You, Too, Can Be An Entrepreneur

Employment opportunity is a major issue for physicists today. Current trends are making it difficult for physicists to find jobs. Fortunately, trends are also making it an opportune time for physicists to start their own businesses. The main theme of this article is that starting your own business is a viable career option. Your technical training is not meant to be limiting; it is valuable, relevant and enabling.

I'll share with you the most important things I've learned and experienced, both as a technical entrepreneur and as an investor. I took the plunge from my aerospace industry "member of senior technical staff" research job in 1971, without any prior business experience, just two years out of school. I'll describe a low-risk business model that worked for me every time; it can get you started nicely. I'll also suggest factors to consider when you decide what kind of business to start and how to prepare yourself. Mainly, I want to convince you of the fact that it's possible to start a successful business and challenge you to consider doing so.

Let me begin by telling you two true stories about young technical entrepreneurs who started their own companies, and then generalize from their experiences. In both cases, the people involved had no prior business experience, and I was involved as an investor and an advisor.

Alistair Black earned his Ph.D. studying high-speed optoelectronics at Stanford University's Ginzton Laboratories. He started Gadzoox Microsystems Inc. the day he graduated because he had always wanted to start his own company. His approach was to launch the company with products he could complete quickly without a large investment. By adopting that strategy and drawing a small salary, he and his partner, Tom Tobin, could retain a large percentage of the company. From my standpoint as one of the first investors, I could afford to take the risk of a small investment and learn a new business. I was not investing in the product, I was betting on Alistair's potential as an individual!

They invested in a workstation and simulation software and set up shop in a garage. They designed an integrated circuit (IC) chip set to generate and control the jitter of digital pulses, and they are now designing test instruments based on the chip set. They convinced a major IC company to license the chip set in exchange for foundry services to produce the first run. It was a minor miracle that the chip set worked flawlessly as intended on the first try. With that success, they raised additional capital at an attractive valuation to bring the test instrument to market. By talking with customers, Alistair found other important applications in the communications industry for his design skills. Gadzoox is on its way to becoming a hugely successful company.

Scott Silfvast, the son of a physicist, is a bright young musician too impatient to finish college. He took a job at Stanford Research Systems Inc. (SRS), where he learned to design circuits and build instruments. Being a musician at heart, he decided to build a small recording studio, but found that recording-studio mixers were manually driven, expensive and hard to use.

Scott immediately drew an analogy to what he learned at SRS, which is to build an instrument for a proven market from a clean slate, using modern components and new system architecture to achieve significant price and performance advantages. He started Euphonix Inc. to build a computerized

Scott Silfvast, musician son of a physicist, started Euphonix Inc., built a computerized professional recording studio mixer and "ate a lot of ramen noodles for three years."

professional recording-studio mixer that sells in the $100,000 range. He was careful to make the user interface similar to what customers are accustomed to seeing, so technology wouldn't scare them off. Like Alistair Black, he wanted to keep a high percentage of ownership, so he attracted a small amount of investment, took a low salary and "ate a lot of ramen noodles for three years."

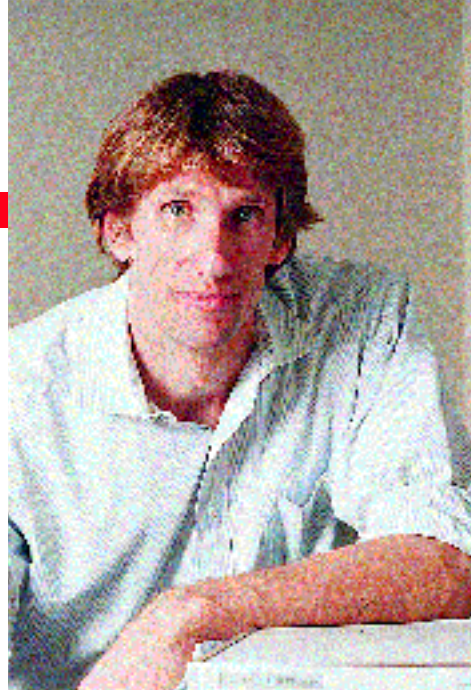
Once the product was successful in the marketplace, he was able to raise venture capital to expand the business. The product won the Technical Excellence and Creativity Award from the Audio Engineering Society in 1994 and is a huge success, used to produce Oscar-winning records such as "The Lion King."

These people did it. So can you. I firmly believe that this is a time of opportunity when physicists and engineers can capitalize on their technical skills and make an impact on society by starting new ventures.

