from one realm to explain their concerns to those from the other realm. Of course, this requires that the director and the board chair develop a board agenda that is sensitive to the information needs of both business and academic members.

In practice, the Patent Foundation board has enjoyed a healthy exchange of information and perspectives, which has allowed the foundation to operate in a businesslike manner while still being highly sensitive to academic needs. Interestingly, the board almost always acts by consensus; in the last seven years, I can recall very few board votes that were not unanimous decisions.

Note: It may not be necessary to have a separate foundation to enjoy the benefits of such a board structure. Some technology transfer offices have academic-industrial advisory boards, which may provide similar benefits.

Clear Financial Profit-and-Loss Responsibilities

As explained above, the Patent Foundation board provides me, as executive director and chief executive officer, with the authority to expend funds, along with the responsibility of keeping expenditures within the budget approved by the board. The Patent Foundation's chief financial officer and I propose the annual budget to a finance committee of the board, and, once that committee's comments and concerns have been addressed, the final budget is submitted to the full board for approval. Importantly, the board also holds me responsible for the income side of the ledger. Various categories of

income are projected along with expenditures in each budget the board approves, and it is up to me to make my numbers. So, balancing early-stage payments with downstream royalties, collections, and auditing of licensees, etc., are my responsibility, too.

One of the most important responsibilities the board gives me is to manage un-reimbursed patenting costs, along with all other Patent Foundation expenditures. Patenting dollars, staff salary dollars, and other operating funds are all my responsibility, and they are fungible (subject to shuffling between budget categories).

Unfortunately, many internal academic licensing departments carry patenting costs as expenses outside of the office's operating budget. This is not a wise approach. When the costs don't come from your budget, it is too easy to patent seemingly valuable inventions and put them in inventory for another day. Admittedly, if the office is understaffed, which is too often the case, putting valuable inventions in inventory may be the only alternative to throwing them away; but they represent sunk costs that may take a long time to be recovered, if at all. If such a program had the funds to hire more staff, it could reduce those sunk costs, license more inventions, get more patenting costs reimbursed, and probably make more royalty income in the long run. Unfortunately, when the office asks for money to hire more staff, the patenting costs are taken into consideration, and the request is often denied; the program already costs way too much!

This is a classic Catch 22: You need more staff to reduce patenting costs, and you can't reduce patenting costs without more staff. To make matters worse, since patenting is a long-term commitment, patenting costs become compounded and continue to increase, which can lead to escalating administrative frustration. All of that good technology sitting idle can lead to escalating faculty frustration, too. When administrative frustration and faculty frustration reach their peak and combine, the result is often a call to replace the director! Sadly, if the director is replaced, this death spiral will likely repeat itself, as the new director probably won't be given the power to solve the Catch 22, either.

Fortunately, this death spiral can be escaped. The simple answer is to make patenting funds part of the office budget. The reason this works is that it allows the office to shift dollars toward hiring more licensing staff and away from building an inventory of unli-

censed patents. The benefits of operating under this deal-based business model are described in the last section of this chapter. Of course, this approach requires that the combined technology transfer budget is adequate. A combined technology transfer budget equal to about 1 percent of a university's research budget should, in most cases, be sufficient for success.

Some may feel that the profit-and-loss responsibilities described here are in conflict with the foundation's faculty-service model, which is described in the next section of this chapter. At the foundation, this is not the case. If you ask any customer service-oriented company (such as American Express), they will tell you that good customer service leads to revenues, and that you don't make money by focusing on money, but by focusing on customers. This is also the philosophy at the Patent Foundation regarding technology transfer. As explained in the next section, satisfied faculty disclose more inventions, which leads to more licenses, and, ultimately, more royalties.

Independent Accountability

Of the several requirements the foundation must meet to remain a recognized UVA-related foundation, the best one is that the foundation must have an independent audit done each year and give a copy to UVA. This provides the foundation with absolute accountability for income and expenditures. The foundation actually has the books audited on a quarterly basis, which allows the chief financial officer and me to assure the foundation is on track to meet the annual budget commitments. We also report this information to the board each quarter. But perhaps the most important use of these quarterly audits is to provide the chief financial officer and me with a financial report card that keeps us focused on managing costs and on meeting revenue projections. To further take advantage of the discipline this accounting imparts, and to give us statistics we can reliably report to others, the auditors also audit the number of invention disclosures, patent applications, and deals on a quarterly basis.

