

# **Kyros: Lessons of a Startup**

Keith Mayers

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*To Sara*



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# Preface

## Why Write This Book

One of my friends, familiar with the affairs of Kyros Corporation, used to say I'd come out with my book about the company before we got our first product to market. I laughed at the time. I had so thoroughly convinced myself that, despite all the fumbles, we'd pull it off, we'd make a company, we'd become rich and successful, happy statistics in the seemingly endless march of mega-millionaires built on the bits and bytes of the computer revolution. Sadly, he was right and I was wrong. You are reading this book and there is no product. Without a doubt, there will never be a product, even though we developed an excellent technology for the right market at the right time. There is no company and there are no riches. There is, however, a wealth of experience. Priceless experience. I dropped more than \$400,000 of my own money plus more than eight years of my life without pay on the project, but I don't regret it. Sure, I'd rather have the money now than not, but I

gained something intangible from the experience that's irreplaceable.

This book is the story of how and why we failed. I write it so that other would-be entrepreneurs and students both of business and of human endeavor can learn something from the mistakes we made. I've noticed that there are lots of books about businesses that have succeeded but precious few about those that have failed. Perhaps some would-be authors flinch at baring their stupidities before the world; perhaps people only want to read about success and high achievement. Well, I don't mind who knows the extent of my foolishness, and I'm banking that there is an audience for a soul-searching recollection of just what went wrong with our attempt to catch the brass ring that will help others go right. If I'm on target this time, maybe, as a bonus, I can earn back some of the money I lost last time. I also write this chronicle because the story of Kyros Corporation is a damn good one, worth telling, interesting for its own sake, despite the unhappy ending.

In looking back over the decade-long effort to make Kyros into a successful high-tech venture, I can see, with the perspective of time, the accumulation of errors that snowballed into ultimate failure. As we were going along, it was easy to fool ourselves into thinking that

mistakes were actually achievements. My two partners were Bill and Cie Heath—brother and sister. We were hungry for successes that would tell us we were doing okay. We needed to know we were progressing, step-by-step, to our final goal. So we read warnings as successes rather than as red flags. We ignored the signs that failure was moving inexorably in our direction. Partly we convinced ourselves that dazzling technological innovations and sheer perseverance were all it would take in the end; partly we operated under the spell of the self-realization movement of the eighties. In the end, we dug ourselves deeper and deeper into a hole created by a lack of money and a lack of experience.

Some could object that my analysis of what happened is hindsight, with which we all seem abundantly endowed. We can see clearly with hindsight what we hide from ourselves in the present moment. There is a lot of truth to this view, but I believe you miss both the point of the experience and the lessons it has to teach if you excuse yourself so facilely. The real truth, as I see it, is that we are each responsible for what happens to us and for the successes and failures we generate. If we will truly open our eyes—not always an easy task—we can see what is happening around us right now. We don't have to wait for the history books. The purpose of this

book is to help others open their eyes so the success that eluded us will be theirs.

### **Who To Acknowledge**

There are undoubtedly many errors of fact and interpretation in this account. Despite my efforts to research the record and get the facts right, I'm certain that I've made mistakes. I apologize for these in advance. They are entirely my responsibility. I spent about five months reviewing the computer-based documents of Kyros Corporation in an effort to be accurate. I want to thank especially Cecelia Heath Lael, my friend and former partner, for sending me the tape backup of the company's records. Because of the difficulties and time involved I did not review any physical copies of written materials even when they have no duplicates in the computer records. Also, with the exception of William A. Heath, my other former partner, with whom I am in regular and frequent contact (we both live in San Diego), I did not interview the other participants in the story of Kyros. My profound thanks to Bill for his cooperation in the writing of this account. He filled in the gaps in my memory and answered all my pesky questions over the year I worked on this project. Bill read the manuscript and made many thoughtful and worthwhile suggestions. It would not

have obtained whatever accuracy it has without his considerable help. Jack, Carol and Chuck Sanders gave the manuscript a careful reading and I am very grateful for the excellent suggestions they made to improve it. Carol, especially, applied her rapier pen with great effect, always excising and tightening with skillful precision.

This book is my take on the story, no one else's. I have tried to be fair and accurate, but it will necessarily have my viewpoint and prejudices built in.

My thanks to each individual who in any way took part in the Kyros tale. Our shareholders, our employees, our advisors, our suppliers. You are too numerous to thank individually, but you know who you are. Some of you get mention in this book and some don't. I value my association with each of you no matter how brief or transitory. My life is richer for having met and interacted with you.

There is no way I could have written this book without the unwavering support, emotional and financial, of my wonderful wife, Sara Baase Mayers. Sara makes my life worthwhile and I will be forever grateful for the joy and happiness she gives me. As though that were not enough, she has provided sound editorial advice and a careful, detailed reading of the manuscript. I have incorporated many of her suggestions. This book would be far inferior were it not for her untiring assistance.



# Chapter 1

## The Lessons of Kyros

### What Kyros Did

Kyros Corporation started out to build a cordless telephone that, as we were fond of saying, would really work. Remember the early cordless telephones of the mid-eighties? You may also remember the static and the dropped connections. We wanted to build a superior, hands-free cordless phone, based on a radio technology that new FCC<sup>1</sup> regulations of the time had made commercially feasible. Called “spread spectrum,” the technique gives radio transmission a robustness that allows you to use your radio under quite adverse conditions. We developed the CDMA variant of spread spectrum. CDMA stands for code division multiple access. This technique is a way to split up a radio signal. Even when interference blocks part of the signal, you will still re-

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<sup>1</sup>Federal Communications Commission, the U.S. agency that regulates use of the airwaves.

ceive sufficient information from the digitally-encoded signal so that you can interpret the original message with little or no loss of meaning. Nowadays, CDMA is becoming very popular in PCS<sup>2</sup> cell phones based on a similar technology developed by a San Diego company, Qualcomm, Inc. Our phone would even have included a raft of personal organizer functions: address book, editor, calculator, calendar reminder system.

After a few years, on a shoestring budget, we had developed the first of several partially working prototypes of our transmission system, but we realized that the additional development costs to get us into production with a miniature, hands-free telephone were far beyond our means. We had only been able to raise capital in dribs and drabs. We needed at least several million dollars more just to complete development, not to mention startup marketing and production costs. Besides, if we brought a telephone to market, we'd be competing in a concentrated, cut-throat industry composed of a handful of the world's largest and most successful corporations. And we were having trouble raising money just to fund a development effort by a small team. So we decided in

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<sup>2</sup>Personal cellular system; these modern cell phones usually employ a protocol called PCN (packet cell network) in which information, either voice or data, travels throughout the network in small chunks that the system reassembles into its original form when it reaches its destination.

1988 to switch markets.

We would build a wireless local area network<sup>3</sup> (LAN) instead of a wireless telephone. Same technology, different application. We'd move data instead of sound. From the technical standpoint, a minor adjustment. We would lose almost none of our previous development effort. Eventually we would build the telephone; we'd just start the company with an "easier" project. We felt we'd have a better chance of succeeding in the very young market of computer networking, made up mostly of other startups like us. At the time we switched direction, there were no viable wireless LANs on the market, though we lived the next several years in terror that someone else would beat us to market with a product equal to or better than ours. The computer business was full of young startups and the culture of the industry embraced innovative, dynamic companies. We would be selling to computer people who only cared whether or not your product worked, not what your pedigree was. If your product wasn't perfect, they could cope. They didn't need handholding. Marketing into this vibrant, diverse environment would beat the socks off trying to pry our way into the staid,

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<sup>3</sup>A local area network is a system that connects computers together in a small geographic area, like an office building, so they can communicate with each other and share data; by contrast, the Internet connects computers all over the world for essentially the same purposes.

walnut-paneled preserves of monoliths like AT&T and Sony. We wrote an elaborate business plan (one of many) to detail our approach for our potential investors, venture capitalists (VCs),<sup>4</sup> and corporate partners-to-be.

Not only that, the wireless LAN product we ultimately settled on and developed to the engineering prototype stage,<sup>5</sup> had data throughput equivalent to the standard wired LANs of the time (Ethernet, Token Ring and Arcnet) at no additional cost per workstation. Our product would have given our customers the added advantages of wireless communication (flexibility, mobility, ease of setup and ease of repair) for free—gratis, no charge, nada—without sacrificing the reliability of a wired LAN. In fact, in many ways the product would have increased the reliability of their computer systems. Although we conceived this product in 1988, to this day, as far as I can tell, no wireless LAN product measures up to ours in both price and performance.

In the end, we never discovered whether or not our plan would have worked. We were never able to get the money we needed to complete a full prototype of any

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<sup>4</sup>Venture Capitalists are the source of much of the capital needed by entrepreneurial startup companies.

<sup>5</sup>An engineering prototype, in electronics parlance, also called a “breadboard,” demonstrates the concept and functionality of a product, but is not suitable for production.

product. We raised and spent more than one and a half million dollars over eight years. Yet, except for the time I personally took a \$208,000 mortgage on my house to pump money into a cash-starved Kyros, we never had a sizable nest egg that would allow us to plan confidently even a few months into the future. Again and again we made schedules on the hope that we would get money and then remade them on the reality of no money. My partner, Bill, and I have often speculated that had we started with the million and a half we actually spent, we would have had little trouble bringing a successful product to market long before any competitor had a product, let alone something that would match ours. So many of the cumulatively fatal mistakes we made we would have avoided if we had had enough money to plan the project from beginning to end and to follow through on each required step.

The mistakes and missteps we made will become apparent as you read the narrative history of Kyros presented here. You will undoubtedly find some that I've missed. Even so, before I start my account, I will list—in no special order—what I see as the principal errors that led us to failure rather than to success. A kind of scorecard as you follow the game.

## How We Blundered

Each of the items that follow is something we did wrong in trying to build Kyros from a dream into a real company. Avoid each of these mistakes and you'll be well on your way to doing the job right.

### *People*

- Employ the families of the founders:

Kyros built its staff initially with family and friends. This was a big mistake. We tended to make decisions based on the relationships rather than the good of the business. In addition, the family and friends who worked for us were well-meaning, many were hard workers, but few had the developed skills needed to make a success of the business. If you can't get experienced people for your project, choose a project for which you can get the right people, or limit the scope of the project so you can do it with the few experienced people you can get.

- Choose employees based on their willingness to take stock for pay:

For the same reasons that you shouldn't employ family and friends, you should not hire employees just because they are cheap. Paying in stock is tempting

and appears to be an inexpensive way to get workers. Actually, giving stock to employees instead of cash, while it seems cheap, can be an expensive way to fund a business. If you limit yourself to only those who are willing to work for stock, as we did, you may not get the experienced, top-notch people you need to complete the job. A large percentage of your pool of potential employees simply can't afford to work without cash compensation. Choose only based on the precise skills a person brings to the product and business development you are working on. If they are the best people for the job, then pay them with stock to give them a stake in the company and to win their loyalty, not to save cash.

- Use the services of people and organizations who are not professional in the area for which they are providing service:

We committed this offense several times to conserve cash. We hired a gymnastics instructor to be an electronic technician. We hired an engineer to provide management advice. Toward the end—we were really getting desperate—we hired a car salesman (with some computer sales experience), and then had him try to raise capital.

- Put people who have skills in one area of endeavor in charge of another area they know nothing about (including yourself):

I am a good example of this error. I had managed two businesses prior to getting involved with Kyros but I was neither an electronics engineer nor a software engineer. However, in the beginning I wrote software for the prototype of the cordless telephone, the first product we attempted. I had an excellent mentor in my partner, Bill Heath, but it was an extraordinarily inefficient and slow way to get the job done. While I, who already knew how to operate a business, fumbled with computer code, we burned money using people without the right training to run the company.

- Work full-time without having a source of income (quit your paying job before your company has steady income):

My opinion is that a new startup company, unless already well funded by VCs or wealthy investors, should spend no cash on administrative overhead of any sort, including pay for workers, until it has a working prototype of its product that at least demonstrates the concept and function. Spend only on

components for the working prototype. Then, after you've raised the money you need for the entire project, you can start paying people and you can quit your other jobs.

### *Planning*

- Start working, and spending, without a business plan:

When I joined Bill and Cie Heath in the fall of 1985, as a lark, without any real commitment to the project, they had already borrowed \$50,000 from the bank, spent most of it and yet didn't have a business plan. The first thing I said was, "Where's your business plan?" We didn't need the kind of polished document you give to a venture capitalist, just a real outline of what we were doing, how we were going to get there and how much it would cost. They had done the first part. They knew what they wanted to build, but they really didn't have any clear idea of how long it would take, how it would fit in with the existing market or how much it would cost them. They had guessed at these important issues. We should have stopped all spending and development until we created a coherent business plan. Enthusiasm carried us away. We suspended judgment. Basi-

cally we “played” at making a company. Of course, you will also need a business plan to raise money, but first of all you need it to know what you’re doing.

- Start working, and spending, before you have all the capital you need to complete a full working prototype of your product:

The prospect of digging in and getting your dream underway can easily entice you to begin work before you have all the details in place. Always remember that, in addition to a clear plan, you need money. You need all the money. Mark my words, you will rue the day you started without having secured the entire funding to complete your prototype plus extra to raise the next round of funding. If you don’t follow this advice, you’ll have to make decisions that cost you more and take you down the wrong road. In our case, we built five different prototypes, plus a number of variants, just to raise relatively small amounts of money, that we then spent on the next prototype that we used to raise more money. We spent much of the money we raised raising more money. We never completed a fully working production prototype (a prototype of what we would actually sell), but, if we had had the money up front, we would have been

able to complete a production prototype with half what we spent.

- Raise capital a little at a time, from multiple investors, in small quantities:

There are many difficulties you will meet if you try to fund your project with capital from small investors. First, it is enormously time-consuming. More than 50% of the time of the founders of our company, over an eight year period went to raising capital. Ask any real estate agent: selling a million dollar house is just as easy as selling a \$100,000 house. It's often easier to sell the more expensive house and the commission is ten times fatter. Second, you never know when you'll get it or how much you'll get. You can't do effective long term planning when your cash flow comes in fits and starts. Third, the typical small investor does not add expertise to your company. And, no matter how much you think you know, you desperately need expertise, especially expertise in whatever business you will be in. An insurance executive doesn't add the right expertise for an electronics startup. Finally, lots of small investors make your stock structure so complex that large investors, venture capitalists and

corporate partners lose interest in participating. The big money that you will ultimately require to make a real company out of your dream doesn't want to mess with scores of small fry who may have unrealistic expectations.

