

Tech Transfer Update *January 2009*

Vital Legal Information for the University Technology Transfer Community

This issue of the Tech Transfer Update points out important items to consider in connection with the formation of a startup company by a university professor or research scientist. Work in an academic environment doesn't necessarily prepare one for starting a company. This article is intended to help faculty entrepreneurs avoid some common pitfalls, and to serve as a resource for the tech transfer professionals who are called on to advise academicians embarking for the first time on an entrepreneurial venture.

How (Not) to Start a Company

A good question to start with is: "Do you really want to start a company?" Some researchers may think of it as being like a new hobby, but it's much more a second job than like a hobby. Factors to consider include:

- It requires large amounts of time, often with externally imposed deadlines.
- It will likely require some personal expense, to seed the company.
- It requires different skills than those required for success in academia, and the faculty member or research scientist may or may not possess those skills; being a brilliant scientist or a great teacher does not guarantee success.
- In a university or research institute setting, one has extraordinary freedom to choose the problems on which one wants to work. In business, there is much less autonomy; the market dictates the problem you work on, the time within which you must solve it and the cost constraints under which you operate.

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- The funding processes and requirements are different from academia. While government agencies will fund projects simply to advance the state of knowledge in a field, professional investors will only put up cash if there appears to be a short path to commercial success.
- Assuming you need significant outside investment, you will need to share control of the endeavor, if not give it up entirely. Even if you end up as the CEO (which you may or may not), having a board of directors dominated by professional investors will feel more like having a boss than does a faculty member's relationship to department chairs or deans.

Of course there are also some positives. Starting a company may be a way for you to get the benefits of your inventions to a wide audience. It can create jobs in the community and, in particular, jobs for young scientists, including those from your laboratory group or institution. It can provide a new and different challenge, which some people enjoy. Of course there can also be financial benefit. There have been some spectacularly successful companies that started with university technology, such as Hewlett Packard, Sun Microsystems, Cisco, Yahoo, Google, Bose, DEC, Genzyme, Biogen, and others. There have also been plenty of moderately successful ventures. But many university spinout companies, like other startups, fail outright.

When a spinout company does fail, the reason or reasons for the failure are often not related to the quality of the technology on which the business was based. It's not enough to have a good invention. The problems include management issues, especially hiring, firing and disciplining staff, weak communications skills, inadequate funding, competition, and failure to assess accurately the market for the proposed product from the start. If, after sober assessment, you really do want to start a company, hopefully the material below will assist in avoiding some of the more common pitfalls.

1. Careful Analysis of the Market

A key early step in planning any business is to analyze carefully the market for the proposed product or service. There is a difference between technology that is "neat," "cool" or "elegant" and technology for which there is a significant market demand. The best way to gauge this is to describe your proposed product to potential customers, and get their feedback. Does it fill some unmet need? If the product was available today, would they buy it? If so, what price would they be willing to pay for it, and what features would the product need to have? Are you likely to be able to produce the product at that price and with those features, within a time frame that meets the market need, and make a satisfactory profit? How are customers solving the problem today? Who else is producing something similar, and what would be your relative advantages and disadvantages in price, quality and features. What would competitors do in response to introduction of your product. These may seem like obvious questions, but omitting a sufficiently detailed market assessment is a common mistake for university spinouts,

because the founders are scientists, and tend naturally to focus on the technology more than the market. Market research is a way to get answers to important threshold questions before investing a lot of time and money creating a new product or service.

Getting good estimates of the total size of the market potentially addressed by your product is also valuable, and not necessarily easy. A small market can support a small company. That may be sufficient if you don't need large amounts of capital to get the company going. If your funding requirements are large, then you are likely to want to look to venture capital sources. To interest those, the potential market for the product must be very large (hundreds of millions of dollars), and you'll need credible evidence of that market size.

One of the places to get market data are published reports by market research firms. These are not cheap – perhaps \$5,000 – and may not be sufficiently tailored to your exact niche to be very useful. A second approach is to hire a market research firm to conduct a custom market research survey and produce a report.