Faculty Service

Separating the technology transfer office from the university in a foundation structure does not result in a separation of missions. At the foundation, we are very mindful that

UVA is the only beneficiary and that serving UVA's needs is the only purpose. This is reflected in the UVA Patent Foundation Mission Statement:

- to provide accessible, responsive, competent, timely, and professional patenting and licensing services to UVA, its faculty, and staff
- to serve as an efficient and effective conduit for the licensing of promising UVA technologies to industry, thus promoting their entry into the commercial marketplace and also generating royalties that can fund further UVA research
- to support and encourage local economic development by licensing locally, by licensing to startup companies, and by encouraging and supporting faculty startup activities
- to serve as a resource for information about patents and licensing and to encourage recognition that such matters have become meaningful and valuable aspects of academic life
- to encourage greater integration between academia and industry, hence improving the flow of innovative university technologies to the public marketplace

The cornerstone of the Patent Foundation's mission, and the source of the foundation's success, is the primary commitment to faculty service. Faculty members have interests, concerns, and needs regarding the future development of their inventions. Even though faculty members assign their inventions to UVA, and UVA assigns ownership to the Patent Foundation, this does not limit the passion with which the faculty inventors hope that their inventions will improve health care or otherwise serve the needs of the public. At the foundation, we share that passion, and we work with both faculty inventors and companies to help make commercialization of new UVA technologies a reality. Of course, the Patent Foundation also works to earn royalties that are used to support future UVA research, are shared with the inventors, and are used to cover operating expenses. But, as the manager of any service business will tell you, such businesses make money by focusing on the needs of customers, not by focusing on making money. At the Patent Foundation, we feel we have demonstrated that this principle applies to university technology transfer, too.

Of course, the primary benefits of the focus on faculty service are enjoyed by the faculty inventors themselves. They can easily get professional advice about the patentability of their inventions, work with in-house patent attorneys in person, and get provisional

patent applications filed quickly enough to avoid delays in publication. They can discuss the commercialization process with experienced licensing professionals who will carry out detailed market research, develop a marketing strategy, and discuss the invention with targeted company decision makers. Once a potential licensee has been identified, the faculty inventors receive regular briefings about the progress of negotiations and can participate directly if they wish. Last but not least, the professional business staff at the Patent Foundation monitors each licensee's performance and makes sure that all payments are properly and timely made—including royalty-sharing payments to UVA and the faculty inventors.

There are many other benefits that flow from the focus on faculty service. One is that satisfied faculty inventors disclose more inventions, which, in turn, creates more licensing opportunities, leads to more new technologies reaching the marketplace, and more potential income. The 2003 *AUTM Licensing Survey*™ data show that the national average disclosure rate among universities in 2003 was 39 invention disclosures per \$100 million in research funding. In that same year, the Patent Foundation received 69 invention disclosures per \$100 million in research funding, which is higher than the relative disclosure rate at many other top-ranked American universities. Of course, it is the creativity and skill of faculty inventors that creates these inventions, but, at the foundation, we believe that our level of service to faculty inventors is the key to encouraging inventors to disclose these inventions and become involved in technology transfer.

Faculty inventors want to see their inventions become available in the marketplace, so the focus on providing the best faculty service drives deal flow, too. In 2003, the Patent Foundation completed 22.7 license and option agreements per \$100 million in UVA research, which is more than double the national average of 11 agreements per \$100 million and is higher than many other top universities. More importantly, the Patent Foundation has maintained a high level of deal flow for a long time. Over the five-year period from June 2000 to June 2004, the Patent Foundation has executed 255 license and option agreements, averaging about 50 per year. Since it generally takes about seven years to get from license agreement to product launch, we are hopeful that valuable new products and significant revenues are right around the corner.