- Pick a product that requires large amounts of capital to develop:

We could have started with a modest product, like a pocket electronic organizer, that would have been a step on the way to our hands-free, cordless spread spectrum telephone. It wouldn't have taken a lot of money. We would have gained business experience for our enterprise. We would have had a cash flow. True, it wouldn't be sexy nor would it attract the VCs. But we couldn't sign up the VCs anyway. Then, after we had cash flow, we could have begun development of the more complex product, provided we were able to secure the needed funds for the development. Furthermore, this second stage would have a better chance of attracting adequate capital because we would have had a business track record. Instead, we dove into a development on which, we discovered later, large and successful companies lavished as much as \$100 million. Think big, but build

small pieces first and let your company grow methodically.

- Pick a totally new technology:

When we started development practically no one had any concept of what a wireless local area network was. Certainly, no one, except a select group of engineers and physicists, knew what “spread spectrum” radio is. Nonetheless we chose this entirely new medium and new market for our first product. As a result, we had the daunting task of educating each new investor we uncovered to the intricacies of a complex science and then convincing each one that there was a future market for our product. The education process consumed a large part of our time and in many cases we failed to win over potential investors. We failed big time in the job of winning over investors with the significant resources we needed for success.

### *Organization*

- Create a “company” structure:

Office, employees, audits, shareholders, taxes, and so on will consume your time, energy and resources. A “company” is the infrastructure that you need

when you have a real business (that is, when you are selling something). You don't need a "company" in order to develop a product. To develop most products you need only a garage or a basement, a small amount of equipment and a few talented people willing to pool their skills. If you need more resources than that for your product, don't create that product unless you have two to three times the money that your meticulously detailed plan tells you that you need. One of the major errors we made was to employ a pack of non-productive people to manage overhead that we really didn't need anyway.

- Lose control over how you spend money:

Businesses earn profits by generating sales and controlling costs. While you're developing your first product for a startup business, you don't have any sales. Controlling spending is the only financial option you have to make sure you make it to market so that you can one day have sales and the resulting profits. Of course you have to spend enough to get your product made, but not one penny more. Whoever is in charge of the purse strings has to be ruthless. Be sure your money person can not only handle his or her own finances expertly but is strong-willed

enough to resist the incessant pressure from everyone else on the team to buy what they think is essential. You'll find that the essentials are usually superfluous. Once you've picked a strong-willed money person, give him or her final authority on spending.

- Depend on what people say they can do:

You operate at your own peril if you forget to verify, with hard facts, that people can actually accomplish the tasks they claim they can do. We came across many well-meaning people and not a few scam artists who told us that for sure they could do this or that job. Most of them were trying to sell business advice or business plan preparation or fundraising assistance. Almost without exception, these “consultants” had nothing real to offer. They all wanted upfront money. We usually resisted by insisting that any pay they receive be 100% based on results: you bring us \$1 million in capital and we'll give you a 5% cut. They all faded away because they were long on talk and short on results.

- Neglect to check that work is progressing:

Make sure, week-by-week, that tasks you've contracted for are getting done. A prime example of what not to do: Toward the end of our development

we chose a subcontractor to turn our “breadboard”<sup>6</sup> radio into a production unit. Instead of checking with him each week, and demanding verification of progress, we relied on his integrity—he had none—and ended up after eight months without a key component of our production prototype.

### *Stopping*

- Continue the project after it’s clear you have the wrong product (either the wrong product for the market or the time, or the wrong product for your level of skill and funding) or you have the wrong partners or the project is hemorrhaging money:

My two former partners have told me that they still believe the Kyros project could have worked. I take a different view. I believe that if we had really done some serious soul-searching at any number of points along the way, we’d have concluded that the project could not make it. In my opinion, we had the right product for the right market at the right time, but we did not have the necessary skills among us to carry it off. It was an exciting time in my life. I allowed myself to get carried away by the excitement. There

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<sup>6</sup>Breadboard is another name for an engineering prototype, an early functional version of a product.

were many reasons to keep going, not least of which was to “keep faith” with our small investors. But in the end it was futile because we ought to have seen the signs in plain view. The VCs who wouldn’t touch us, the inadequate tools we struggled with, our inability to get the right people, the dwindling flow of cash. We suspended critical analysis. The lesson is, each month evaluate dispassionately whether or not you should continue. If the answer is no, then stop. The next project may be the one that works.



## **Chapter 2**

### **Where We Came From**

There is no doubt about it. We were a motley crew. No real business training among us and only a modicum of business experience. What made us think we could pull it off? But then, if you look at the history of the great technology companies of the past 30 years, the founders of more than a handful—including some of the most successful—got their starts with even less training and experience than we had. So it's not necessarily lack of previous training and experience that kills you. If you're careful and use your head at every minute, you can make it even without the proper background that VCs insist is essential. Our failure came not entirely from lack of business acumen, but from certain cascading errors in judgment that brought down our enterprise. Still, our backgrounds help make us who we are and help determine what choices we make.

What background and experience, then, did each of the three of us who called ourselves founders bring to Kyros? Take a look.

### **William A. Heath, Chief Executive**

When he was in college at New Jersey Institute of Technology (then called Newark College of Engineering), Bill Heath had to decide whether to continue his studies to be an engineer—the path his father wanted for him—or to switch to an unconventional or uncertain career as a dancer. He had been taking dance classes in his spare time at the Joffrey School in New York. As he told me much later, he had found a way to express himself beyond compare. Forced to choose by the exigencies of his participation in Air Force ROTC, Bill made a decision that he didn't completely come to terms with until after the demise of Kyros.

He chose engineering. After a degree in electrical engineering and a master's degree in computer science, he moved to Boston, to MIT,<sup>1</sup> the Athens of engineering in America, to study for a PhD in control engineering. He wanted to build ships that fly into outer space. At the time, and maybe still, MIT supplied jobs for many of

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<sup>1</sup>Massachusetts Institute of Technology—along with California Institute of Technology, one of the top engineering schools in the United States.

its graduate students at its Charles Stark Draper Laboratories in Cambridge. Bill got one of those jobs and worked for two women who had been high-level software managers for NASA's Apollo mission<sup>2</sup> during the sixties. They were exploring the idea of software verification. When they formed their own company, Higher Order Software, Bill followed. While working for them, Bill came up with the kernel of his own theory. You might be able, he speculated, to develop a system that allowed you to design software—and any other system for that matter—and prove that it would work as designed. He wanted to be able to develop error-free software and prove that it was correct. If he could do this, you'd no longer have to put a system into actual operation and discover its errors the hard way. Convinced that he was onto something big, Bill dropped his PhD studies, even though he had completed most of the course requirements and was getting ready to start the thesis phase, to pursue development of his system. He could have taken a different tack. He might instead have switched from the Department of Astronautics and Aeronautics to the Computer Science Department and incorporated his research into a PhD program. But he believed that if he did

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<sup>2</sup>The Apollo mission, the crowning glory of NASA (the U.S. National Aeronautical and Space Administration), sent the first men to the moon in 1969.

that he would lose ownership of his idea.

MIT's policy, as Bill understood it, was that all research by graduate students is property of the university. If he was to prove systems correct—a feat no one else had then or has since accomplished—his fortune would be secure. He was tired of being a poor student and was unwilling to give up his chance at riches for the sake of a degree. And, he had other ideas he wanted to try out. Ideas that required huge amounts of capital—capital that products based on his new system, if he could build it, would generate. The kinds of ideas creative engineers come up with, ideas about space travel and space habitats.

Bill has been kicking himself about his decision to drop out of school short of his PhD because he later realized that he could have researched and developed the underlying theory—what he calls the “system calculus”—under the auspices and with the resources and support of a major research university, without getting into the commercial aspects. In fact, Bill's original worry was more about MIT gaining ownership of those commercial elements. It would not really matter if MIT owned the theory. You can't really protect a theory from other entrepreneurs anyway. All you can protect are inventions and implementations. He could have saved those for later

and still completed the theoretical part while a graduate student.

Besides—and this is something that Bill didn't fully understand about business at the time he dropped out of MIT—by and large, business people don't even take notice of a theory until someone reduces it to a successful commercial application. He needn't have worried about someone with more money getting the jump on his development effort because his research wouldn't have appeared on their radar screens until he had made a successful product employing it. Furthermore, the idea or the invention does not make the commercial success. The idea may be a necessary condition of success but it is not sufficient. It's the ability to turn that invention into a useful product that you are then able to sell that makes commercial success. This is a basic principle of business, but it's also common to find engineers and scientists who haven't learned this simple lesson.

Bill's father, himself an engineer and inventor, went through his life believing that his longtime employer had ripped him off by garnering tens of millions of dollars in revenue from products based on his patents. Bill Sr. did his best to instill this unproductive attitude in his son, with only partial success. What the father somehow never recognized, despite an extraordinary intelli-

gence, was that, without a huge corporation behind him, he wouldn't have had the free time to think about and come up with or the money to apply for, maintain and defend the patents or the millions of dollars and the organization needed to build and market the sophisticated products that used the inventions.

Bill, on the other hand, eventually learned the lesson, but by then his MIT career was long over. He had started a line of independent research into proving systems correct that continues today. As he saw it, the first step was to develop a system design language and an optimizing compiler<sup>3</sup> for the language based on the principles he had come up with so far. He knew he was a long way from a fully developed "system calculus." Nonetheless, he believed he had put together a set of principles that, while not yet totally defined and self-contained in a mathematical sense, would be the foundation for superior software development tools he could sell to fund further research, until his system calculus had proven its worth.

It takes Bill longer to get started on a project than many people I know, but once he gets going he works day

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<sup>3</sup>An optimizing compiler is a special type of compiler. A compiler is a computer software program that translates the computer instructions that a programmer writes into a form that the computer can execute directly. An optimizing compiler, in addition to producing machine readable code, attempts to improve the machine code by, for example, rearranging and modifying instructions so that they execute most efficiently.

and night. He jokes that he's like the Queen Mary. You need all those tugboats to get her going, but once she's under way, she's unstoppable. She just keeps steaming along. So, when he was slow, as usual, to get rolling on his optimizing compiler task, he went to his father for advice. Bill Sr. had managed large teams of engineers and had experience with people who accomplish a lot employing a variety of work habits. The father suggested that Bill get someone to work with him, someone whose work habits were more conventional. Bill Sr. had someone in mind for the job—me.

At the time, 1979, I had my own small but prospering piano tuning and repair business that I had gotten into because I played the piano seriously and wanted to tune my own seven foot Steinway B every few weeks—an expensive proposition if you have to hire the tuner. By then I had tired of piano tuning as a business and was looking for another challenge for my meandering mind. Since Bill Sr. and his wife, Shy, were good friends of my parents, and I liked them a lot, I had been helping them in my spare time build an addition to the lakefront cabin where they lived. Bill Sr. and I talked about many topics, including the mathematical investigation of irrational numbers he had been working on for many years. He got the idea I was stable, reliable and intelligent.

Bill came down to New Jersey from Boston to meet me. I took a liking to him at once. Although he seemed shy, he had a contagious enthusiasm that exploded out of him when he talked. As he explained his ideas, I believed that he could do what he was saying. Of course, I didn't have the foggiest notion, from my woefully inadequate (literary) background, how to make even an informal judgment about the merits of his idea. It just seemed like it would be fun to work with him and like he knew what he was talking about. So I said yes, and he said yes, and with nothing to lose, I moved to Massachusetts so we could work together—first to Boston, then shortly thereafter to Beverly, a coastal town north of Boston near Salem (of witch trial fame), where he had taken a day job to support the project. I was somehow to help complete the Herculean task.

My first job with Bill was to master the intricacies of computer architecture and how you use software to control the computer hardware. The basics of computer science. While Bill worked at a paying job for 10 to 12 hours a day, I studied this stuff. He worked on the system design during his off hours. As soon as I learned enough, he guided me in the job of writing the system documentation and then programming various modules of the compiler. For my effort, I was to have a one-tenth

share of the one-third of the enterprise that went to Bill's parents and other family members (that is, about 3%). He kept the rest.

We worked like this for several months. I began to realize that the job we were undertaking was more than just the compiler. It was a totally new way of approaching software design that, it seemed to me, would take years to get to a salable product, even with a staff of highly trained specialists. We had just two people—Bill part-time and me, a neophyte, full-time. I was already tired of living with no income, depending on Bill for food and shelter. To top it off, Beverly, Massachusetts, in the winter is one of the coldest places I have ever lived. The frigid wind blew in from the North Atlantic that winter, chilling and killing my spirit. I concluded that the chance of riches wasn't enough to keep me working for years at subsistence, in an alien environment. Bill had to go it alone.

Since I was leaving and he was on his own again, Bill decided he'd cut his expenses. He resigned from his job, and, with my help, moved his belongings to a house owned by his sister Cie's then boyfriend in the foothills of New York's Catskill mountains. Jim was an orthodontist with offices there and in the Bronx. Bill could live at Jim's country place rent-free in return for

doing some construction work. In theory, he'd be able to devote most of his time to developing his system calculus and building his compiler. In practice, the construction work ended up taking more than half his time during the first year.

He continued for several years, making slow progress, occasionally taking a contract engineering job to replenish his cash, and, finally, enlisting both Cie and his girlfriend of the time to help with his project. By 1984, when he moved to the Hartford, Connecticut area to take a consulting job with Picker International, a manufacturer of medical imaging equipment, he had significant pieces of his compiler complete, but still had a long way to go. After the Picker job ended, he returned to New Jersey, to his parents' house in Glenwild Lake, where Cie had also relocated after breaking up with her orthodontist. Bill found a short term assignment with Celludata Corporation, a startup near New Haven that was building a cordless phone. He offered them a series of ideas to make their phone better. They rejected them all. So he was ready when Cie approached him in early 1985 about starting a company to create their own cordless phone, with his improvements, better than what Celludata was willing to build.