Assuming you will do research on your own, you will use both published data and information you generate yourself. Published data would likely include government reports, industry magazines, trade association surveys and Internet searches. These can yield some general background information. Direct research that you conduct on your own would include such things as calling up industry insiders - customers, sales representatives, suppliers - and asking what they know about the relevant market, what is already available, and what the customers want. Attending trade shows can give you a sense of what is happening in a field, as well as allowing you to meet people who can provide you with useful information or introductions. You can also contact competitors and ask about their own product offerings. Personal research of the kind described above is often the most helpful, because it provides information that is current and may be very specific to your proposed product. But it is also the most time-consuming method of accumulating market information. You might consider hiring a student from the local business school to do some of the legwork, but would have to exercise a higher degree of involvement than with a professional market research firm.

Pitfall 1(a): the more expensive better mousetrap

You have invented a better mousetrap. It works more easily, reliably, and doesn't require a supply of cheese. The problem is – it is more expensive than a standard mousetrap. People will still buy the \$2.29 wooden plate with the metal trap on a spring trigger, because it works well enough and it's cheaper. To displace familiar technology, ideally a product should be both significantly better and significantly cheaper. If more expensive, the new technology has to be a great deal better and address a problem of such great importance that the customer is relatively indifferent to cost (as may be the case with

medical products). But in most cases, if you don't have a cost advantage or a very significant quality advantage, or both, compared to other available substitutes, you won't have a successful company.

Market analysis is complicated by shifts in demand. You need to be aware of trends in the market, as yesterday's latest and greatest niche may not be tomorrow's. Markets are moody, and when they are in a bad mood, can be outright nasty.

Pitfall 1(b): The cheaper, better mousetrap too late

The year is 2001. You have invented an opto-electronic hybrid communications technology that is faster, smaller and less expensive than what is in the market. You demonstrate to potential customers and they marvel at its elegance. It truly is a "better mousetrap," and less expensive as well. Problem: In 2001 the communications infrastructure has been over-built; no one is building networks, and there is no demand even for a superior product. It takes years for the market to rebound, and in the meantime your company runs out of money and its investors run out of patience and shut it down.

Pitfall 1(c): The cheaper, better mousetrap too early

The year is 2000. You have developed a software-based system for use in webcasts by radio stations, that allows targeting advertisements to individual listeners based on their age, gender and location. Problem: in 2000, very few people listen to the radio through their computers, and selling advertising requires a very large audience. This product will be successful seven or eight years later, but by that time your startup will have folded.

2. The Team

It's unusual for one person to have the full complement of skills and knowledge needed to start a successful company. Hence most ventures will require a team. The skills or information that one person has are supplemented by others on the team.

For a technology-based startup, obviously one key team member is the chief technology officer (CTO). It's desirable to have a full-time employee in this role. So if the founder is a faculty member who plans to remain as a faculty member, it is best to hire someone for the CTO position. There are not enough hours in the day to be both a university professor and a company CTO. Without a full-time CTO, the availability of the faculty member becomes a choke point in the company's activities, including not only R&D but internal business planning, fund-raising, hiring and other areas. This will severely limit the company's progress. One approach is for

the faculty member to quit and work full-time for the company. But giving up a tenured faculty spot for an unproven startup is a level of risk many don't want to take. Approaches that have worked include (a) having the faculty member take a one or two year leave of absence to work full-time at the company, but on a temporary basis, or (b) bringing on a former post-doctoral researcher or graduate student as the CTO, provided that this person has the necessary skills, with the faculty member / founder providing some part-time consulting service to the company while retaining his or her faculty position.

A university spinout usually has the technology function well covered, as long as it avoids the part-time CTO problem. So the main issue becomes filling in the other skills and information sets that the scientific founder or founders don't possess. In most cases, it's critical to have someone (and preferably more than one) who has extensive experience in a commercial setting in the specific industry in which the business will operate. Without this, a company is likely to waste a large amount of time on dead ends that would have been quickly identified as such by someone with more relevant experience. This person is likely to know, or be able to find, information about market size and customer needs. Failing to add this expertise to the team, or to do so early enough, is a common error on the part of university spinouts.