Staff members are continuously looking for ways to improve faculty service, and some of these can be formidable projects. For example, in 2004, foundation staff completed the development of a comprehensive operating manual, which describes every step in the technology transfer process used by the Patent Foundation and catalogs the foundation's checklists, analysis forms, form letters, and model agreements. From this, staff also created an interactive flow diagram of the process that is posted on the foundation's Web site (<http://www.uvapf.org>), and staff also developed a descriptive, abridged version of the manual that can be downloaded from the Web site by UVA faculty and others (you are welcome to download a copy, too). As expected, by improving the transparency of what the foundation is doing and why, the process works better, faculty are more comfortable working with staff, and the results are improved. There have also been other important benefits. University officials in a variety of offices with whom the staff interacts have found the manual helpful in understanding the Patent Foundation and how it works.

The unabridged version of the manual, which includes many step-by-step details, forms, and model agreements, has been distributed free of charge to academic institutions across Virginia. As a service to the university licensing community, the foundation is also providing it to academic technology transfer offices around the world, some of which are modeling parts of their process on the Patent Foundation. (*For more information on the operating manual, visit the "For the Profession" section of the Web site at <http://www.uvapf.org>.*)

Another important area of faculty service is supporting UVA faculty members who wish to start their own technology companies. Since 1999, the foundation has given an absolute licensing preference to faculty startup companies—yes, we will turn down offers from big companies and license to startups instead! There are two reasons for this. One is that we feel we should fully support faculty members who are themselves willing to commit their time and, often, their money, to bringing their inventions to the marketplace. The second is that this preference may lead to the development of a considerable number of startup companies here in central Virginia and may help UVA in developing the University of Virginia Research Park. Over the long run, the goal is to have a robust corporate research community here in Charlottesville that closely complements and interacts with the academic research community at UVA.

At an elementary level, the success of a new high-technology venture depends on five key ingredients: technical expertise, intellectual property assets, business expertise, physical space, and money. Faculty entrepreneurs themselves can provide the needed technical expertise, and the Patent Foundation can license key patent rights to the company. But business expertise, space, and money are often more difficult to come by. Once the foundation began giving licensing preference to faculty startups, these needs became increasingly pressing. The Patent Foundation staff initially provided business advice and referrals, but it became increasingly clear that this expanding need required dedicated resources. So, in 2000, the foundation created a subsidiary company, Spinner Technologies Inc., to develop this role. Spinner provides early-stage business expertise to faculty entrepreneurs and helps them find business partners to provide that expertise over the long run. Spinner also has a limited amount of wet lab space that it leases to faculty startups.

Not surprisingly, helping faculty entrepreneurs obtain funding for their companies is a formidable challenge. To help make this easier, Spinner Technologies is currently developing plans to form a member-managed angel investment group. This group of individual angel investors will contribute to a pooled fund and will then work together to evaluate companies and decide where and how much to invest. We are enthusiastic that this group will be able to provide early-stage funding to a number of UVA faculty startup companies. We hope that these early-stage investments will encourage established venture capital firms to consider investing in UVA spinoff companies, too.

A Pragmatic, Just-in-Time Business Model

Although I realize that many see the technology transfer profession as one that is more focused on public good than revenues, I firmly believe that academic technology transfer is a business, and that we best serve the public good when we view it that way. Since 1997, the Patent Foundation has operated under what we refer to as a deal-based business model. Under this model, in most cases, a license is negotiated before the big money is spent on converting a provisional patent application to a PCT (Patent Cooperation Treaty) or regular U.S. application. This model has proven to be far better than the patent-based model under which a separate (and sometimes open-ended) budget for patenting expenses drives the conversion process.