## **Cecelia Heath Lael, President**

Cie has an iron will. During the eight years we worked closely together, I can't remember anytime when she didn't get her way. I'm sure it must have happened, I just can't recall. She got both Bill and me to work for her, as well as dozens of other friends and relatives. She bought a lakefront house even though she had no money and no income. She had the wedding of the decade and a six week honeymoon trip to Europe, again without money or income and already deeply in debt. The countless little decisions we made in running the company always seemed to come out, in the end, as she wished. Where did this woman come from? What forces created her? How could she be so forceful? Frankly, I don't know how she came to have this indefatigable determination and grit that I will always recognize as her hallmark. The people around her seem always to succumb to her purpose. As it turned out, astonishingly, willpower was not sufficient for business success. I hope some background will shed enough light for you to understand the strength she brought to Kyros.

When she went off to college, Cie once told me, her depression-reared mother gave her five dollars as spending money, with the admonition, "it's only for emergencies. Don't spend it!" The implication was, if she came

home without the five dollars, there would be hell to pay. Perhaps this attitude contributed to her burning desire to be rich. She must have returned the five dollars, because in due course, she graduated from Fordham University. Two friends she met there became lawyers and played a role in guiding Kyros Corporation through a number of legal thickets.

After college Cie held a variety of part-time and temporary jobs and took classes at Columbia University toward a master's degree in Anthropology. One summer she worked for her brother-in-law managing the warehouse for his furniture business in Cleveland. Then, she hooked up with the Bronx orthodontist. Theirs was a stormy relationship that nonetheless lasted many years. During this time, she and Jim offered brother Bill lodging at the Walden, New York, house where she lived and worked part-time for her boyfriend as a dental hygienist.

According to Cie, the event that changed her life and gave her the impetus, eventually, to break off the rocky relationship with Jim was the EST training. EST stands for Erhard Seminar Training. A Philadelphia encyclopedia salesman who took the name Werner Erhard started the self-help program in the early seventies to share the benefit of the personal transformation he had undergone. EST became hugely popular across the country

and spread as the result of testimonials to friends and relatives by those who had taken the course. More than a million people have taken the program and its successors. One of Cie's six sisters and her husband, a physician, had taken the EST training sometime around 1980 and convinced Cie that it would be a positive force in her life. Cie, in turn, got their brother, Bill, to do the Training not long after he had come to live in Walden.

Erhard created a second seminar program in the mid-eighties, to succeed the Training, called the Forum. Cie took this course too, in early 1985. The Forum encourages participants to examine their lives and to break out of the mold that often holds them trapped on a certain path. The idea is to remove the boundaries we place on ourselves so we can act on and accomplish our dreams. At the time Cie took the Forum it lasted two consecutive weekends. Between the first and the second weekend of the course, she had talked Bill into dropping his system calculus research and becoming her partner in a new company to build a superior cordless phone. This was truly something she never would have tried without the push the Forum provided.

Although she didn't have strong business background, Cie brought to our proceedings an intuitive sense of people and how they interrelate. She is one of those people

who always manage to encourage and bring out the best in others. On top of her innate people skills, she superimposed, by dint of hard work both before and during the Kyros period, a huge amount of training in how to work with and draw out people of all levels of education and intelligence. Her association with the Forum provided her not only with this very effective training but also with a network of contacts that she tapped into throughout our Kyros journey. Early on, Cie became what, in Forum terms, you called a “Forum Supervisor.” This role gave her many opportunities, independent of Kyros and in a controlled environment, to flex her management muscles and learn how to coordinate the efforts of many people bent on accomplishing a single task. She brought these skills to Kyros.

### **Keith A. Mayers, Vice President**

My mother, who has since died, used to warn me, with a mixture of humor and reality, “don’t get mixed up in any crazy schemes.” To her steady ways, her only son had a somewhat scattered approach to life. I think she would have preferred if I had a solid nine-to-five job with some big, dependable company—something like her own father’s 42 years with the Pennsylvania Railroad. Both my mother and my father felt my Kyros ad-

venture was a mistake. Although they always supported whatever decisions I made in life, no matter how foolish, I never managed to reassure them completely that I knew what I was doing in my dealings with Kyros.

My dad ran his own public relations business in Newark, New Jersey, for 40 years and was a local Republican councilman for several years in the New Jersey town where I grew up. He was an atheist, my mother a Roman Catholic. During my adult years his influence has won out, but during my early years she definitely swayed me. At thirteen I packed off to a Franciscan minor seminary to study to be a priest. I liked the idea of helping other people and I liked the peaceful, calm spirit and the oneness with nature that I saw in the stories of Saint Francis. It seemed at the time the only way to go. I got an extraordinary, rigorous classical education during the six years—high school and two years of college—that I spent in the seminary. But every summer when I came home for vacation I worked for my father in his small business. There I got a different kind of education—a real taste of how the world works.

I completed college at Seton Hall University, a local Catholic college, because they took all 92 of my seminary-earned college credits, and because it was close enough to home that I could commute. An inexpensive

conclusion to my otherwise free private schooling. Although I wanted to go to graduate school, the Vietnam War was in the way. Both philosophically and religiously opposed to war, I saw that the Peace Corps offered a suitable alternative. So I taught English to Tunisian students instead of going to war. By the time I returned to the United States from Tunisia, with a high number in the draft lottery,<sup>4</sup> I had lost interest in graduate school. Without the war, I probably would now be an English professor, teaching poetry to twenty-year-olds.

Over the next fifteen years—until Kyros—I held a series of jobs. Always looking for the next challenge. As soon as I mastered a job, it lost its appeal. I was, successively, a carpenter, a newspaper reporter, a public relations copywriter, a sheet metal mechanic, a welder and machine designer, a piano tuner, a writer of instructional materials for correspondence courses in locksmithing, the manager of a startup packaging company, the manager of an import company.

When I first started working for a startup company owned by Al Fielding, one of the founders of Sealed Air

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<sup>4</sup>In 1969, the Nixon administration instituted a lottery to determine who the military could conscript from among the draft eligible young men to serve in the Vietnam War. They scrambled all 366 dates of the year and then randomly chose them, one after another. If they chose your birthdate early in the drawing, you would certainly go. My birthdate got a number above 300 so they didn't call me.

Corporation (makers of BubbleWrap®), the only business I had managed was my one person piano tuning and repair shop. The level of management required was low. To keep expenses down, I worked out of my basement where I had set up a full woodworking shop. Required management skills were minimal: recordkeeping for taxes, asking customers to recommend me to friends, getting to appointments on time. I had spent many hours talking with my father over the years about business but I hadn't run one except for that. Al told me, "don't worry, I'm interested mostly in your hands-on experience building machinery."

As he knew from our conversation, I had plenty of hands-on experience. I had rebuilt pianos and worked on and off as a carpenter. For four years, while writing a series of short novels I had hoped to publish, I worked in a small factory in Pompton Lakes, New Jersey. Though I started as a laborer, the owner, who became my friend, gave me more and more complex responsibilities. I learned welding, sheet metal fabrication, machine design. I built hydraulic and pneumatic retraction systems for high-temperature heating equipment, usually by myself. The machines I built went into plants with web processing lines—in the printing and textile industry mostly. I could build these things fast and accurately. That was

the skill Al Fielding wanted.

I never would have connected with Al Fielding if I hadn't wanted to buy a lathe for my home workshop. His first wife, Ginnie, was still my neighbor. I helped her with a small home repair job that required me to go into her basement. I saw the lathe there on the workbench and asked her if I could buy it, certain that she had no use for it. She informed me that it belonged to Al and he just hadn't come round to pick it up. Ginnie suggested that I call him at his office and ask him directly. She gave me the number for his private line, I called and we got together for lunch. That's when he told me about Steelboard.

Al and his Sealed Air partner, Marc Chavannes, had a new packaging idea. This time, instead of capturing air in bubbles between two layers of plastic sheet, the two inventors envisioned capturing wire between two layers of kraft paper, then forming it into a wire-reinforced corrugated cardboard. The wire embedded in the corrugated sheet increased the stacking strength of boxes made from this new composite material. With better stacking strength you can pile boxes higher. As Al reasoned, he could take a big chunk of the market for the large, cubic meter, bulk shipping containers. Called gaylords, each of these containers carries hundreds of pounds of the pea-

sized pellets of raw material that feed the plastics industry.<sup>5</sup> Just those shipping containers made a multi-billion dollar market.

Gaylords use triple wall corrugated board to gain adequate stacking strength. With wire reinforced board—what we called “Steelboard,” the preliminary calculations showed that you got the same strength with a single wall corrugated (comparable to the ordinary corrugated box most consumer goods travel in from factory to showroom). You saved between a quarter and a half inch on all sides of the box. This may not seem like much and, indeed, it isn’t if you ship only one box. But think about the hundreds of thousands of these desk-size boxes that move around the world every year. When you can save about two cubic feet of space for each gaylord—close to 5%—you start to talk about real money. Those savings would be the hook that would break “Steelboard” into the market.

There is another big problem in shipping bulk plastics that Al was sure their new product solved. Elephant feet! When you stack these large containers filled with hundreds of pounds of pellets, the bottom container supports a tremendous weight. The four bottom corners tend

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<sup>5</sup>In plastics manufacturing, you pour pellets of raw material into extruders and injection molders to create the myriad of plastic products that surround us.

to splay out—to get bigger than the original dimensions of the box. Imagine what happens when you pack these cartons tightly in a truck trailer or ocean container. After a few days trying to support all that weight, the bottom layer bulges. It's tough even with a forklift truck to get them out of the truck. Workers have to push and shove and eventually the elephant feet break open to spill the contents on the street or warehouse floor. You lose part of your load and the expensive gaylord container is dead. Ah, but if you add wire, where can the sides of the box go? You've constrained them. Caught in a steel corset, they stay put and the box slides in and out of the truck with ease.

And, of course, there would be scores of other applications and markets for the product, after we milked this primary market. That was the theory.

A simple, even elegant, concept, this wire reinforced box. Getting it to work was quite another matter. We worked diligently for four years, testing scores of ideas, to construct the right process and machinery to make enough material to test properly whether or not we had a viable product.

We spent more than three years working on developing the machinery and the process to make wire reinforced board. Marc's first idea was to slice a continu-

ous roll of kraft paper into stripes about a quarter inch wide and immediately glue them to an underlying sheet of kraft, then add wires coming off hundreds of rolls and glue on a top sheet from another continuous roll. Al saw right away that this wouldn't work because there was no space for the wires if you simply slice the paper. You had to remove enough paper to accommodate the diameter of the wire.

Instead of circular cutters, we used a series of small circular saw blades. But you couldn't just line them up on a single long shaft, separated by spacers because they would heat and expand and you'd never be able to keep the blades in the correct position. Besides, maintenance would be a nightmare. If the machine is six or seven feet wide, how do you change a broken blade in the middle of a set of 300? So we made individual mandrels,<sup>6</sup> each about a foot long, staggered to avoid conflict with the support mechanism of the neighbor. How do you keep the adhesive the right temperature until it reaches the surface of the paper? How do you keep the sawed edges of the paper from fraying, making it difficult to insert the wires? And on and on.

One after another we found and solved new problems with the method. But ultimately, there were just too

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<sup>6</sup>A mandrel is the shaft on which a circular saw or grinding wheel rotates.

many problems or potential problems. After two and a half years we were at wits' end, when Al came up with the idea of extruding a plastic layer in which to embed the wires between two sheets of kraft paper. We had a plastics extruder<sup>7</sup> in the plant, so we quickly built a small test machine to try it out. It worked perfectly, was no more expensive than paper and solved virtually all the problems. Everything was simpler and easier to maintain during production.

Finally, we had worked out all the kinks.

Al and Marc had spent hundreds of thousands of dollars on patents, machinery, R&D. Fortunately, because of the success of Sealed Air, money they could afford to lose. In the end, they killed the project because the wire did not add enough value to the ordinary box to make it a clear winner. It would have taken millions to market "steelboard." The potential reward, in their minds, was not worth the risk.

My experience at SteelBoard Corporation taught me a couple of key lessons that, if I had applied them to my

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<sup>7</sup>An extruder is a rather large piece of machinery that applies a carefully controlled quantity of heat to a stream of plastic pellets of any of a variety of chemical compounds. The pellets are usually about the size of peas. The extruder forces the become-molten plastic resin through an orifice of some shape (the die). After the material exits the die, its temperature quickly drops and takes a permanent shape similar to the orifice of the die. In our Steelboard experiments we extruded polyethylene into a narrow sheet about three feet wide and 1/32th inch thick.

engagement with Kyros, would have saved me a fortune. Marc had the original idea of putting wire into paper. He immediately applied for patents. Then, when he had trouble implementing his idea, he went to Al for engineering assistance.

Marc, at 85, was the promoter, the showman; a man who had gathered and lost several fortunes by the time I met him. It was Marc's idea, Al told me, when they launched BubbleWrap<sup>®</sup>, the product that created Sealed Air, to send all their potential key customers a crystal wine goblet by mail. Every one of them arrived intact. Al, on the other hand, was the methodical engineer. Creative, but careful.

What I noted was that they both got carried away when it came to Steelboard.

Applying for the patents before they had developed the product cost them several hundred thousand dollars in lawyers' fees and application and maintenance fees to jurisdictions all over the world. That was Marc's error. He started a process that demanded care and feeding, an administrative overhead, before he had anything to sell. He could have created a detailed design notebook, had it notarized and put it away in a safety deposit box. That would have proven the date he came up with the concept. Patents could have come later.

Al's error, in my opinion, was also a fundamental one. He commissioned me to build a production machine seven feet wide by eight feet high by forty feet long before we even knew if we could make the product, or if the product gave us sufficient added value to make it worth doing. He violated a centuries old principle of engineering. Test it on a small scale—on a scale you can get your hands around—and only after you have assured yourself that it works at that size, graduate to larger sizes, in stages. He had followed this principle faithfully in developing Sealed Air. He abandoned it with Steelboard.

My guess is that both of them knew better, even while they were doing it, but since they had enough money to do it the wrong way, they figured they might get lucky.

Al Fielding also devoted a generous portion of his time to recounting the intricacies of how he and Marc got Sealed Air off the ground. His tutoring was invaluable. How did they get their funding? How did they manage an IPO? How do you negotiate real estate deals for new plants? How do you open a new facility in an overseas market? Unfortunately, because Kyros never got past the funding issue, the other counsel he provided me never got put to use.

