

How to start your own business

This first article in a new series explains why engineers and scientists should give serious thought to starting and running a high-technology business.

I believe the most efficient and direct form of technology commercialization is when an engineer or scientist starts his or her own business. Such high-tech startup companies are, in fact, a uniquely American phenomenon and one of our major competitive advantages. They can serve as natural incubators for developing new technologies. Our culture, our financial infrastructure, and our government encourage us to form new enterprises.

Regardless of whether you start your own high-tech company, this series of articles will sensitize you to the business aspects of what's happening around you. I strongly believe that engineers and scientists can fundamentally improve their contribution to society and benefit themselves as well by learning more about business. Every nation, every company, every person must deal with the issues of productivity and competitiveness. Our standard of living depends on what we produce, and engineers and scientists, more than any other group, can create wealth for society because they are directly coupled to the engines of productivity.

What's in it for you?

An awareness of business will help you make more-informed decisions in your career. In the past, engineers obtained job security by joining a stable company and completing their assignments with dedication and excellence. Today, we obtain job security by being competitive in the job market and by making sure our actions directly contribute to the company's success. That means knowing who the company's real customers are, what problems they need solved, and how our actions affect other parts of the company.

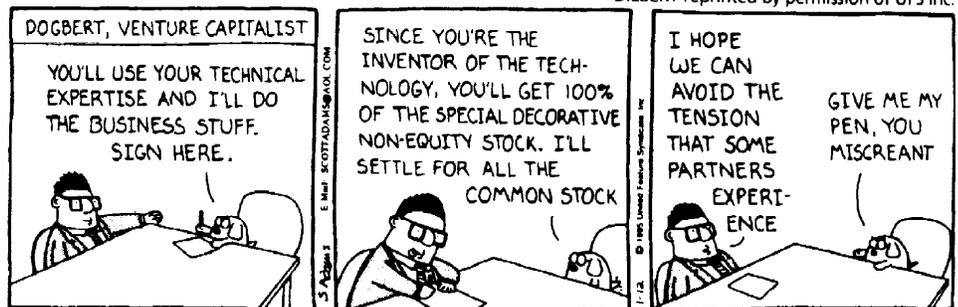
If you're a university professor, a knowledge of business could help you

create cooperative relationships with industry. These relationships can add relevance to your research and will influence your students' attitude to succeed in the industrial workplace. Some funding agencies are more likely to support your research if you're doing it in the context of an industrial relationship.

For those of you working in large companies, taking an interest in business is a way to gain greater control over your life. Engineers who understand business and are willing to manage people often command larger salaries. And a knowledge of business is

see that it's most appropriate to raise venture capital when you've already begun to operate and you need an infusion of capital to drive the business. Venture capitalists serve a very useful purpose under those circumstances. Reputable venture-capital investors generally don't provide seed money to brand-new companies.

These investors tend to have shared opinions about what's hot; that is, which fields are candidates for investments at any given moment. For sure, the optics industry hasn't been hot for a long time, not since the mid-1970's. Very few laser and optics companies



essential if you want a greater Say in how companies manage product development and allocate resources.

Technical training positions engineers well to succeed in business. Technology call provide a competitive advantage in any industry, even low-tech businesses. Certainly in a high-technology market, business decisions are best made by people who understand both technology and business. In general, I think engineers can learn about business much more easily than business people can learn about technology.

Getting started: raising money

Most books, and articles about starting a business, and also most people's concepts about starting a business, pertain to the venture-capital model. In that model, you identify an opportunity in a large and growing market, hire a complete team of experienced and successful managers, raise a lot of money, and spend it to accelerate your business development. Just by reading this simple description, you can

have been successfull in getting venture funding. Once venture-capital investors commit funds, they need an objective measure of whether the company is on track; thus, managers have to be concerned about meeting the milestones on the business plan. This management approach can be costly for a small company; it can lead you to spend money before the business really requires it, in order to complete tasks that look less important now than they did when you wrote the plan.

Consider this, too. Venture-backed businesses have high failure rates — perhaps only about 10% of them become big successes. This failure rate is partially due to the fact that the winners have to compensate for the losses sustained by the other 90%. For that reason, venture capitalists tend to have high expectations for the return on their investment, typically 50% per year. The only way they can get that type of return is to take a high percentage of your business for their investment, especially when you approach them too

early in your development. In that sense, venture capital is expensive. Another problem is that venture capitalists generally assume engineers can't manage this kind of business. Also, when venture capitalists are disappointed, they are quite willing to "pull the plug."

The low-risk model

Chances are you won't be able to hustle venture capital the first time around. What you read or hear about startups generally doesn't apply to you; in fact, business writers often prescribe the opposite of what you should be doing. Instead of going the venture-capital route, I recommend following a low-risk start-up model that gives you the opportunity to learn management skills while you grow your business. And when a big opportunity presents itself, you'll be able to seize it.

The two models aren't necessarily incompatible or inconsistent. The optimum approach for you may very well be to adopt the low-risk model to start your company, then raise venture capital when your business is headed in the right direction

The low-risk model is a common-sense approach to business. You start small, build a solid foundation, and learn the ropes as you grow. You raise a small amount of money from friends, family, or other entrepreneurs. You learn to watch cash flow and to spend money wisely — if you run out of money, you're out of business. You hire the team appropriate for building a small company now and hire more experienced people as you grow.