At some point the company will need to bring in someone who has familiarity with budgets, accounting, corporate controls and finance. While not absolutely necessary from the first day, this skill set will be needed once the company has raised any significant amount of financing.

Where can you find your team? Assuming you don't already have the right people in your circle (which you probably don't), this will require some networking, and will take some time. Here are a few approaches:

- Attend an industry conference; try to choose a conference that is attended by many people from industry rather than all from academia.
- Research companies that have been sold, that were in the same field. Where did the founders end up? Maybe they are available, or can suggest people.
- Speak with a venture capital firm that has invested in a similar area. There may be entrepreneurs that the firm invested with previously, now looking for another opportunity.
- Talk to an organized angel investor group about who is in their network from the right industry. Many angel investors are interested in working, to varying degrees, in the ventures in which they invest.

- As the people who work at your institution either in tech transfer or in corporate relations.
- Where are your former students or colleagues who have gone into business? Would any of them be sources of referrals or candidates themselves.

- Look under the heading industry expertise at the web site of your local business school.

Whatever your source of people, you will need to be selective and go slow in choosing the team. Do they have entrepreneurial drive or just like to talk about it? You can start by saying you are looking for advice. This may help you to size up what they know, and along the way you may pick up some good advice (as well as some bad).

Should the founding scientist be the Chief Executive Officer (CEO)? There is no general answer to this question, except where the founder will remain an active faculty member, in which case the answer is no. A recurring complaint from venture capital investors is that the faculty member / inventor wants to be the CEO but does not have the right skills. No doubt this happens at times. On the other hand, some faculty members who have left a university either temporarily or permanently to run a company have done very well. There have also been times when a professional CEO tapped by the investors has come into a startup company and made a mess of things. Who should be the CEO has to be assessed case by case based on the skills of the individual and the needs of the company (which may vary over time as it grows). The founder needs to put ego aside and may need to be flexible about adapting to different roles based on the needs of the company over time. In a situation where an investor recommends engagement of a particular person as CEO, the founder should participate in the selection, through interviewing the person and speaking with references, and make his or her own independent assessment.

As in any team setting, in addition to having a group that possesses all of the necessary skills and backgrounds, it's important that the group can work together in a positive collaborative spirit, and will dedicate the necessary time and energy to the venture. Consideration should be given to arrangements in which equity shares are not fully owned immediately when the person joins the company, but instead vest over time so as to eliminate or limit the equity grant if a team member does not work out.

Pitfall 2: Gaps in the team

You are a biochemist and have invented a terrific new technology that clearly represents a potentially significant improvement in the processes used to produce biofuels. You have no business experience so you ask help from your cousin, whom you trust, and who

started an Internet company and later sold it for over \$100 million. He volunteers to be CEO, to which you agree, and he brings in as Chief Financial Officer the person who was the CFO of his former company. The three of you collaborate on drafting a business plan and set about trying to raise money for the venture. Problem: no one in the group has any experience in operating a biorefinery, or in fuel production or distribution, or in the automobile industry, or in any other relevant industrial setting. You are destined to make mistakes that would be avoided by a complete team.

Filling out the team will require giving up some more equity, which you should be willing to do (see Pitfall 3, “Owning 100% of nothing”). In addition to the founding group, you will also need an attorney, preferably one with experience working with university-based startups, to advise on a variety of legal matters, including choosing whether to use a corporation or limited liability company, financing, compliance with securities laws, employment issues, licensing patents from a university or research institute and other legal matters.

3. Funding

Some say the three most important requirements of starting a new company are money, money and money. Funding of university spinouts, like other startup companies, can come from the entrepreneur’s personal savings, friends and family, government grants, angel investors, corporate partners and venture capital firms.