As it happens, regarding the funding of Sealed Air, their experience wasn't completely different from ours at

Kyros. A crucial difference was that they had a limited number of investors. Their final outcome was, of course, different. Unlike Kyros, during that entire decade of effort, they kept their expenses to the bone. They maintained other income to keep them going personally—Al his machine job shop,<sup>8</sup> Marc his other business interests. They did the development in the corner of Al's machine shop and in the corner of a small plastics plant that Marc owned. They did, after more than a decade of limping along, get the money they needed.

Their angel, as you would call him today, was Charles Engelhard of Engelhard Industries. An angel, in current parlance, is a rich individual investor, often a former entrepreneur who intimately understands the difficulties, willing to underwrite a risky venture for a superior financial return if the investment is successful. Engelhard had accumulated hoards of money from businesses that centered on South African mining. Marc Chavannes knew him from some past experience, was able to get an audience with him and was able to convince him to sink money into Sealed Air at the crucial moment.

Within a few years Donaldson, Lufkin & Jenrette (DLJ)—one of the big investment banking firms—

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<sup>8</sup>A job shop is a business that does not have its own products, but depends instead on work for hire that comes from a variety of outside customers. Most machine shops operate this way.

picked up the bulk of the Engelhard investment and later acted as underwriter for the eventual public offering of stock. Al, and to a lesser extent Marc, relayed all the gory details of these goings-on. Once Sealed Air was public, Al and Marc (for, I believe, the fourth time), were on easy street. The two of them ended up with only a few percent each of the company they founded, but a very lucrative few percent indeed.

When Al was getting ready, after four years, to pull the plug on Steelboard Corporation, he told me he still wanted a company separate from Sealed Air. He had never had the opportunity to run Sealed Air. Marc was president in the early years, then, when DLJ took control, they installed a CEO trained in business rather than an engineer like Al. Al agreed with this decision, recognizing that the company needed professional management if it were to grow to its full potential. Still, he wanted to run a company, to be in charge. He was approaching 70 and planning to retire from his position as Executive Vice President of Sealed Air.

One day Al said to me, “if you can find a suitable import company, I will buy it and you can continue as general manager.” He wanted an import company so he and his second wife, a Norwegian, would have an excuse to travel. The prospect of searching for a company

and helping him buy it excited me. While I wasn't sure I wanted to run an import company, I agreed to look and then we could decide. It took only a few weeks for me to uncover a small family company that imported imprinted souvenirs from the Far East and distributed them to wholesalers around the United States. Al and his wife had hoped for a higher end line of merchandise, but concluded this met their needs. They could gradually upgrade and expand the line. They bought, and I found myself managing a souvenir import company. I agreed to stay on until the Fieldings were ready to take over their "retirement" business. For a year and a half I learned about importing and about the sale and marketing of inexpensive merchandise while managing the company. My experience made a fascinating education, but definitely not what I wanted to do with my life. Al and Synnove took over, much to my relief.

About this time—summer of 1985—Cie Heath called me up and said she and Bill wanted to show me what they were up to. They had started a company and were going to build a really neat cordless phone. They'd been working on the project since April. It didn't occur to me that they wanted me to work with them. I just thought they wanted to bounce their ideas off me. I went over to their parents' house that they were using as their office

and watched the slick presentation they had put together. This same presentation had convinced Sam Wilson, the local branch officer at First Fidelity Bank to lend them \$50,000—more high risk capital than a traditional bank loan despite the parents’ house as collateral. The potential really impressed me, but I was more impressed with the thoroughness of Bill’s approach. The physical design of their proposed phone—they showed me the plastic model—was compact and elegant. It looked like a stylized wing, somewhat reminiscent of the old Eastern Airlines corporate logo. The features they planned to cram into the hands-free wireless device were beyond anything I had ever seen, very similar to what you find in today’s PDAs<sup>9</sup> (that hadn’t been born yet in 1985). Bill explained how feasible it all was and his plan to make it happen. Even after he offered to lend me one of the two Apple IIc computers they had bought with part of the loan proceeds, I still didn’t realize that he was trying to lure me into working with him. Crafty cuss. I couldn’t resist the chance to play with one of those adorable little machines.

At this point in my life I didn’t really have to work

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<sup>9</sup>PDA stands for personal digital assistant, a class of handheld computers that usually include an address book, personal scheduler program, notepad and other so-called “productivity applications,” and occasionally also include a modem for e-mail access.

to earn my keep. The minimal life style I preferred was easy to maintain. I owned my Pines Lake house free and clear. My parents lived upstairs and paid the taxes and insurance as their rent. I lived downstairs in the partially finished basement with no out-of-pocket cost. I handled the yard and maintenance work myself and liked doing it. The large garden provided fresh vegetables six months of the year. I had accumulated enough money from stock market investments during my period of working for Al Fielding to pay for the simple lifestyle I preferred. Carpentry jobs for neighbors kept me busy with thoroughly enjoyable and healthy physical labor. I didn't work for the money, I worked for the enjoyment of it. In my spare time I was reading literature and history that I picked up on weekly bicycle trips to any of the three libraries in the vicinity of my house. Occasionally I'd drive or take the bus to the large, well-stocked Newark Public Library. My woodworking shop in the converted garage let me pursue my predilection for making furniture. In short, except that I didn't have a girlfriend at the time, my life was the life of Riley.

Ever since I had lived with Bill in Beverly, Massachusetts, and studied about computers under his tutelage, I'd been musing that it would be a kick to be able to program these machines to do what I wanted them to

do. Not that I had any idea what I wanted them to do; it just seemed like a fun intellectual exercise. An exercise of logic and control. Here was the perfect opportunity to learn with a master programmer teaching me.

So I told Bill I'd like to try one of the Apples. Over the next several months, I spent more and more of my time sitting in front of the screen and on the phone with Bill. He was using a programming language called Modula-2, the successor to Pascal, the well-known language designed by the eminent Swiss computer scientist, Niklaus Wirth. With Modula-2 Wirth added an element of structure to his language that Bill deeply appreciated. He patiently explained the details of the language as well as the basic concepts of programming, many of which he had introduced me to during my stint in Beverly. Now, I found out how much easier it was to grasp these arcane concepts—arrays, linked lists, pointers, while loops, repeat statements, procedure calls—when you actually use them and make them do work.

Also, I liked working with Bill. Unlike my experience in Beverly where I was working most of the time by myself, now he was guiding me. He exuded an irrepressible enthusiasm for the work he was doing. He suggested I learn by creating this or that element of the code he was writing because it was good training. He'd then be able

to spend more time helping me since what I was doing was moving his project along. Naive as I was, it still didn't occur to me that he might have an ulterior motive. I learned a tremendous amount in those two months and, by the end of October, he had me hooked. By the time Cie and Bill got around to asking me to join them, there was no question what my response would be. I wanted to be part of this project. I was having a blast. What did I have to lose, I wondered. I'm just trading one interesting pastime for another. My livelihood doesn't depend on its success or failure. I don't even have to consider whether or not the project is sound from a business perspective. It was a lark at first. No commitment. Why not learn a little more about computers? Computers made a fascinating study for a techno-illiterate literary type.

## **Touchstone**

Kyros Corporation, our company, was an afterthought. The cordless telephone project that launched our startup was, first of all, a project of Touchstone, Inc. Bill Heath had formed Touchstone in 1980 as the corporate home for his system calculus and optimizing compiler project. He made the mistake of thinking he needed a "company" in order to have a legitimate development effort. As I've mentioned, you only need a company when you have

something to sell. You might make a case for creating a company to appease outside investors who insist on having shares in something. In my opinion, though, that's a very weak case, because in practice a contract between individuals, or a partnership agreement, gives everyone involved just as much protection.

In Bill's plan he would get money for the next stage of his development by marketing the compiler to electronic design professionals. He planned to design the hardware and software for a supercomputer. His system calculus was to be the technical foundation for a massively parallel machine.<sup>10</sup> The eventual aim of his grand plan was to build a space habitat using robot labor. The system calculus would allow him to build the design system and its compiler, the design system would allow him to build the supercomputer, the supercomputer would allow him to build a self-replicating robot factory, the robot fac-

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<sup>10</sup>Supercomputers are enormously expensive, but some tasks need the enormous power they provide. You can cut the cost by dividing up the job. A parallel processing computer performs its work by dividing the jobs it has to do among multiple processors. No matter how inexpensive the individual microprocessor becomes, you can accomplish more for a lower cost if you replace a more expensive unit with lots of cheaper units. Bill believed his system calculus would allow him to design software that would control and coordinate the efforts of an unlimited number of networked computer processors and, in effect, create an inexpensive supercomputer. In recent years, others have succeeded in corralling separate computers connected by a network to accomplish complex tasks that would take a single computer centuries. They, however, are using different techniques than Bill had in mind.

tory would build robots, the robots would build his space habitat. The key to his scheme was this system calculus with which he could prove that any system would operate exactly as designed. That's what he originally had in mind for Touchstone. His long range plan.

What actually happened with Touchstone, in contrast to the plan? With all the diversion to earn money, Bill was taking a lot longer than he originally thought to complete his theory and his compiler. He had been at it for more than four years. Then his sister, Cie, came along with an alternative that she contended would move him rapidly to the next stage of his plan. She suggested that they together build a cordless telephone like the one he had recently suggested to Celludata, one of his consulting customers. They could build it quickly and get Bill enough money to support the entire system calculus, optimizing compiler, supercomputer development. After this one last diversion, there would be nothing else to keep him from accomplishing his goal. She would handle all the business aspects of the project. They could have a product in a year. Bill later told me that he had had misgivings from the outset about the advisability of getting into this project, but that he thought it might work and that he could always bail out.

The new project—dubbed “talkman” after the Sony

Walkman<sup>®</sup>—was exciting and sexy. Bill had given some thought to raising capital from investors for Touchstone. It seemed like you could raise money much more easily for a hands-free telephone with built-in “productivity” features than you could for an esoteric, arcane optimizing compiler that few people could understand. The phone was a consumer device. Everyone could understand it because everyone could use it. After all, the radio of their phone, as they envisioned it, would utilize the newly available spread spectrum technique. Using spread spectrum, a cordless telephone would have crystal clear sound quality. Even businesses could use such a reliable device. The cordless phone was no longer a toy. It became a real business tool.

Bill agreed to take part and agreed that they could operate as part of Touchstone, at least in the beginning. They were to be equal partners. They agreed that they might need a new company later in order to divide up the ownership properly and bring in investors. He was not going to give away any more of Touchstone. Touchstone was his company. He had already given a third of the company to members of his family, partly in return for a loan from his parents to buy computer equipment. No more. In fact, at first Bill was only going to act as the system architect for the telephone development. He was

going to come up with an overall design and specification for the product, help find a subcontractor to do the actual building—especially the crucial radio—and then get back to his own project. Cie would carry the ball from there. He agreed because he thought, naively, that his part would take no longer than six months. As the weeks passed, the talkman project sucked him in.



## Chapter 3

### Extravagances

#### Cinderella's Wedding

A beautiful mid-June day at the castle in the Berkshires. We're starting the final decade of the 20th century. The robber baron who built this mansion at the end of the last century, a hundred years ago, would undoubtedly have smiled at the regal pomp and ceremony of the day. Laid out on his front yard, nestled in the western Massachusetts hills a chamber orchestra befitting nearby Tanglewood, the redolent buffet tables, the cricket court on the lawn below the assembled guests. All reminiscent of scenes from Scott Fitzgerald—the Hamptons or Sag Harbor or Newport. To stage such extravaganzas is surely why he built the 50-room getaway in the first place.

Our bride and groom, nervous and excited in anticipation despite their midlife gray, paced back and forth near

the horse drawn carriage that was to carry her to center stage. A picture perfect scene for her wedding. What she had always dreamed of. Dreams perhaps formed by the lazy summer days of her youth, crowded with nine siblings onto the family boat on the south shore of Long Island—Patchogue, Shinnecock, Shelter Island. Close enough to smell and see and lust after the splendor and wealth, but not quite close enough to touch it. Now she was touching it, and tasting it. She was the princess. The royal wedding party—females adorned in satin gowns and garlands of flowers, males in waistcoats and riding boots waiting to salute. Her prince charming on steed, ready to greet her carriage. Cheering family and friends who had taken over the entire estate for the three days—many of them as her guests, wishing her well as she embarked on the adventure of married life.

Not a cloud in the sky, not a blade of grass out of place. No dissenting note from the hawks that circled overhead. Everyone she loved gathered to share the occasion with her. A weekend of festivities at this mountain retreat, then a whirlwind six week tour of Europe, before she plunged back into the work of her company. For now, nothing to mar the beauty of the event. Only later, after the band stopped playing and the guests returned to their everyday affairs, would reality set in. A reality she had

managed, by waving her magic wand, to banish completely from this convocation. The reality that there was no money. There was neither money for her company nor, indeed, for this event. In the end the elaborate house of cards would collapse. The company would fall, the creditors—personal and business, including the proprietors of this sumptuous inn—would come banging at the door, the bank would ask for the keys to the house. Ultimately, even the tax men, most persistent and effective of all, would hound her with their relentless pursuit.

## **Lessons**

In many ways the wedding ceremony and reception mirrored Cie Heath's approach to building the company. Although she had the least business experience of the three of us who held the biggest stake in the venture, the company took on her personality. It was, after all, her idea to start Kyros. Her brother joined almost under duress. I was a Johnny-come-lately, in it for fun.

Cie's brother, Bill, was the technical brain behind the development. He had been working on another project when Cie suggested they start a company together to develop a "really good" cordless telephone. This new phone solved the problems of range and reliability that plagued existing instruments. A tool businesses could

use. And besides, theirs would be fun. Bill had already done consulting work for a cordless phone startup company. While not a focused expert, he knew his way around the technologies involved. Though reluctant, he agreed, thinking she might be right that the sexier, cordless telephone was an easier way to bootstrap his other, more esoteric research project.

My initial influence was minor. I hadn't joined until six months after the start. Although I had managed two other small companies, for at least the first year of my involvement with Kyros I had little or no influence on the path the company was taking.

Cie, on the other hand, had wedded herself to the idea of this company. She seemed to have no difficulty steering the rest of us in the direction she wanted. She would raise money. She would, and did, bring in the far-flung members of her large immediate family to assist in whatever way they could. It didn't matter to her that they didn't have the correct experience for the job. Two characteristics were important. First, you could trust them in a way you could not trust outsiders. Second, they did not demand cash compensation for their work. They were building the family business. Although Cie had convinced Bill that getting me was a good idea, she didn't fully trust me until many months after I started working.