The timing is right

Today, technology can create a competitive advantage for any kind of business, even "low-tech" business. For years, Benetton maintained a worldwide information network to keep the cost of inventory low. Sales information from each store went to the headquarters in Italy at the end of each day so the factories could, for example, dye sweaters the right color for each store. Most physicists can implement that kind of information system.

Starting a business is less capital-intensive than it used to be. You no longer need to own a giant hydraulic press or a microlithography clean room because big companies have become more open. Many of them will make sophisticated capabilities available to you, for example, by providing foundry services or by joining you in a strategic alliance. They need you because they know you are capable of moving much more quickly than they can. Design and simulation tools have



Alister Black started Gadzoox Microsystems Inc. the day he graduated and set up shop in a garage

become quite affordable, and you can work out of a garage on your workstation as productively as any engineer can in a big company. Your investment can go mostly into payroll for smart people.

Hiring patterns also have changed in favor of small companies. In the days when established companies offered job security, small companies found it impossible to recruit good people. Now small companies with the right culture have first pick, because they offer broad exposure to all aspects of a business and that gives people a competitive edge in the job market. You can set your standards high and attract the best to help you succeed.

Government policies also support small companies. Small companies are catalysts for commercializing technology. The federal government is investing more than $2 billion a year through the Small Business Innovation Research Program alone. If you're disciplined enough to pursue contracts that are directly related to your new product plans, government contracts can provide a wonderful source of supplemental funding.

We in America are fortunate that our culture and our economic system encourage us to start businesses. Investment capital is readily available for your business idea, more so than in any other country, if you're willing to strike a fair deal. Culturally, failure is not a stigma here. We merely shrug it off as a learning experience. You can recover even if you had a false start. Given the rapid changes that are occurring, the opportunities coming your way will be abundant. You'll be learning business skills that position you better to take advantage of a new opportunity. And if all fails, with your practical business experience you can land a higher managerial job. The downside risks are small.

The low-risk model

Insofar as you have considered starting a business, most likely you have thought about creating another Apple Computer Inc. or similar high-profile company, which is like attempting to climb Mount Everest or win the lottery. Such companies were formed according to the venture capital model, in which you target a large and growing market, hire a complete manage-

ment team, raise a lot of money and spend it to advance up a steep sales curve. The tasks are so formidable that most of us rationally will not even give it a try. And because this model is high-risk, investors demand high rewards. Chances are you will not retain much of the company at the end of the game.

The low-risk model brings us back to business basics. It's a model most of us can follow to get started. You start small, build a solid foundation and learn to manage as you grow. Most likely you can raise a small amount of money from successful entrepreneurs or people you know. You avoid taking on too many projects because you don't get paid until the product is shipped and the customers are happy. You have to make sure your product has every knob that people need. You live within your means, trying to be profitable at every stage so as to reach the next step. That means spending the money as if it were your own, watching the cash flow and all the while reminding yourself that you're out of business when you can't pay your bills.

You don't worry much about market research because you are only a small fish in the sea. You concentrate on serving the specialized needs of a small group of customers so well that no competitor can take them away from you. This discipline makes you focus on the right issue, which is solving your customers' problems particularly well.

You don't have a complete team, but everyone chips in to do what needs to be done. What you don't know, you learn, and you hire to bring in the skills you can't learn fast enough. You take care in hiring, because people are your most important asset and you can not afford to make a mistake.

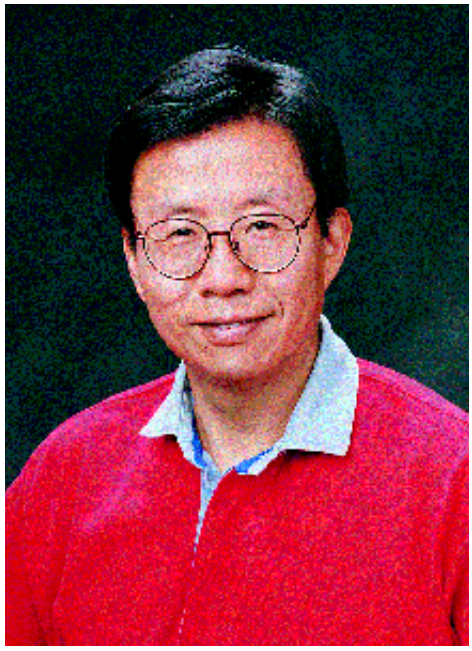
This low-risk model doesn't necessarily mean you will continue to be a small company. It's only a stepping stone on a long journey of learning and growing. Rapid changes in technology are going to bring you opportunities, and you're in the midst of it all. In the meantime, you're learning and preparing yourself for the next big break. When you're ready to talk to venture capitalists and go after a big opportunity, you'll find receptive ears. Chances are you will retain a larger percentage of ownership after starting with the low-risk model because you already have a track record.