You deliver a product or service that you can provide better than anyone else. You take a "bottoms-up" approach to marketing; rather than quantifying the world market and figuring you will capture a certain share, you focus on what it takes to get one customer to part with his money. Once you succeed, you'll have an easier time selling to a few more customers. Then you serve those customers so well that nobody can take them away from you.

This approach forces you to address the most fundamental of business principles, which is to serve your customers particularly well. The low-risk model doesn't imply that the company has to remain small, because the process con-

tinues: customers multiply, and your business grows. You achieve stepwise goals consistent with the resources at hand. At each stage, you are building a profitable business.

A company formed in this way can be flexible, informal, and idealistic. Rather than being tied to your objectives, you're more likely to do what feels right. For example, if your business is developing more slowly than you expected, you can put off hiring a vice president of finance for six months without concern that someone might accuse you of failing to operate according to plan. You can raise investment capital as you grow. And it won't be as expensive, because your company will receive successively higher valuations. You'll end up with a much bigger share of the company and control your own destiny.

Case history: starting small

Iris Medical Instruments Inc. (Mountain View, CA) illustrates the principle of starting small and building value in steps. The founders wanted to develop novel equipment for ophthalmic surgery based on high-power diode lasers. They tried to raise venture capital at the beginning, but they couldn't generate any interest. So they broadened their team of founders by adding entrepreneurs with general management experience and started the company with their own funds. Over the next six months, they built a breadboard system to prove the technical feasibility of their idea and hired a graphic artist to illustrate their concept of the pro-

duct. At that point, venture capitalists were interested in investing. Today the company is the leading manufacturer of ophthalmic surgery equipment using high-power semiconductor lasers.

Ted Boutacoff, one of the founders of Iris, tells the story this way: "Venture capitalists have to reconcile the inherent conflict between their need to maximize return and their need to minimize risk. They look for opportunities where the risk is sufficiently low and the potential gain is sufficiently high to make an investment. They examine risk in four areas: management, technology, regulatory issues, and the market. When we first went to them they weren't interested because they saw high risk in all four areas.

"So we started the company with our own funds and began to take actions that would reduce risk in their eyes. We reduced the management risk dramatically by adding two entrepreneurs as founders and members of the board of directors. We reduced technical risk by building a prototype in a garage in Los Altos. We also took steps to move through the regulatory cycle and validate the market. By doing all those things, we reduced the risk sufficiently to attract venture-capital investment."

Starting a business is hard work, but it's not as difficult as you might think. Don't be discouraged by statistics of high failure rates. With proper preparation, you have a good chance to succeed.

Two ways to start a business: a comparison

	Venture start-up	Low-risk model
Funding assumption	Deep pocket	Finite resources
Investment risk	High-risk gamble	Every company succeeds
Investment decisions	Herd instinct	Shared vision
Priorities	Market size\technology\people	People/technology/market size
Market research	Top down	Bottom up
Management team	Complete from beginning	Add as needed
Management belief	Technologist can't do it	Technologist can learn
Driving force	Meeting milestones	Do what feels right
Company culture	Traditional	Informal, frugal, idealistic
Spending burn rate	High, according to plan	Lower, like spending own money

Starting your own business

In this series of articles on the basics of starting and running your own company, author Milton Chang shares what he learned the hard way about the electro-optics business in the last 24 years. You'll find a heavy dose of common sense and a tremendous emphasis on people, along with the nuts and bolts of putting together a business. Each article will also explain business principles and the philosophy behind them.

Series topics

- Getting started: the low-risk model
- Preparing yourself
- Deciding on a business
- Developing the business plan
- Finding startup money
- Forming the team
- Developing your first product
- Manufacturing and operations
- Marketing and sales
- Finance, administration, and informationsystems
- Selecting and working with outside professionals
- Maximizing value creation

When to take the plunge

Any time is a good time to start a company. People who find reasons not to start today will find another reason tomorrow. A startup company based on the low-risk model is not particularly affected by the overall economy because it is targeting a very small segment of the population. And there are tradeoffs that work to your advantage. During good times, people are more willing to spend money. But during tough times, you're likely to find better employees, and more suppliers will be willing to work hard for you and extend you credit.

Many aspects of today's business environment actually favor the formation of small companies. Until recently, people wanted to work for big companies. Now the best people want to join small companies. Because people are the key ingredient for success, this is an important trend. Design and simulation software and computer workstations are affordable and accessible to almost everyone. Universities and big companies are much more open and willing to make their facilities and their people available. The national lab-

oratories are also eager to support small companies by providing access to characterization facilities.

**Starting a business
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Let's face it. Who is better equipped to take advantage of the vast opportunities brought about by rapid technology changes in all types of business than you are? If you think of your training as enabling rather than limiting, your possibilities are unlimited.

You've worked hard to gain your technical skills. If you're willing to broaden and extend yourself a little more, you will gain more control over your own destiny, earn more respect from others, and create more wealth for society. Let us seize the day! □