At the start I don't think she realized how extraordinarily difficult her job of raising money was. Funding a startup is difficult at best. But when you don't have a clearly defined, detailed plan, it is virtually impossible to get large, sophisticated investors to part with their capital.

The company consequently came to follow a less structured, but more overhead-heavy model than I would have chosen. The basic decision to fund the company a little at a time—which fit the way Cie saw her role in the company—rather than to create a business plan and then fund the plan, had profoundly negative implications for Kyros. As a result, we built an administrative apparatus that had as its main function feeding the two-headed albatross of shareholder relations and shareholder recruitment. In my opinion, given the growing number of very small shareholders—investing \$5,000 or \$10,000 each—and the lack of a well-conceived, carefully detailed plan from the outset, our chances of ever raising capital from the large, sophisticated investors, who typically make such projects as ours a success, was virtually nil. We needed multiple millions of dollars and we were raising it a spoonful at a time. Of course, all along the way, we hoped to snag the big one. An angel or a VC or a corporate partner who would end our funding woes. This was a false hope precisely because of how we had structured

our fundraising effort.

In order to enroll investors—large ones that we didn’t sign up and small ones that we did—we needed to support a myriad of functions. We needed stock to sell. Stock meant a corporate structure and filings and someone to manage the paperwork. We needed a private placement memorandum. A private placement meant lawyers and accountants and complying with SEC<sup>1</sup> regulations and state “blue sky” laws. We needed—on the advice of many people whom we consulted and trusted—certified audits by a major accounting firm. We needed a model that demonstrated in some fashion the system we planned to build and sell. As it turned out, to feed the shareholder monster we needed multiple demonstration systems that consumed huge amounts of engineering time to build and executive time to demonstrate. And each of these tasks required money. Vast amounts of money for an operation of our size. More money than you might think if you’ve never done it before.

Choosing to fund the company from small investors gave rise to other major difficulties. Here are some of the difficulties that grew out of that fundamental decision.

- Too much product

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<sup>1</sup>Securities and Exchange Commission, the U.S. federal agency charged with regulating the sale and transfer of stock.

- Too much people (and the wrong people for the job)
- Too much office
- Too much high-priced experts

Let's look at each of them.

### *Too Much Product*

When Bill and Cie Heath started development of a hands-free cordless telephone (with personal management tools built in) they didn't realize how much engineering it took. Bill thought he could get a third party contractor to build him a radio. All he had to do then was develop the software and a small control circuit board, and have a slick case designed and built. The growing group of would-be entrepreneurs, myself included, proceeded on that assumption for almost a year. By the time the enormity of what we were attempting had sunk in we had already incorporated a new company and started selling stock.

We discussed the possibility of scaling back the product. We might simply offer a pocket organizer, something like the modern day Sharp Wizard, with a built-in phone dialer. We already had all the elements designed. We'd just have to shell out the \$25,000 to \$30,000 in up-front costs to get the manufacturing started. One trouble

with such a plan was that we didn't have enough money. And, it was emotionally difficult for all of us to back off from what was a very sexy, high-end consumer product to a relatively inexpensive product with an uncertain market. But the most important reason, and the reason why we ultimately did not try to make and sell the simpler, already-almost-developed product, was shareholders.

We had already sold stock to a number of people on the promise that we were developing a hands-free, cordless phone with enormous market potential. It might be acceptable to switch to an equally lucrative market, as we later did in moving into the local area network market. We judged it quite unacceptable to divert all the effort of our fledgling company to a less expensive—and hence less profitable—product with an, at the time, untested market filled with large Japanese manufacturing companies who could build such devices at a fraction of our cost. We didn't have the resources to work on two products at once. Not only that, with a pocket organizer we had nothing really unique. Our software was very snappy—far better than what the Japanese competitors had put out. If we were successful, however, they could copy us in a matter of weeks. We talked to several key advisors and to a number of the largest of our new shareholders. Without exception, they said, “stick

to your original idea.”

In hindsight, I believe it would have been better to ignore the wishes of these shareholders, brave the potential complaints, go ahead and sink our last dollars into a pocket organizer. We could have tried some low-cost marketing, gained experience, gotten a little cash flow stream started and then graduated to more and more advanced versions, and finally, when it was ready, to the “big” product. If we hadn’t had shareholders coloring our decision, we almost certainly would have done just that. The inexperienced shareholders added to our inexperience and kept us on a disastrous course.

### *Too Much People (And the Wrong People for the Job)*

From the very first days the wrong people participated in Kyros. We had too many people who, no matter how well meaning, were not sufficiently experienced or skilled in the work they were doing to contribute to the growth of the company. However, to feed the shareholder machine, we escalated the number of people we involved in Kyros. It was not a conscious, thought-out decision. It just sort of happened.

In the beginning, it was only Bill and Cie. Bill had no business experience but considerable engineering experience, in electronic hardware and software development,

and in managing small teams of engineers. Cie had no technical experience though Bill had spent a few weeks teaching her the rudiments of computer programming, in the hope that she might be able to help him with his project. She made up for the lack of expertise with tenacity and drive.

Here was the deal. Cie was to raise the money and run the business, leaving Bill free to develop the product. Bill was to be chief executive but Cie, as president, would handle the business details.

Unfortunately, Cie had no significant business experience. She had worked during one summer as warehouse manager for her then brother-in-law's furniture store and she had worked for several years as a dental assistant in a part-time office of an orthodontist. She is gutsy and determined, and very persuasive, but definitely did not have the complete skill set to do the job she was asking of herself. Her biggest failing as an executive—a fatal one in my opinion—was an inability to follow through and get things done in a timely manner.

For his part, Bill is a brilliant and innovative engineer—at times a touch theoretical and a bit of a dreamer, but for the most part down-to-earth, practical and extraordinarily well organized. He did not, however, have any background, at the time, in either communica-

tions theory or in radio frequency (RF) engineering, two disciplines essential for the development he was undertaking. In fact, Bill spent the better part of one year learning what he needed to know about spread spectrum communications techniques. If we had had adequate funding we would have hired that skill.

We did find an excellent RF engineer in the person of Mark Rudy, who was single—as were most of us—and willing to work solely for stock options. Mark was an RF circuit designer, not a systems engineer. Bill was a very good systems engineer but had no detailed knowledge of radios. As a result, Mark spent the first year and a half that he worked for us designing his own radio, optimized for our purpose. Then, we found out from a chance conversation with Mark, we could have put together off-the-shelf components to accomplish the same task for prototyping our system.

So, as skilled as they were, both Bill and Mark were doing the wrong job. With the right level of funding before we started—which could have bought us the right executives—we could have used the talents of these engineers to maximum benefit. Bill, as I discovered, was an often inspiring engineering manager, but, despite good instincts, too deeply embedded in detail to be a good business executive.

For my part, I had experience managing two small businesses, one a startup in the packaging industry, the other an import company. Earlier I had successfully operated my own small service business as a piano tuner and rebuilder. So I joined the project with more business experience than either Bill or Cie. On the other hand, in school I had studied Latin and Greek and French and German and English and American literature. Science and math? During my entire college career, I took a total of one one-semester introductory science course (mostly physics) and one one-semester introductory math course (mainly review of high school math). Since college? Well, I'd read lots of literature and history and philosophy. Poetry, especially poetry. I particularly love poetry. Also—we're getting close here—some popular science books and articles. But any real serious study of science or related matters? None. Except for an earlier, brief stint working with Bill on his proof of correctness system, none! So what job did I do for Kyros? I helped write software for an advanced spread spectrum telephone. Lots of learning and preparation, and only small quantities of actually productive work.

We had everything backward. We were each doing essential jobs, but none of us was doing a job for which he or she had training. There are lots of other examples

of this phenomenon, but you probably get the idea.

If we had approached the project in a business-like way, written a plan for product development and business startup, then funded the plan and carried through assiduously, we might have had the resources to hire people with the skills we needed. Some of us even knew that that was what we had to do to be successful, but we let matters follow their own course rather than steering in the direction we needed to go.

So we had the wrong people doing the right jobs. But an equally serious error was hiring more and more people. More than we needed. We hired these extra people to compensate for inadequate performance by those who were out of their league, but we also hired them to take care of tasks that materialized only because of the shareholder machine.

Listen to how our shareholder machine worked.

Each time we found a prospect to buy some of our stock, someone had to give a presentation. But the presentation was never static. You couldn't just pull last month's out of the drawer and use it. It was always changing because what we were doing changed and because our progress changed. Whoever was making the presentation, usually Cie, or in the first two years, Cie and her sister Colleen, had to make sure the presenta-

tion was up-to-date with the facts. They'd have to rehearse to make sure they had it right. And so on. We found that for every 25 to 50 presentations we made to potential investors, only one resulted in an investment. Including setup, travel, and followup, each presentation probably averaged 3 to 4 hours—some more, some less. Not counting numerous phone calls that never made it to the live presentation phase. While this is probably not much different than any cold call selling, it does represent an enormous investment of time when you're raising only \$5,000 to \$10,000 from each investor. It was a very inefficient way to raise money. But once you start down the path it is very hard to backtrack. You have to keep feeding the beast. Or, put another way, the roller coaster is making you sick to your stomach but you die if you try to get off before the end of the ride.

Finally, by combination of miracle and hard work, a new investor. More work. Work that in an established, or at least well-funded, company goes to a stock transfer service. In an underfunded startup, such as ours, we had to take care of this work ourselves. Each investor received a private placement memorandum. We were raising capital under the provisions of SEC rule 504 and, consequently, our private placement document had to follow its stipulations precisely. Our attorneys (who

also worked for us for deferred compensation) had insisted that we demand a signed subscription agreement from each investor, for our own protection. The agreement said the investor had read the prospectus and understood the risk.

We needed basic personal information from the investor. Someone had to manage the database of this information and also the physical papers. At first, our database consisted of paper ledgers; later, we put it on a personal computer spreadsheet. We had to create a stock certificate for each investment that both the president and the secretary of the corporation had to sign. Getting the president to sign was not a problem because she worked right there in the office. But our secretary was an attorney friend who lived and worked in New York state (we were in New Jersey). We had to mail the certificate to him and he had to mail it back. Like many attorneys, time was not of the essence to him. It was sometimes weeks before he returned the certificates. So we had to keep track of which certificates we had sent, which he had in his possession and which he had returned. With stock certificates floating around the country, we had to create a ledger to keep track of them.

When we changed the company name (originally, Clarion Corporation) we had to recall the certificates to

replace them with new ones. A sizeable number of shareholders had lost the original certificates, so we had to get notarized statements from them. A nightmare. Not all shareholders were careful about returning the acknowledgment card we supplied them to let us know they had received their certificates, so we had to follow up on that, by phone in many cases.

Then, of course, over time, shareholders wanted to sell or give away some or all of their shares—they could do this under certain conditions. We had to make sure they met all applicable conditions and then handle the paperwork for the transaction. Several shareholders made numerous transactions. It was not until we had cut out all administrative staff, after six years, that we decided we had to charge for multiple transfers. We were not set up as a stock transfer company, so we struggled to develop procedures to handle all these tasks. Even then, we had to deal with stock transfer paperwork on a frequent enough basis that it was time-consuming, but infrequently enough that it did not become a regular, easily handled routine. The whole matter was more complicated because our administrative staff—which we didn't need to begin with at the early stage of the company—changed regularly. Someone had to train each new person in details that required irregular but absolutely accu-

rate treatment.

In addition to the paperwork, there was the growing burden of shareholder communications. For most of our investors, Kyros was the riskiest investment they had ever made. I questioned, and still question, both the propriety and the wisdom of accepting money from unsophisticated investors in the first place. Once we had, we had to provide considerable handholding for many of them. They needed to know what we were doing with their money. Can you blame them? Besides time-consuming shareholder meetings and quarterly newsletters, there were endless phone calls from shareholders seeking updates on our progress. For me, it was actually very enjoyable talking to shareholders on the infrequent occasions when I did. But the point is the entire shareholder apparatus consumed a large part of the company's time, time that we would have better spent developing a product. None of this would have been an onerous chore if we only had a half dozen investors. By the end, we had more than 150 investors. Of the 45 or so people who worked for Kyros off and on over its eight year life, fully half occupied themselves primarily with tasks that would not have existed if we had funded ourselves before starting development and hired only those people essential to the development until we had a product ready to market.

Another, possibly deeper, wrinkle to the shareholder dilemma is the issue of the engineering development itself. If you have a detailed development plan and the money to execute it, you can build a single prototype of your product, test and fix it as needed, then produce and sell it. Very straightforward. Minimum wasted effort—in time and money, and in the number of people you need to accomplish the task. When, however, you start without enough capital to carry the product to production, you must follow a less efficient path. Since none of us had a track record at starting companies, even if we had known at the beginning who to go to for full funding of our idea, as they told us later when we did find them, they wouldn't have given us the money we needed. So, without a track record, we convinced ourselves that we had to have a demonstration prototype. Unfortunately, the project we chose might have required as much as several million dollars to get us to a functioning system. As I've already mentioned, the complexity of the project itself was one of our big errors in judgment.

If we were going to proceed, we thought, we'd have to build something that would show investors what we were doing so they'd have confidence, first that we could design and build things, and, second that what we were building would ultimately work. We needed, in short,

a razzle-dazzle demo system. Over the years, what we ended up doing, not exactly by thought-out prior design, more by responding to the push of the moment, was building successively more functional prototypes. We built all together, I believe, seven different systems. Only the final one had any real relationship to a saleable product. You can imagine how much extra effort this required. The first demo system was a software simulation of the personal organizer functions of our proposed hands-free telephone that ran on an Apple IIc “portable” computer. It included functions like an address book, an auto-dialer, a calculator, call screening, and so on. The last prototype was a 2.4 GHz<sup>2</sup> wireless local area network with a truly sophisticated spread spectrum control system that dramatically simplified the radio “front end.” This last system failed only because we couldn’t get the final few hundred thousand dollars we needed to complete the quite simple radio “front end.”