Just-in-Time Patenting

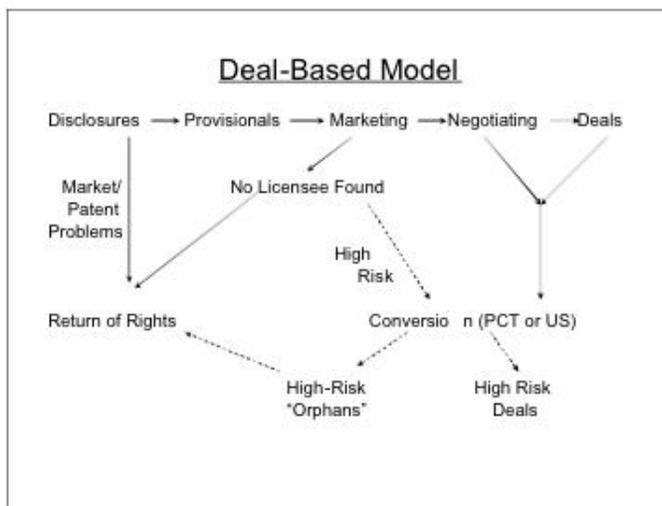
The deal-based model is founded on the fact that patents are hideously expensive “products,” and making more than you can sell (license) is a terrible waste of money. The deal-based model can be equated with the just-in-time manufacturing model used in business today: because of the cost of manufacturing, keeping a warehouse of products ties up your money. So, making products just in time to be shipped to customers is far more economically efficient than building up inventory. Like just-in-time manufacturing, the deal-based model requires that production (patenting) be closely linked to sales (licensing). The key to this model is to negotiate a license, or at least identify a willing licensee, before spending money to convert a provisional application to a PCT or regular U.S. application, and let the licensee pick up the cost of patenting.

Primary Models

Deal-based: Market first, only patent if licensee is found (analogous to inventory-based manufacturing)

Patent-based: Patent those that look promising, market and license later (analogous to inventory-based manufacturing)

Figure 1: Deal-Based Model



The diagram of the deal-based model (figure 1) illustrates a few details about how the model operates. The foundation files provisional applications on every invention that the triage process says have patentable subject matter *and* a significant market. In practice, the Patent Foundation files provisional applications on 80 percent or more of inventions disclosed; but they are not all treated equally. The lawyer’s time invested in a provisional for a broad,

large-market invention is greater than for a narrow, small-market invention. Filing provisionals generously allows faculty to publish early; because the Patent Foundation has in-house patent lawyers, staff is able to file provisionals on as little as one day’s notice.

Then, the foundation takes advantage of the provisional year to market and, we hope, license the invention. If the foundation doesn't find a licensee within about nine months, staff notifies the inventors and, often, offers to return the rights to them.

All of the go/no-go decisions on filing regular U.S. or PCT applications are made at the quarterly conversion meetings, which are meetings of the entire licensing and patenting staff. In cases where a license has been completed, or where negotiations are nearing completion, the answer is automatically yes. For cases where a licensee has been identified but a license has not yet been negotiated, when or whether to proceed is determined on a case-by-case basis (we often convince the potential licensee to cover the conversion costs in exchange for an exclusive option to enter into the desired license).

Cases for which there is no license and no licensee has been identified are considered for high-risk-investment conversion, where the foundation uses its own precious funds. To be eligible for high-risk consideration, (a) an invention must have been of interest to industry but the industry feels more proof-of-principle research is needed, (b) the inventors must still be working on the invention, and (c) the inventors must have sufficient research funding to carry out the proof-of-principle experiments. Those that pass this test are then ranked on the basis of potential market value, and the top-ranked one or two per quarter are converted as an investment—the funds available for this are budgeted, fixed, and never exceeded. Although some of these high-risk cases turn out to be unlicensable orphans, the foundation has a good track record of turning high risk-cases into licensed inventions—largely because the foundation has sufficient staffing to handle ongoing work as it comes up, so when the needed experiments have been completed, staff can weave the high-risk invention back into its marketing efforts in real time. The foundation has also developed a culture in which conserving patenting costs is at the core, which encourages staff to find homes for those cases in which the foundation invested. The foundation has enjoyed demonstrable economic efficiency by following the deal-based model. In 2003, the national average for nonreimbursed patenting costs was \$738,499 per 100 disclosures. In that same year, the Patent Foundation's unreimbursed patenting costs were \$178,138 per 100 disclosures, which is 76 percent lower than the national average.

The deal-based model is founded on two core principles. First, deals make money, while patents without deals cost you dearly. Second, a single human can carry out a certain amount of work in a given period, and no more. Operationally, the foundation has reduced this to two simple planning rules: you need to have one full-time licensing person for every 25 new inventions per year, and you can expect a reasonably trained licensing person to generate ten deals per year. (Deals are defined according to the *AUTM Licensing Survey*™ definition, which includes licenses and option agreements). These rules work. The foundation has had five full-time licensing professionals in fiscal years 2001, 2002, 2003, and 2004, and the foundation has completed just over 50 deals in each of those years.