Choosing a business

Let me make some generalizations about where to find ideas, how to evaluate them and how to position your business to succeed. A scientific business within your own area of expertise is a possibility. The market

potential is finite, but you know where the customers are, how to reach them and what they need. Entering the market is relatively easy because customers are receptive to new technologies. Companies that advertise in the scientific journals are good examples, and some of them may become the next Varian Associates Inc. and Thermo Electron Corp. of the world.

Then there is the lure of applying technical expertise to serve a broader market. Your hobbies and outside interests can be places to look. Gemstar Development Corp. sold $60 million worth of VCR Plus+ programmers in its first Christmas season. You can develop your product using the low-risk startup model, but most likely you'll have to resort to venture capital and create strategic alliances to ramp up the business. You'll also need professionals to help you develop the market and establish the proper distribution channels. Keep an open mind about technology—customers don't fall in love with technology, they just want a cost-effective solution. If you don't provide it, others will.



Milton Chang has been involved in the formation of many high tech companies without experiencing a single failure.

Your passion and commitment are your most important competitive advantages. Small businesses can be flexible, fast-moving and relationship-oriented. If you choose a business that exploits those advantages, large companies will have a hard time competing with you. Consider choosing a business that others ignore because it's hard to do or because people don't like to do it. That strategy usually identifies a specialized market or customers who require a high degree of customizing or attention. Big companies simply can't respond to their needs. Be extreme. You can succeed by being the cheapest or the best, but being middle-of-the-road makes you vulnerable to attack by competitors.

Unless you're a gambler, avoid businesses with big markets that also require big investments — you're not as well positioned as companies that already serve these markets. Neither should you think, "I can make it cheaper and better because big companies are inept." You must respect your competitors.

Making the transition

Why aren't there more physicist-entrepreneurs? Many physicists have a negative attitude toward business, and some aspects of our education (primarily our cultural mindset) prepared us poorly to succeed in the business world. Yet the transition is easy once we decide to make it.

To begin, you must not reject business. Industry is the engine of society. It is mostly about honor in relationships; people do business with people they trust. In the jewelry business, people would ship a million dollars in diamonds on a consignment basis, totally on faith. Business is not all bad.

We must also learn to deal with uncertainties. Our technical training conditions us to want to live in a deterministic world. We're accustomed to finding a single solution to a well-defined problem within a set of fixed boundaries. In business, we're dealing with people, and people are unpredictable. We have to work through several scenarios and then take a chance.

Business is not difficult to learn, and you can hire experts. I learned most of what I know by osmosis—from reading *Business Week*, *Forbes* and *The Wall Street Journal*, and by listening to people. You pick up one concept at a time and your knowledge gradually accumulates.

When we first took an interest in science, we were curious about everything and we wanted to build things. Something went awry along the way. Since industry wanted specialists, we became experts in narrow technical disciplines that are vulnerable in the face of today's rapid technology advances. In business we can't solve problems with any preconceived mindset, or someone will find a better way. We need to broaden our technical knowledge base so we can create rounded solutions and also learn about sociology and psychology so we can orchestrate people to help us succeed. We must rekindle our natural curiosity and learn how to select the best course of action from many alternatives. In physics, we learned to do things right. In business, we must learn to do the right thing.

A personal note

Many of you are facing early retirement, or are entering an uncertain job market. This moment in time may provide an important opportunity for growth. Without change, there is no growth. The change that you face may be difficult, but it just might be the best thing that ever happened to you. I took the plunge because I did not like my first job, and my subsequent experience has been very positive and rewarding. My technical background gives me a competitive advantage as a businessman, and both the technical and the business communities have treated me well. If you have an innate need to "do your own thing," starting your own business is definitely a viable option. There's no reason to reject it out of hand for fear of the unknown. n

Milton Chang is a University of Illinois graduate and a Caltech Ph.D. He was the president of Newport Corp. for many years until 1988, then co-founded New Focus Inc. in 1990. He now sits on the Boards for Euphonix Inc., Gadzoox Microsystems Inc., Iris Medical Instruments Inc., Lightwave Electronics Corp., New Focus Inc. and Rochester Photonics Corp. He is a Director at Large and a Fellow of the Optical Society of America.