It happened this way. The engineering team—in the beginning just Bill and me, later eight engineers and two technicians—built a prototype that the fundraising team—Cie and various assistants over the years, including me—used to sell the company to investors. Cie was always able to raise, from the small investors who were

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<sup>2</sup>GHz stands for *gigahertz*, that is, one billion cycles per second.

her bread and butter, just enough to just about keep the current bills just about paid. But never more. We were always on the edge. So while she raised money to keep the company eking along, the engineering group worked on the next version. In the process we spent all the money that was coming in and only kept our heads above water. We told ourselves we always had to have a better prototype to show investors or the trickle that was keeping us going would dry up completely.

Instead of telling investors, more honestly I think, look, here's a presentation of our plan—slides, analysis, talk—but there is no demo prototype. There will be no demo prototype. We don't have resources to build a demo prototype, we have to husband our capital and build a product. You'll have to trust us. Instead of that, we caved in to the allure of building a sexy presentation to catch the "big bucks." And, to make the current investors feel that we were making progress. But we never caught the big bucks no matter how many prototypes we built. Given the vicious circle we had fallen into, I don't think we would have.

It's true that each prototype got us closer to our goal, but in the process each one frittered away the limited resources we had and kept us on a treadmill. It was very much like Sisyphus rolling the boulder up the hill, only to

have it roll down as soon as he reached the top. I am absolutely convinced that the successive demo prototypes contributed virtually nothing to our fundraising. They contributed to our knowledge base and understanding of our system, but not to our pool of capital. They were negative drains. Suppose for a minute that we had spend the \$1.5 million that we did raise for building a production system and for the expenses of one founder (no cash pay) who would give a simple, inexpensive investor presentation and keep track of everything related to investors. In this case, I think we could have succeeded in creating a viable company. Even if the money had come in, as it did, in small chunks. Even if we had also made the mistake, as we did, of choosing too complex a product that was too expensive to develop. We could have made all these mistakes and others too. Only a few of our mistakes were truly fatal. In my opinion, building all those demo systems was one of those fatal mistakes.

By and large, the small investors did not need a prototype. They always invested on the basis of trust. One or the other of us, usually Cie, created a personal relationship with them and they thereafter believed in our integrity. They didn't understand the technical problems that a demonstration often masks anyway. Most of them didn't understand the market for computer networking

products. They did understand that we were totally committed to making it work and they were willing to take a chance on us because of that. The big investors, the sophisticated professionals, were never going to invest in an unproven product that a handful of unproven people claimed was better than what the biggest companies in the industry were able to do. Our only chance with them might have come after we had a product ready to sell, and maybe only after we were already selling it. It was very much like the bank that will only lend you money once you don't really need it.

### *Too Much Office*

Sitting on the white leather sofa in Bill's office while we talked about how to staff our engineering department, I could imagine myself in the office of the CEO of any successful, rapidly growing company. The personal conference table at one end, teak, with four upholstered swivel chairs, gave the room a feeling of earnest luxury. A place to work, but also a place of prominence. Since we needed to ask the president a question or two, we joined her in her smaller, but quite adequate office with its wraparound leather sofa and carved antique desk, refinished and rebuilt at company expense. The three of us decided we wanted some refreshments, so we adjourned

to the employee lounge, complete with its own mini-kitchen. I sat on a Breuer chair sipping herb tea while Bill and Cie relaxed on yet another of our leather sofas. Along with the rest of the office—visitor reception area, library, full conference room, lab, assorted office spaces, all done in teak and oak and overflowing with plants, it amounted to pretty fancy digs for a group that could barely keep its circuit boards populated with resistors and capacitors.

The office in Butler Center, Butler, NJ, was symptomatic of the put-on-a-good-face-to-the-world virus Kyros contracted early in its life. It took way too long for the company to shake off the malady. The Butler office was our third of four. The first—for the first two years—was the living room of the house of Bill and Cie’s parents, who soon decided to tour America in their RV while Kyros was abuilding in their parlor. The last was Bill’s rental house, also in Butler, out of which Bill and I made our final stabs at resurrecting the dream. The second office was a rather nice but too small commercial space in a neighboring town, Riverdale, NJ, that we left when the landlord rented to someone else expansion space he had promised to us.

If you were to look at the outside of Butler Center, you might have thought that anyone who housed their busi-

ness in such bleak, rust-belt surroundings must be thrifty indeed. The building, or rather conglomeration of buildings, is a 125-year-old, 400,000 square foot, abandoned rubber mill. Parts of the old mill now housed warehouses and light industry. Exterior looks, however, were deceiving. The landlords had bought property for the proverbial song and were gradually upgrading more and more of the facility to prime office space. The place actually had a kind of late 20th century yuppie appeal.

We picked out and designed our office. They custom built it to our specification. We were paying \$3,000 per month for 2,500 square feet. The price was not out of line for comparable space in the area at that time—around 1988, but it was way out of line for what we could really afford. Not only that, we filled the place with that solid oak and teak and leather furniture. How did we justify it? Well, we needed good offices to bring in potential investors. Oh, and the furniture? We paid virtually nothing for it, a bargain at about \$15,000, because we bought it for cost from a nephew of Cie and Bill who was in the furniture business at the time. Never mind that \$15,000 would have brought us a down payment on a custom chip for our system or a network analyzer to keep our frustrated RF engineer working for us without pay. We had decided that showing the world we were successful was

more important than taking the steps required to become successful.

I was a dissenter from this policy and often made myself unwelcome at our regular executive staff meetings over the years by pushing for frugality. Two stories illustrate the foolhardiness of the approach we took.

First story. My pre-Kyros days, when I worked for Al Fielding. Al's Sealed Air Corporation was an extraordinarily successful packaging company. Though I did not work for Sealed Air, on occasion I met Al at an office he kept in the Sealed Air research lab in Fair Lawn, near the small plant that I did manage for him. On behalf of Sealed Air he had made a very favorable long-term arrangement with the landlord many years before. If I remember the terms correctly, the half expired 20-year lease on the 40,000 square foot building cost Sealed Air \$1.30 per foot per year. At the time I was visiting, comparable space was going for \$15 to \$20. Sealed Air had sublet to an established company about a quarter of the building at current rates that more than paid for the whole building. Another company, a marketing startup, had leased 10,000 square feet or so, the part that now included Al's huge pied-a-terre office suite. They had spent money like crazy, Al told me. He watched them and knew they would never make it. Imported furniture,

artwork, luxury automobiles. They lasted, he said, about six months, then filed for bankruptcy.

Second story. I worked in the early to mid-seventies for another entrepreneur, Richard Eck, who, in the mid-fifties, had started a small manufacturing company that made industrial heating equipment. He had scrimped and saved and built his company slowly and steadily, concentrating on good engineering and quality products, and he became quite successful, though not on the scale of Al Fielding. When we were raising money for Kyros, after we had moved into our second office—the one in Riverdale, I had finally decided, despite some misgivings about how we were handling the business, to risk inviting people I knew to consider investing. Al and Dick, of course, came immediately to mind. Al replied to my request with his characteristic caution and told me to call him again when we had a product ready for market; he might consider it then. Dick, on the other hand, whose plant was just around the corner from our office, said he's come by and take a look. My guess is that he came mostly out of curiosity. In any case, he listened to my half-hour spiel about the product, the market, the competition and our business plans. Then, he asked one question. "What," he said in essence, "are you doing in fancy offices like this when you don't even have a product, let

alone income? Why should I invest in a company that spends its capital on the frivolous instead of the essential?” While I gave him a stock answer about the potential of the product and the market, I understood that he was right. I really had no answer. I shudder to think what he would have thought if I had brought him back when we were later ensconced in the Butler Center office.

These two incidents left me with the firmly embedded idea, already native to me by personality and training, that you have to live within your means, whether you're a individual or a family or a business or a government. Whatever extras you want in life can come to you if you work and plan for them, but you can't short-circuit the process of building wealth and expect them to come without the effort. I knew this. Somehow I let this fundamental principle slip to the back of my mind. It resurfaced occasionally, yet I never once, while working on Kyros, took a stand for it. I did not insist that if we didn't operate the business in a way I knew to be correct, I was not going to take part. And the truth is, the investors we got would have been just as happy with a garage.

*Too Much High-Priced Experts*

For years we prided ourselves on our resistance to the legions of business consultants who paraded through our doors peddling vapor advice in return for exorbitant pay-me-now-before-you-have-results fees. We felt very strongly that if their advice was really worth anything they'd be willing to take their compensation out of the results they were able to achieve for us. With one small exception, toward the end of its life as a viable organization, Kyros stuck assiduously to this capitalist road. I firmly believe that this was a wise course.

The problem, however, was not with the consultants we sent packing, but with the professional experts we welcomed with open arms—primarily, the lawyers and the accountants. This is not a diatribe against lawyers and accountants. Ours were excellent, but, in spite of the fact that they took either no cash pay, in the case of the lawyers, or low pay in comparison to their normal charges, in the case of the accountants, what they required of us and the expenses we incurred as a result of their advice helped drain the company dry. All for the sake of present or future shareholders.

Our attorneys were an old-line New York firm, Holtzmann, Wise and Shepherd, with sumptuous offices overlooking Central Park, that handled general corporate law

but also concentrated in securities law. Our accountants were Coopers & Lybrand, one of the nation's big accounting firms. Why, you rightly ask, did we pick such prestigious and high-priced firms when we were living from hand-to-mouth? The answer, in the case of the lawyers, is simple. We had a friend—a partner in the firm—who convinced his associates that it was a good bet to work for us for deferred payment. In the case of the accountants, the lawyers recommended we get a major accounting firm since we were planning to go public as soon as possible. They said that any good underwriter<sup>3</sup> would demand that we have audits by a major firm. If we didn't use one of the big firms, we might have trouble going public when the time came. As far as it went, it was probably good advice. So, I interviewed six of the so-called big eight accounting firms—in itself a substantial, time-consuming task. Coopers offered the best deal. Because they liked our basic business plan, they would do the audit for \$4,000, a fraction of their typical charge, in the hope that we'd make it and they'd have our business as we grew.

What did these professionals do for us and how did they affect the development of the business? Be clear

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<sup>3</sup>Underwriters are companies licensed with the Securities and Exchange Commission (SEC) to manage the issuance of stocks and bonds for corporations.

about this, it was our decision to try to build a company we could take public. No one forced us into it. Indeed, if we hadn't made many of the errors in judgment and action that I'm relating in this book, we might have made it. That said, these high-priced firms are used to dealing with well-heeled clients. Getting in bed with them put us in the position of having to supply much more sophisticated and costly information than would otherwise have been necessary. It took a lot of our time—time that we could have spent developing a product—just to comply with all the requirements of private placements, blue sky laws in a dozen different states, certified audits to prepare us for an eventual IPO.<sup>4</sup> In answer to the important question that we failed to ask ourselves at the time—did we really need so many lawyers and accountants at such an early stage in the company's history—the only answer I can come up with is that we didn't.

But, you might object, we had to do these things, given the fact that we wanted to raise money and to go public. The fact is that we didn't have to and we could still have gone public at some time in the future. Lots of companies do.

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<sup>4</sup>Initial Public Offering, the highly regulated and controlled sale of a company's stock on the public market, as opposed to a private placement—also regulated but with somewhat simpler rules—in which a company sells its stock privately under certain restrictions to a limited number of usually wealthy investors.

We could have, for example, structured our effort as a limited partnership or a subchapter-S corporation and have raised money with a lot less overhead. True, we would have had to limit how many investors we signed up and accept some other restrictions, but that, in my opinion, would have been a salvation for us rather than a limitation. It would have forced us to think out our plans more thoroughly before starting. It would have forced us to approach only the really sophisticated investors who were able to supply not only sufficient money to get us started on the right track but also expertise, and contacts for the second round of funding that you inevitably need. We would not have been able to tap so heavily into friends and relatives who wished us well but who knew little about business and contributed nothing to our business beyond their cash.

We could even have sought the money to develop a product from one or two private investors without forming a company. Show them a detailed plan for creating a product. Make private agreements with them about ownership of rights to what we create. Make similar agreements with talented engineers to share ownership of rights to the product they help create—no payroll, no excess overhead, just a joint effort to build something worthwhile. The entrepreneurial spirit at its best. Then,

when we had something, after one year or two years or even three years, only then might we form a corporation and issue shares according to the pre-agreed proportions. We would have had to carefully craft such agreements to take into account various contingencies, but we would have avoided huge amounts of unneeded overhead. My guess is that if we had done it this way, we could have had a product ready to market in two years for less than a million dollars.

Even though our accountants and attorneys informed us that to take our standard corporation public we had to have certified audits dating back to the start of the corporation's existence, or three years, whichever is less, we didn't have to do it. Despite their advice, just because we wanted to go public one day did not mean we had to have audits from the start of our development effort. You can spend as many years as you like building a better mousetrap in your basement, then, and only then, form a corporation when you are ready to start selling the mousetrap. You don't need a "company" until you have something to sell. Then, for example, audit your new mousetrap company to your accountant's heart's content—now you have income—and go public whenever you are ready. With this approach, you avoid income tax filings for those development years (there's no income, after all, so why

should you force yourself into tax filings when you have only expenses). You avoid payroll and payroll filings. And, you avoid the administrative expense of keeping track of it all. You do, of course, have to keep some simple records of expenditures if you want to deduct the money you spend during the development period from your mousetrap company's taxable income. Those simple records don't approach the internal expense you'll incur if you do a certified audit by a large accounting firm—even if they give it away.

In the case of Kyros Corporation, just the act of forming a corporation long before we had any honestly compelling reason to do so or anything to sell, began an epidemic of spending on items not directly and immediately related to developing a product we could sell. One of the biggest difficulties with the advice of experts is that they rarely go beyond your questions to question your assumptions. While they may answer your questions fully and accurately, they don't think to tell you that you are acting imprudently unless you happen to ask the right question. You have to rely on yourself to think out the ramifications of what you are doing and figure out which questions to ask. Get as much advice as you can, but think about the implications of following it. Think about the vested interest of each expert in having you do some-

thing in a way that promotes his or her not always obvious self interest. Most of all, always think about whether or not you are actually doing the right job.

## Chapter 4

### Talkman

In deciding on a design for the “Talkman” telephone, Bill and Cie had to choose which market was their primary audience—home users, small business users or large business users. You always have to select the features you are going to incorporate in a product. Some will appeal to one class of customers, some will appeal to another. Occasionally a product will appeal to everyone and sell across the board. However, even if your product does have a broadscale appeal, when you’re a startup company, it’s almost always better to limit your target market in some way to reduce the cost of selling.