UVA Patent Foundation Planning Rules for Deal-Based Operations

- Each experienced licensing associate (more than one year of experience) can handle up to 25 new invention disclosures per year
- Each experience licensing association can produce about 10 deals per year

Staff follows these planning rules carefully. In FY2003, the foundation had 160 invention disclosures, breaking the 150 mark for the first time. Since the foundation has seen some fluctuations in disclosure numbers from year to year, we waited until the FY2004 numbers were known before hiring. When the 2004 disclosures came in at exactly 150, the foundation hired a sixth licensing associate.

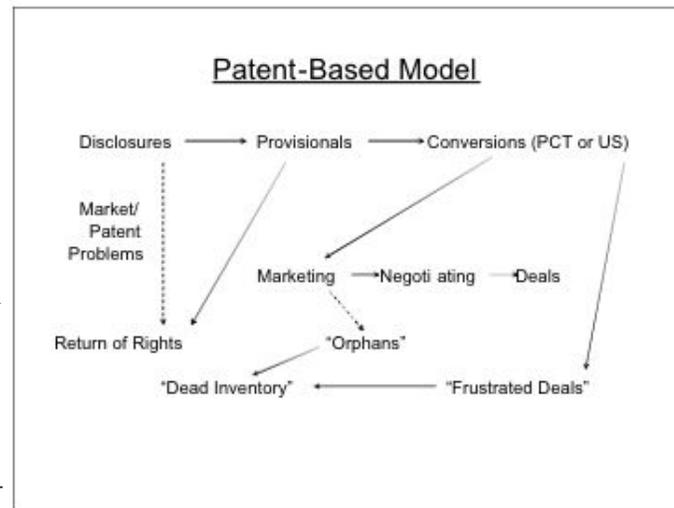
Inventory Patenting

The alternative to the deal-based model is the patent-based model, where the approach is to convert provisional applications or file initial regular patent applications in the absence of a licensee, and plan to market and license the invention at a later time (see figure 2). This is analogous to inventory-based manufacturing, where the factory floor and the sales force are not coordinated; the factory makes product continuously, whether there are customers or not. Although this model has been universally recognized by industry as being less capital efficient, this is what naturally occurs if patenting and licensing are not closely coordinated or if adequate resources are not focused on achieving a deal-based operation.

The most common scenario for the patent-based model is when patenting costs are paid from funds outside of the technology transfer office's budget, and the office budget doesn't allow for staffing levels needed to operate in deal-based mode. The reason staffing is key to operating under the deal-based model is that you must have enough people to do the marketing and licensing before the provisional conversion date comes due—which comes back to the basic tru-

ism that a single human can only produce a certain amount of work in a given period of time, and no more. It appears that some universities may have forgotten this, or perhaps have equated licensing professionals with those who process grant applications, when in reality, they have very, very different jobs. When the staff workload gets too high for licensing professionals to market and license inventions during the provisional year, the office is faced with either forgoing patent rights that have not been market-tested or patenting them on their speculative value, hoping that the staff will get around to marketing them—of course, future marketing of the technology is unlikely if the staff can't even keep up with new disclosures. Once the regular or PCT application has been filed, the pressure is off, so new disclosures get priority. The inventory of patent applications continues to consume money to pay downstream patenting costs, and they may never be licensed, so those costs may be sunk costs unlikely to be recovered from a licensee. The worst result is that faculty members become quite dissatisfied, as they become hopeful when a decision is made to patent their invention, only to have those hopes frustrated because a deal never materializes—sometimes, even after they have identified some good leads. As these frustrated deals stack up, faculty dissatisfaction spreads. At the same time, patenting costs escalate. As mentioned earlier, when faculty dissatisfaction and administrative alarm over costs combine, the result can be a call for a new director.

Figure 2: Patent-Based Model



A Results-Based Assessment of the Two Models

By making a few assumptions, we can map out the financial and programmatic results of a hypothetical academic technology transfer program that receives 100 invention disclosures in a given year. Figures 3 and 4 illustrate what would happen if that program used the deal-based model, and, alternatively, what would happen if the program used the patent-based model. Jumping to the bottom line, the deal-based model earns \$1,244,800 more than the patent-based model—and the patent-based model actually winds up nearly \$300,000 in the hole!