Using a certain amount of personal savings is fine, but you should try to avoid putting a large mortgage on the house, or tapping retirement savings. Keep in mind that many startups fail. Friends and family are probably the most common source of initial funding for university startups. Friends and family investors generally don’t ask too many difficult questions when deciding on the investment, won’t require a large percentage of the company in return for their investment, won’t negotiate on the terms, and don’t expect to be able to tell you what to do after investing. A major drawback, however, is that if you lose their money, you still need to see them every Thanksgiving.

The federal Small Business Innovation Research (SBIR) program can play a role, usually as a supplement to other funding, rather than a complete solution. A Phase-I SBIR grant, awarded through a competitive process, can provide up to \$100,000 for approximately 6 months to explore the technical merit or feasibility of an idea or technology. If the Phase I work is successful, a Phase II award of up to \$750,000 may be granted, for up to 2 years, to expand Phase I results. SBIR funds must be for R&D on technology with commercial potential, but not for the later stages of moving from the lab to the marketplace. For that, you need private funding.

Getting money from professional investors may be a good discipline. If you get consistent feedback of the critical variety from several professional investors, you should think long and hard about whether you may need to change aspects of your plan (or abandon it entirely). Professional investors are not faultless (several major players passed on investing in Apple Computer when it was presented to them). But they probably have more experience with startups than you, and therefore their comments deserve some attention.

Most startups are underfunded. Experienced venture capitalists usually assume that, to become self-sufficient, a company will take 2-3 times as much money, and 2-3 times as much time, as the founders predict. For planning purposes, doubling your expected expenses is not a bad idea. One doesn't ever hear entrepreneurs complaining in retrospect about having over-funded their companies.

Raising money requires giving up part of the ownership (except in the case of government grants). With any equity financing, there will be a negotiation over the reasonable valuation of the company, and what percentage of the equity should go to the investors. Without suggesting that founders should give away equity for nothing, it's important for you to keep this in mind: If a company is successful, it is likely that the founders will do very well, whether their ownership share ends up a bit higher or a bit lower; if their company fails, they have nothing, no matter how large a percentage they own.

Pitfall 3: Owning 100% of nothing

You have a new semiconductor technology. It's a rapidly moving field, and getting your innovation to market quickly is important, and will require substantial financial resources. You talk to several venture capital firms and they all want at least 50% ownership of the company to invest \$6 million. You don't think that fairly values your invention and don't want to give up that much ownership or control. So you try to limp along with some much smaller government grants. Four years later you are still limping, while the prevailing techniques used in the semiconductor industry have gone through two generations of improvement, and you have missed an opportunity that adequate funding would have provided.

4. Picking an investor

All venture capital firms will tell you that they bring much more than money to the table – they offer expertise, useful industry contacts, a network of potential employees, etc. – and some of them, though not all, really do. During the fund-raising process and afterwards, it's important

to listen to feedback from investors, but don't suspend your own judgment. Often the investors will be experienced with startups, and you can learn from them. In most successful companies, however, the entrepreneur is the main visionary and driver. The major contribution of investors to a startup is still the green stuff, and for most startups the non-monetary contributions of the investors, if any, will not be a decisive factor in success. There are situations, though, where a mismatch between investor and company will be a critical factor in failure.

Pitfall 4: Investor mismatch

You are a professor at a medical school and have developed some compounds that have shown interesting results regarding treatment of certain cancers. You estimate that FDA approval and marketing of an actual drug, if it ever occurs, is at least eight years away. You have been unsuccessful so far in raising money from venture capital firms, and you are introduced to a small group of individuals who have become moderately wealthy through investing in real estate. They don't know anything about medicine, pharmaceuticals, FDA approvals or early stage companies, but they are prepared to invest a few hundred thousand dollars in your company. They want a seat on the board of directors, and want their investment in the form of a debt that matures in two years, secured by all of the company's assets. When told that the company doesn't have any significant assets other than its license to the compounds from the university, they ask that the university pledge the patents to secure their investment, which the university refuses to do. Your attorney tells you that the term sheet proposed by the investors is otherwise onerous and may make it difficult to get future financings. But you have no other immediate prospects and are eager to get started so you agree to take the money. The angel financing takes months to complete, costs a disproportionately large amount in legal fees and causes strain between the company and the university tech transfer office. After two years the company needs much more funding, but this investor group does not have enough money to provide it. Some venture capital firms have a potential interest in investing, but the angel group refuses to give up their senior debt position, and instead uses the imminent maturity of the promissory notes to coerce an early sale of the company at a low price.