For example, if I develop an inexpensive electronic design editor, I don’t have to take out expensive ads in *The Wall Street Journal* or *The New York Times* or sixty second spots on the Superbowl. It’s overkill. I don’t need to pay to reach 100 million people when my product will

appeal only to engineers. My potential U.S. customer base is the 100,000 or so electronic design engineers. In this case I could put a low-cost, quarter-page display ad in a publication called *Electronic Engineering Times* [*EE Times*, for short], and reach my entire market with one shot.

In the case of Talkman, Bill and Cie knew that a high quality, hands-free cordless telephone might have appeal to everyone who uses a telephone, but they decided to aim initially at the small business market with their first product for several reasons.

*First*, the product was relatively expensive. At least in the beginning of its life cycle, the only consumers who would want it were gadget freaks and the wealthy for whom price is no object.

*Second*, the product was perfect for small business owners. While large companies might buy for their executives—you could plug the new phone into any PBX<sup>1</sup> system that accepted standard phones—or for special situations, like communicating in airports or on the floor of the stock exchange, the real boon would accrue to the small business person. If designed correctly, Talk-

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<sup>1</sup>PBX stands for private branch exchange. A PBX is an automatic switching system that controls multiple telephone lines connected to multiple telephone instruments within a small company or organization, or in a department or facility of a large company or organization.

man could, in effect, provide a complete phone system for the millions of professionals and small companies with, say, a dozen or fewer employees. Doctors, lawyers, dentists, architects, travel agents, real estate agents, small advertising agencies, small stores, and so on.

*Third*, you can focus your marketing when you start out selling to one segment of the market, with less cost than if you try to sell to everyone.

Talkman, therefore, was to be a two-line telephone, with an option to add another two lines. Individual consumers didn't, generally, need a two-line phone and neither two nor four lines are adequate for larger businesses. Yet exactly right for the targeted small shops. The phone included call screening, call forwarding, speed dialing, repeat dialing and conferencing built-in, so you didn't have to pay the phone company extra for these services. It was to be hands-free and cordless. If the instrument was sitting in its recharger base station on your desk, the speakerphone allowed you to talk to your contact while you continued to write. Alternatively, you could wear the super lightweight detachable headset and clip the cordless unit—about the size of a large pocket calculator—to your belt, and wander up to a half mile from the base station.

Your purchase of the system gave you one base station

and two handsets, so the phone on the desk could still be available for a second person on the same line or for a second line if you or someone else were moving around talking on the first line. The two handsets worked as an intercom—independent of the phone company. For example, you could send the office boy to the storeroom and then guide him by phone to that obscure item when you are the only one who knows its exact location. Because of the superb voice quality and interference rejection of the spread spectrum electronics, range and clarity would hold up in environments in which previous cordless telephones were totally useless. Just about the only place it wasn't going to work was a bank vault.

In addition, the phone, as designed, had a full complement of software features. The front face had an alphanumeric touchscreen keypad (A through Z plus number pad) and a two-line, 40-character LCD<sup>2</sup> screen to put information into the instrument and get it out, and to control the phone functions. Besides the phone features already mentioned, there was an address book big enough to store a thousand entries (names, multiple phone numbers, addresses, notes), a mini-notepad editor, a two-line calculator (that is, you can see both operands at the same

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<sup>2</sup>LCD stands for liquid crystal display. Computing devices use various types of display screens, LCDs being among the oldest in use for portable and handheld devices.

time when you do arithmetic, just like when you use paper) with ten “memories,” and a calendar reminder system. To top it off, the phone had an AM-FM radio built-in so you could listen to the radio when you want or let your customers listen to music when you have to put them on hold.

### **Celludata: The Birth of the Idea**

Bill hadn't thought much about the technology of telephones until he took a consulting job with a well-funded startup company called Celludata, just prior to starting the Talkman project. Celludata was a Canadian company with a presence in Greenwich, Connecticut, because its president lived there. It was a startup so it didn't have any really established facility. Though Bill didn't know it at the time, the chairman and founder of Celludata was having serious trouble with the Canadian government, the source of most of his capital. In short order, the Canadian government withdrew its support and the company collapsed, but not before Bill had done several months of solid work for the company.

Even if Bill had known about the financial troubles, that wouldn't have affected him because he was simply a gun for hire, and his assignment was short term at that. The company president, Doyle G. “Red” Collins, whom

Bill didn't know at the time he did his work for Celludata, had hired a New Jersey engineering group to develop the system. This group in turn had hired Bill to create the engineering specification for the product. They were, however, already well along in the development process. In fact, they had even had production molds made for the instrument. They were building a conventional, desktop phone. When Bill submitted his completed specification, he also gave them a report that suggested they turn their phone into a really hot product by making it a smart hands-free portable phone—adding many of the features that ended up in the Talkman design. Too far along in the development cycle, Celludata couldn't or wouldn't change and enlarge its product development. The company might have eventually agreed to Bill's improvements. Then he would have gotten more consulting work and there would have been no Kyros. However, the Canadians pulled the plug on Celludata and the better mousetrap was just waiting to happen.

Bill came away from the Celludata experience with two important items. First, he had a fully developed idea of how he wanted to build a hands-free phone. This he converted into a thorough and detailed specification for our proposed first product. Second, he came away with the name and phone number of the president of the com-

pany. Even though Bill had not met him, a few months later when the time came to think about how to fund his Talkman project, Bill made a cold call to Collins, hoping for some advice on how to proceed and perhaps sources for investment. He and Cie met with Red, who took an immediate liking to them. Red became one of the key advisors to Kyros over many years. He not only gave us advice but also encouragement as we tried to build ourselves a business. Red Collins was no neophyte to business, but he was also not primarily an entrepreneur. An engineer by training, he had had a distinguished career as a manager with large companies, having held high level positions at both IBM and ITT over many years. Celluldata was his swan song. After it collapsed, through no fault of his, he retired.

The idea to use spread spectrum for a cordless telephone was novel in 1985. Bill's father, who spent most of his career as a high level engineer at Kearfott Corporation, a defense-aerospace contractor that at the time was part of Singer Corporation, had worked with military systems that used spread spectrum. The FCC was just changing its rules to allow spread spectrum modulation for commercial radio applications. Up until then only the military could get authorization to use the technique. Bill Sr. had been singing the praises of spread

spectrum to his engineer son.

Naturally, when an opportunity to build a product that might include this advanced method came along, what red-blooded American engineer wouldn't jump. Spread spectrum was the first thought Bill had when his sister suggested they make their own cordless phone. While he hadn't studied the ins and the outs of communications theory, Bill was reasonably confident he'd be able to find and manage a subcontractor building the radio. He only had to develop the specification and write the software for some relatively simple applications—a few thousand lines of code. Writing the product specification and the software did turn out to be a piece of cake for Bill and a great learning experience for me when I joined him toward the end of 1985. The real challenges turned out to be, first, creating a sophisticated radio, and, second, making its components small enough to fit the small dimensions he had chosen.

By the time I chose to devote my energies to the Talkman project, Bill had concluded that he was not able to find any subcontractor to build him a miniature radio for the money he had available. Even a flight to Atlanta in the late spring to meet with a potential radio manufacturer failed to turn up a viable lead. As it happened, because the military had monopolized the knowledge for so

many years, building a spread spectrum radio was not a task very many people knew much about.

### **The First Bank Loan**

The first job, after deciding to set aside his system calculus research temporarily for the “sexy” project, was the specification. It took Bill only two or three weeks to turn out an extraordinarily detailed description of every function they proposed for the phone. From this blueprint he was later able to write fully functioning code for a system simulator, designed to run on a portable Apple computer, in less than two months. But first they needed money. Given how they planned to develop the company, they judged that they’d have to have money for startup expenses. In order to raise the half million to million dollars Bill initially figured—without too much precise calculating—that it would take to develop the product, they had to have something to show potential investors. People would not just invest on the basis of an idea with a couple of untested managers. They decided to give investors something concrete to look at. The proposed investor presentation consisted of plastic models of the phone, with which they’d demonstrate a mock phone conversation, and a computer simulation of the multiple functions that were visible on the phone’s

screen.

To put together the investor presentation, they had to spend money they didn't have. The model maker wanted \$2,000 for a set of simple phones machined out of solid lexan<sup>®</sup><sup>3</sup>—two  $3 \times 3 \times \frac{3}{4}$  inch bases and three  $3 \times 6 \times \frac{3}{4}$  inch handheld units that rested on the bases when not in use by fitting into brass pins. The pins also represented the electric contacts for recharging. The labelmaker wanted several hundred dollars to make a stick-on acetate sheet imprinted with a keypad that looked like the real thing. Bill also needed computing equipment, both to create the software and to demonstrate it for investors.

Although he had bought two minicomputers for a total of \$20,000 in the early eighties in order to work on his compiler and system calculus, he believed they were not the right machines for this job. First, they were not portable. Investors would have to come to the office to see a demo. He and Cie had decided it was better if they could take the machines to the investors. Second, the software available for the LSI-11<sup>4</sup> computer he owned was both expensive (very expensive) and rudimentary.

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<sup>3</sup>Lexan<sup>®</sup> is a DuPont tradename for the tough, highly machinable plastic known generically as polycarbonate.

<sup>4</sup>LSI-11 was a minicomputer from Digital Equipment Corporation, a successor to their venerable PDP-11 and a precursor of their hugely successful VAX. Bill owned LSI-11 compatible computers from a small clone maker. Despite their high cost, by today's standards they were not powerful machines.

He was going to have to write graphic applications that mimicked the operation of the small LCD screen of the telephone. On the minicomputer you had to write all the graphic routines yourself.

Bill didn't want to waste time doing extra work if he could avoid it. He preferred buying a newer machine—even if it meant spending hard-to-come-by cash—equipped with software that already provided the basic graphics he needed. That's why, after looking at IBM compatible PCs and Apples, he chose the Apple IIc with a portable LCD screen. The Apples were small and compact enough to be quite portable, they had inexpensive software by comparison with the LSI-11, and they had a graphic package called "Turtle Graphics" that quite nicely filled the needs of the job. Two of these machines, fully outfitted with alternate monitors as well as the portable LCD screens for demos and all the software he needed, cost about \$8,000.

Then, add in the cost of office supplies, phones, travel expenses, money to keep them going while they weren't bringing in income, and on and on. They figured that if they could get \$50,000 they'd be able to put a presentation together that would raise the money to build the actual product.

Where would they get that kind of money? Neither

Bill nor Cie had any savings. Neither of them was currently working at a paying job. They talked the situation over with their parents. Bill and Shy, the parents, had a history of supporting their ten children financially. They paid for an exclusive private high school for one grandson, they had provided house down payments, they had lent their son, Bill, the \$20,000 he spent on buying computers for his compiler development. Just a few years before they had sold their large lakefront house in Pines Lake, New Jersey, a quite well-to-do community about 25 miles west of the George Washington Bridge. After buying a small retirement cabin at another northern New Jersey lake, Glenwild Lake, they had a large cash retirement fund to supplement pension and social security.

By the time Bill and Cie talked to them about their project, the retirement fund had dwindled dramatically from “child support.” Yet, like many depression-reared parents of their generation, Bill and Shy could not bring themselves to deny the request for help from their children implicit in the conversation. They talked it over. Bill would lend his considerable prestige to the effort. If the “kids” could convince a bank to lend them the startup money, they would put their house on the line, if necessary, as collateral. Bill Sr. also agreed to help put together the presentation for the bank and take part when

the time came. He had recently retired as chief technical advisor to the president of Singer-Kearfott Corporation, so his presence might go far in swaying the decision makers at the bank.

The catch, for Bill and Cie, was that they had to agree to make good on any loss their parents suffered if the project went awry. They, and not the parents, had to pay back the entire loan. Bill and Shy did not want to spend their retirement years as paupers. In return for their risk—albeit reduced to a minimum because Bill and Cie were guaranteeing it—the parents were to get a percentage ownership. The family group had not at that point worked out all the details, but, roughly speaking, of the ownership they were then dividing, Bill would get 50%, Cie would get 25% and the older couple would get 25%. Bill insisted on a larger share in return for diverting his attention from his ongoing research. In fact, he would not go further if he didn't get it. They all understood that these shares could get severely diluted as they raised money from outside sources.

Bill and his dad spent several weeks in the spring of 1985 cobbling together a flip chart presentation for the local branch manager of First Fidelity Bank in Bloomington, their local town. First Fidelity—now part of North Carolina megabank, First Union Corporation—

was the largest bank in New Jersey. Although the Heaths didn't know it going in, the bank's clear general policy precluded risky loans of the type they were asking for. They made multi-billion dollar high-risk loans to third world countries that never pay them back, but, typically and by edict, not to a startup local firm whose credit-worthy principals personally guaranteed to pay it all back if the affair went bad. In this case, however, the local manager made an exception that we heard later almost cost him his job.

I believe that the reason for their success with the bank lies in the quality of the presentation Bill, Cie and their dad made to the bank manager, and in his lack of experience with such well constructed business shows. The father knew how to make an effective presentation and had trained his children well. Basically, they wowed Mr. Wilson, the manager, with a great idea, a creditable plan and fancy footwork. They made a sharp, clear, succinct case for how they could make a success of the enterprise and not only return his money with interest but also, in the process, create a large new customer for the bank. So, ignoring the stricture of conservative bank policy, he gave them \$50,000 on a 90-day revolving note. The understanding was that he would let them turn the note over a few times if needed. The Heaths had to put up the house

as collateral and each of them had to be personally liable to the bank for the entire amount. With the bank money secured, they bought the equipment they wanted—both computers and office equipment.

### **Building a Team**

Bill and Shy also agreed to let them set up an office in the large one room main floor of the Glenwild Lake cabin—in the same house that guaranteed the bank loan. But, only until they raised the rest of the money. In the meantime, the parents would travel, as they had planned for their retirement. It soon became clear, however, that Bill and Cie needed more help. The two of them, Bill and Cie, wouldn't be able to get the balance of the money by themselves. Bill could do the software simulator himself if necessary, but he couldn't also do planning and scheduling for the full development effort. Cie needed help to find investors, to convince them to invest and to write a business plan. She had no experience with any of these activities. Determination alone would not do the job. To succeed they'd have to recruit a crew of assistants—the nucleus of a team for the new company. Again, the catch-22. There was no money to pay people; until they got full funding they couldn't pay salaries, but if they didn't pay salaries how would they get the few

key people they needed to secure the full funding?