The primary assumptions are shown below; others are described in the text that follows.

1. One licensing full-time equivalent (FTE) staff member, reasonably well-trained, can handle 25 new inventions per year; and, from those, produce about 10 deals. Note that the national average, based on the 2003 *AUTM Licensing Survey* data for all respondents (total number of deals/total number of FTEs), was only 5.3 deals/licensing FTE/year. So, 10 is probably on the generous side (although using the deal-based model, the Patent Foundation has enjoyed 10 or more deals per FTE for the last five years running).
2. The average revenue per year per license that generates revenue is \$126,000. This is based on 2003 *AUTM Licensing Survey* data for all respondents (total license income/total number of licenses generating revenues). Of course, income arrives many years after a deal is done, and licenses expire as others start to generate revenue, but for the purposes of this analysis, we will evaluate the steady state. Keep in mind that the error bars on this average revenue figure are probably huge—some licenses make only a few thousand dollars, and some have earned more than \$50 million per year.
3. About 20 percent of the deals completed will eventually generate revenue. This statistic also comes from the 2003 *AUTM Licensing Survey*, but is not so easily calculated. It is tempting to simply divide the number of deals generating revenue by the number of active licenses, but this would not account for those executed licenses that died along the way. What we want to know is how many newly executed deals will eventually generate revenue. To estimate this, from the long-range cumulative data in the survey, I added up the number of deals done over the ten-year period of 1994 to 2003,

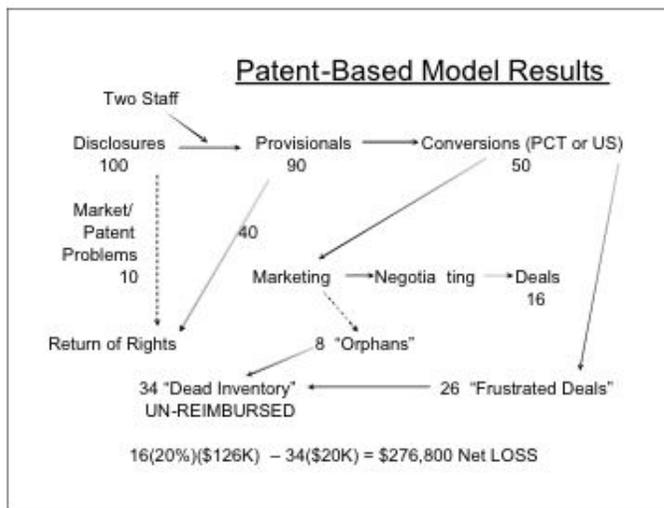
which was 29,882. Then, to see how many of the new deals executed during the ten-year period were generating revenues at the end of that period, I subtracted the number of deals generating revenue in 1993, just before the ten-year period began, from the number of deals generating revenues in 2003. The answer was 5,572. Dividing the number of deals executed during the ten-year period that earned revenue during that period (5,572) by the total number of deals executed during the ten-year period (29,882) gives the result: 18.6 percent of the deals done during the ten-year period generated revenues by the end of that period. For simplicity's sake, we will call it 20 percent.

Now you may be saying to yourself, wait a minute, there are quite a few variables that have been given no homage here, e.g., deals done near the end of the ten-year period would not have had time to generate much revenue; and some deals done before the ten-year period may generate revenues in 2003. But this is as close as we can get with the available data, and it seems reasonable to say that over the entire 29,882 deals, positive aberrations may cancel out negative ones. Interestingly, when the foundation calculates the revenue success rate for its deals, it comes out to around 20 percent. But this is only one data point, and we suspect that this number varies among institutions from 10 percent to 30 percent, depending on the inventions received, the technology mix represented, financial goals of the program, and many unknown factors affecting individual companies.