You need suitable investors. They should preferably understand the business, and if they don't, they have to agree to be completely passive, without any control over the company. Ideally they will have invested in the same industry before. Equity investments are preferred to debt for startups, as startups won't have the cash flow needed to repay the debt.

5. Dealings with Established Companies

Many startups are unsure about what contacts they should have with much larger, established companies in related markets. Typically they worry about having their ideas stolen, or being squashed by a much more powerful company. While there may be some associated competitive risk, there are also often strong reasons to interact with corporate giants. There are a variety of strategic relationships that a startup might have with more established companies, such as licenses, joint ventures, supply relationships and distribution relationships. A larger company may be able to help a startup get to the market much more quickly or effectively. The established company may have relevant customer contacts, credibility, manufacturing or distribution capabilities, cash to invest, and other advantages. Also, venture capital firms that are considering providing financing will often ask a startup to present its technology and market plan to an established business in a related field. In making an investment decision, the venture capitalists then rely in part on the assessment of the startup's prospects provided by the mature company.

For university spinouts in particular, the benefits of establishing contacts with large industry players usually outweigh the competitive risks, for the following reasons:

- University spinouts rely primarily on patents for their intellectual property protection, not trade secrets, at least in regard to inventions that grew out of the university laboratories. All those innovations are published, so they are not eligible for trade secret protection anyway. If the big company really wants to try to steal your ideas, they can look them up in the scientific literature. If you have a good patent position, you should be well protected.
- It's hard for a small, new company to do everything. Doing what you can do better than anyone else, and relying on partners for everything else, can be a good formula.
- Some customers won't buy directly from a startup because of concern about its stability. Working through a larger company as a distributor or joint venture partner or in some other form of collaboration can overcome this obstacle to sales.
- Strategic partners can be sources of financing, sometimes on more favorable terms than venture capital firms, and ultimately may provide an exit through acquisition.

Pitfall 5: Paranoia

You have developed some novel chemical compounds and have filed for patent protection. You make a presentation about your business plan to a venture capital firm, VC. VC



has some preliminary interest, and ask to set up a meeting between you and LargeCo. LargeCo is one of the world's leading chemical manufacturers, a potential supplier of your company, and an investor in VC's latest fund. VC wants LargeCo's assessment of your technology and of the market demand for the product. But you are concerned that if you reveal your technology to LargeCo, it will enter the market itself, copying your ideas, and by using its much greater resources, squash your company. So you decline the meeting. VC, lacking the validation it was seeking, decides not to invest. Your decision was probably not right, unless you have another financing source lined up. Both your patent protection and the relationship between LargeCo and VC make it relatively unlikely that LargeCo would misuse the information you provide to them, even if they don't feel constrained by ethical considerations.

6. Conclusions

In summary, the entrepreneurial faculty member who is considering starting a company should include the following steps in the planning process:

- Analyze the market carefully, paying close attention to expected cost of your product relative to competing products, and noting any trends in the market
- Fill out your team with others who have skills or information that you do not, particularly looking for people who (individually or in combination) have extensive background in the relevant industry, knowledge of the market, personal contact with customers, time to devote to the venture, experience with startups and perhaps a bit of money to invest. Seek out people that you think will work together harmoniously and be prepared to give them meaningful equity incentives.
- Figure out how much money you think it will take you to get going, then double that figure and try to raise the money. It's likely to be slower and more expensive than your initial estimates. Evaluate the investors for their own familiarity with the industry and type of investment and select someone that is a good fit.
- Make sure your patent filings are in place, and then be prepared to engage with existing major industry players when the opportunity arises for joint ventures or other collaborations.