4. A single U.S. patent costs about \$20,000 by the time it issues. Foreign patenting costs were not considered in this hypothetical analysis, as many universities don't file them without a licensee.
5. Whichever model you use, filing provisional applications makes sense in an academic setting. Assuming offices operating under either of these models would file provisionals generously, the costs of doing so were ignored in this analysis.
6. For purposes of this analysis, every license is for only one patent application or patent. In reality, of course, it is not uncommon to license several different applications and/or patents in a single license. On the other hand, there are also nonexclusive licenses, where more than one license is created for a single patent. We have assumed these cancel each other out in this analysis.

inventions have been licensed; and they are also happy because real progress was made early on—frustration was low.

Figure 4: Patent-Based Model Results



Turning now to the same hypothetical program operating under the patent-based model, shown in figure 4, the staff is overburdened with disclosures, as is usually the case when the patent-based model comes into play. Because so much of the budget is devoted to patenting, there is only enough salary money to support two licensing professionals. Thus, the licensing professionals have twice as many technologies as they can handle in a year. Because of this, they

make high-risk patent investments more often than not; they don't want to throw away seemingly valuable inventions, but they don't have the time to market them within the provisional year. Indeed, they may not ever get around to marketing at all, instead focusing on closing deals with prospective licensees that the inventors bring to them. Since the staff members are overburdened with disclosures, they can't quite make it to 10 deals each per year, so, in this example, they close only 8 each (which may be rather generous). Because it is only deals that make money, not patents, the royalty income is a modest \$403,200 (126 x 16 x 20%).

Unfortunately, all those high-risk conversions are very expensive, and, since the staff never really has the time to go back and market them, few of those costs get reimbursed by licensees. Of the 34 high-risk investments, 8 are orphans, and no licensee would likely be found even if the staff had the time to look. The reason there are more orphans than in the deal-based model is that market value assessments here are little more than guesses, as the staff didn't have time to speak with companies and see what the actual industry interest was. (This is in contrast with two orphans when the deal-based model was used,

where the staff applied real-market information and invested only in those that were of most apparent value.) Worse yet, there are 26 technologies that could have been licensed, but weren't. (Note that, under the deal-based model, these were all licensed). Faculty inventors of these technologies are very likely to feel frustrated, because they feel that their technologies are valuable, but nothing is being done with them. But worst of all, many potentially useful technologies may never make it to the marketplace, and the public doesn't get to enjoy the benefits from the university's research.

Turning to the numbers, we can see that using the patent-based model has driven un-reimbursed patenting costs through the roof—\$680,000 was spent on patenting, with no licensee to pick up those costs.

In the patent-based model, given that the staff is already overworked handling new cases, it is unlikely that much, if any, of these costs will ever be recovered. The modest income and very high costs of the patent-based model, in our hypothetical situation, yield a net loss of \$276,800. When compared with the net gain of \$1,018,400 produced by the deal-based model, the deal-based model beats the patent-based model by \$1,244,800!

Conclusions

Based on our experience at the Patent Foundation, we believe that an organization with an intense focus on serving the interests and needs of faculty inventors will ultimately succeed in bringing more technologies to the public marketplace, enhancing local economic development, and providing strong long-term financial performance. We also believe that the foundation structure is a very beneficial framework for building and operating such a program, largely because it allows the program to tap the broad perspectives of a well-chosen board of directors, gives the program flexibility in contracting and hiring, and creates a level of accountability that will help maximize financial and operational efficiency. To reach that financial and operational efficiency, however, the program also needs to have budgetary control over office expenses and patenting expenses. In addition, the funds used for those expenses have to be fungible, because having more licensing professionals really is cheaper than having fewer. An understaffed program inevitably operates under the patent-based model, and un-reimbursed patenting costs soar far higher

than what it would have cost to hire more staff. Worse yet, faculty frustration and dissatisfaction can grow quickly, too. In contrast, a licensing program with one full-time professional for every 25 inventions per year can operate on the more efficient deal-based model, which can provide far better faculty service, produce a much higher deal flow, minimize unreimbursed patenting costs, and, in the long run, make far more in royalties. You can learn more about the University of Virginia Patent Foundation by visiting the Web site at <http://www.uvafpf.org>. I welcome your questions and comments. Please also note that the Web site has a section of free materials for the profession, in which the foundation makes a number of presentations, the abridged operating manual, and other materials available for your use at no cost.

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