One person was close at hand. Their father had a wealth of experience planning and scheduling large projects. He had retired and, except for occasional consulting work, he had lots of free time on his hands. He could let his desire to travel across the country with his wife interfere with helping the kids, or he could set aside his own plans. When Bill and Cie asked him, after getting Shy's okay to postpone their trip, he readily agreed to contribute in whatever way he could.

It occurred to Cie that other family members might be able to help out. It was, after all, a family affair. At first, they made their choices—among members of their large, extended family—after looking for specific, well-recognized skills. Later, however, perhaps in desperation, they enlisted a person because he or she was a warm body willing to work for little or no cash. The mistake, of course, was in not seeing how adversely it would impact the completion of tasks to have people working on them who didn't have experience doing the job at hand. It's true that almost anyone with reasonable intelligence can learn to do almost any job, provided you give them enough time and training. But in a development effort, time and money are directly related. You can hemorrhage money while you wait for the inexperienced to

learn and complete their assigned tasks. That's a big part of what happened to us.

Next, Cie got the idea that maybe they could talk me into working on the project. She knew from her mother, who was a close friend of my mother, that I did not have a full-time job. I was enjoying myself reading and playing the piano and doing carpentry work around the neighborhood. Both she and Bill thought of me as a skilled writer and very organized. When they came to me, they didn't know about the experience I had picked up working for Al Fielding since it had been almost five years since we had last seen each other. They were operating on the warm body theory that Bill had used when he chose me to help him with his system calculus.

The phone call from Cie came one day in August. No mention of work. Just, wouldn't it be fun to see each other again, and I could look at the project she and Bill were starting on and of which they were very proud. She sounded so enthusiastic and I really wanted to see Bill again. We hadn't kept in touch and I'd been wondering how he was doing. Over the next few months, the two of them slowly roped me in.

Bill and Cie showed me basically what they had presented to Sam, the banker. I think the elegant plastic models that reminded me of the Eastern Airlines logo,

were the clincher. Using the models, Bill described how his phone system worked in such enthusiastic detail that I couldn't help but get caught up in it. He also unveiled from his flip-chart easel an artist's rendering of the cute icons they were going to have etched into the LCD screen on the face of the slim phone unit. There was an icon for the address book, for the calculator, for the two-way intercom, for the AM/FM radio. There was one they affectionately called "muteman" that indicated the phone's speaker was off. And, of course, there was one for the basic phone mode.

When you set the unit on its base, Bill explained, it automatically started to recharge its batteries. They explained that they expected it would take no more than a year, once they got full funding, to get a product to market. I thought that was awfully optimistic but Bill assured me he could do it if he had the money he needed. They told me they didn't know how much development would cost yet, but Bill ventured a guess of \$750,000. I asked who they would sell the product to. People like us, they both answered, almost in unison. People who love gadgets, and the latest and best. They said small businesses were a big market—those for whom a two-line or a four-line phone system took care of all their needs. Also, wealthy individuals who appreciated the beauty of

the instrument and the features they were providing and who could afford what they expected would be a high price—the *Sharper Image* crowd. There was no denying it would be a beautiful piece of equipment. As I recall, they had no clear idea, in those early days before bills of material and detailed schedules, how much customers would have to pay. I think Bill may have suggested a price of around \$500 for the two unit set, but I can't be sure, and he doesn't remember.

I was not going to be setting up the business—a job I was ideally suited for by then. I was, instead, to help Bill write the code for the software simulator they'd use to sell the concept to investors and that was also to be the foundation for their production software. It was too exciting to pass up.

In the meantime, Cie easily convinced her sister, Colleen, to help her with the details of setting up business procedures for Touchstone and for whatever company would be its successor. Colleen provided Cie whatever assistance she needed in accomplishing her job of making a business. They worked diligently at their task. Unfortunately, for a tiny company with no product, the task was premature. The proceeds of the first bank loan were draining away. Each new person who came to assist, even without taking a regular salary, consumed money.

More phone calls, more paper, more equipment. Cie and Bill agreed from the start to pay certain expenses, including medical, for people who worked without salary (pay would come later in the form of stock).

Bill and I were working intensely on the simulator that was to be the core of any investor presentation, but it was still a few months away from completion. Did we really need procedures at this point? Cie contended that we were building a company. We even engaged in team building exercises. However, in my view it wasn't the time for all that. What we needed to do was concentrate absolutely every minute on building a product; a company could come later, after we had a product to sell.

The money ran down. By December, everyone realized we'd have to have more money to continue. Since I was then only working part-time, I didn't have much say in these decisions. Bill Sr. was working on an elaborate "setback" chart, as he called it, to determine how long it would take to get the product to market and what resources we needed. This was basically a detailed product development plan. To deal with the crisis, he stopped what he was doing; Cie and Colleen stopped what they were doing; Bill and I stopped what we were doing. Bill Sr. reported that it looked like it would take longer and cost more than they originally thought. This will come

as no surprise to anyone who has engaged in product development. It seems people can rarely foresee everything they will need until they have a detailed, practically hour-by-hour, plan.

So the group decided that we had to go back to the bank and ask for more money in order to continue. I believe this was a crucial mistake. At this point there were no shareholders outside of family members (and me on a tiny scale). The investment to date was less than \$50,000. Here was a perfect time to reassess what we were doing and how we were doing while we could still change with minimum casualty. There was still no coherent business plan, only the optimistic presentation Bill and Cie and their father had made to First Fidelity Bank. But no one suggested that we back off and start afresh, take a different tack, get rid of absolutely all overhead, take day jobs to support the effort. The only thought was to plow ahead. Perseverance conquered all. For my part, I thought about making an issue, but had not earned the right. I had not sufficiently committed myself to deserve a prominent role in the decision. Also, I wasn't then as sure as I am now that the approach was wrong.

For the first half of January 1986, our entire effort went to creating a new presentation for the bank. All work on the simulator ceased. We had to get that addi-

tional money. Once there was some breathing room, Cie went after outside investors, with Colleen's help. Colleen and I had analogous positions. She supported and assisted Cie in much the same way I was assisting and supporting Bill. In order to ensure a really sharp presentation, we rented a Compaq-286 Portable computer with an option to buy (if we got the extra money from the bank). We needed more computers so the people who were working could do so productively. The Compaq was the best IBM-AT compatible we could find at the time. We got the lease company to include Autocad<sup>®</sup>,<sup>5</sup> the best PC technical drafting program available. Bill used the Autocad to make charts for the presentation. If we ended up buying it, we'd use it to do the mechanical design for the case for our device and for computer-aided project scheduling and for managing the finances on an electronic spreadsheet.

The only printer we had in early 1986 was one of the old-style, dot-matrix printers that did not produce presentable copy. Cie and Colleen had a friend whom they had met while doing volunteer work for Werner Erhard & Associates ("EST" and "The Forum"). Marta Nagy, who later worked for us at Kyros, in turn had a friend who said he would print our document for his cost. As with many

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<sup>5</sup>Autocad<sup>®</sup> is a registered trademark of Autodesk, Inc.

bargains, it was anything but. Bill ended up spending 20 hours at this fellow's shop dealing with the incompatibilities between the two systems. We even supplied our own paper to get the right look. Then, the "friend" inflicted the final insult and sent us a bill for \$1,500 for producing a couple dozen copies of the 30-page report. We ignored the bill.

We all worked frantically to make the presentation for Mr. Wilson at the bank even better than the last one. The document was actually approaching the rudimentary outline of a business plan, strong on the engineering side, weak on the marketing side. I was not at the January bank meeting, but the work succeeded in its primary goal, because within a few days Mr. Wilson wrote a check for \$40,000, just about what we asked for, same conditions as before. The limit on the size of the check was the collateral left in the house. The bank would not make Touchstone an unsecured loan.

After the second bank loan, until the simulator was complete about a month later, Bill and I spent practically none of our time considering any business aspects of the project. We concentrated on the technical. Bill was able to make rapid progress, with my help, by holing up in his parents' RV that they kept parked across narrow Pine Tree Road, not far from the house. Back in November he

had strung wires for power and telephone from the house to the parking lot, injuring his shoulder in the process. It gave him a private office where he could work undisturbed. He was putting in long days, 12 to 16 hours, and distractions like the frequently ringing telephones in the main house broke his concentration. I worked at my house, about six miles away, and conferred with him by phone at appointed times throughout the day. We'd meet several times a week to go over what I'd done and re-view what he had done, and where we were going. I was only working part-time at first, then seven or eight hours a day after mid-January, but no match for Bill's heavy work load. Even though I didn't have a heavy technical background, by just applying common sense and having some more distance from the work than Bill, I was able to contribute significantly to avoiding sidetracks. The system worked very well and we made rapid progress.

Around the time of the second bank presentation, Cie convinced another sister, Teresa Rickard, to come and work for the company. Terry and her husband, Bill, were working as gymnastics coaches in Texas. They had concluded that, unless you had the capital to open your own gym, there was no money in gymnastics, despite Bill's recent good fortune in touring China as coach to the U.S. elite gymnastics team. Cie's offer came at exactly the

right moment. The plan was for Terry to come to New Jersey first; Bill Rickard would follow in a few months with their belongings. He minored in math in college and was a computer hobbyist who liked to program but had no formal training. Under the prevailing theory, he would be a great asset to the company.

Since Bill and Terry had no money saved, the company paid their moving expenses out of its meager fund. An investment in the future. Terry did not understand working for deferred pay. She wanted the cash in her hand. Because Cie wanted her to come back to New Jersey in the worst way—her not so secret agenda was to reunite the scattered family through her new company—she was willing to agree to whatever terms Terry wanted. Terry got a small cash stipend plus all her living expenses paid. I warned Cie that her methods of paying people without actually paying salaries could backfire. Government agencies might not approve. She might be putting the entire project in jeopardy. She insisted that it was okay. It is what we have to do to get the company started. Who could object?

Although Terry had not worked as an electronics R&D technician, she had worked as an assembly technician. She was good with her hands and very meticulous and detail-oriented. Her brother, Bill, agreed with Cie that

she would make an excellent technician. He could train her on the job. If we didn't use her, he reasoned, he or I would have to do the technician work. That was a waste of our talents. I was already becoming quite proficient at programming, after my own intensive on-the-job training. He intended to have me translate our software simulator code into the computer language of the Intel microcontroller<sup>6</sup> he intended to use as the electronic brains of the telephone. He was going to have to spend all of his time designing the microcontroller circuitry. To keep on a reasonable schedule, he'd have to focus all his energy on the design and have someone else handle the building of the physical hardware prototype.

Bill and I had already been meeting with representatives of Intel Corporation about becoming a beta site<sup>7</sup> for a new version of their flagship 8-bit<sup>8</sup> microcontroller<sup>9</sup>

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<sup>6</sup>A **microcontroller** is similar to a microprocessor but less complex and usually intended for embedded applications; that is, applications in which the processor and its functioning is at least partially hidden from the user, applications like microwave ovens and brake controls on automobiles.

<sup>7</sup>A **beta site** is a field test site for a product where actual end users of the product test it in real conditions to help uncover any final errors in the product's design prior to releasing it for sale to the general public.

<sup>8</sup>**Bit** means binary digit and stands for a simple logical switch. The simplest type of switch is either on or off. In logic, and in electronic/computer design, the binary digit "one" stands for "on" and the binary digit "zero" stands for "off." A data bit is the smallest distinct information you can process in a computing device. You can encode virtually any kind of information using patterns of ones and zeros.

<sup>9</sup>An **8-bit microcontroller**, or an 8-bit microprocessor, handles eight individual bits of data simultaneously. In 1986, 8-bit devices were the norm for mi-

of the time, the 8051. The new chip Intel was about to field test, called the 80C252, was faster than previous versions, used the then new and less expensive CMOS<sup>10</sup> technology and included beefed up RAM and ROM<sup>11</sup> on the chip. All these factors made the 80C252 an almost perfect choice for our product. We needed something fast and compact for our handheld telephone.

By becoming a beta site for Intel we got use of expensive, advanced equipment—especially an expensive in-circuit emulator<sup>12</sup> (ICE)—and not have to pay for it upfront. We got a jump on the market by being able to design with the most advanced processor of its type before most of our potential competitors. The downside, which

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crocontrollers. By contrast, Intel's Pentium® processor is a 32-bit device; Sun's current version of its Sparc® processor for high-end engineering workstations is a 64-bit device.

<sup>10</sup>**CMOS** stands for complementary metal oxide semiconductor, and is a specific process used in the manufacture of silicon semiconductor material. Since the late eighties, most semiconductor manufacture has used the CMOS process.

<sup>11</sup>**RAM** stands for random access memory and is the volatile memory that computers use for temporary storage while they are processing data; data in RAM disappears as soon as you remove its power source. **ROM** stands for read only memory and is non-volatile memory. This is backup storage, and designers often use it to store key programs that control a device's basic operation. Putting RAM and ROM directly on a chip as opposed to in separate chips speeds up access to the data the processor is manipulating.

<sup>12</sup>An **in-circuit emulator** or **ICE** system allows you to run your computer code on the actual device you will use in your finished product while you are still developing the code. You can tell exactly how your software will behave in the physical environment in which it will operate. With this system you can catch errors before you embed them in expensive hardware.

we didn't realize at first, was that supplying reports and feedback to the manufacturer consumed a large part of our time. This slowed us down considerably. In hindsight, becoming a beta site was a big mistake. We gained nothing and took about one-third longer to complete our design than we otherwise would have. In addition, after the beta program ended, though we were still forever away from a saleable product, we owed Intel \$7,500 for the ICE system we had agreed to buy.

## Chapter 5

### A New Company

During the late winter and early spring of 1986 Bill designed the control circuit for the phone, Terry built it under his guidance and I translated the computer code that ran it. In the meantime, the senior Heaths had decided that living in the midst of this hectic, all-hours workplace with a crew of their adult children overrunning the house was more than they wanted for the tranquil retirement years. Everyone was getting on everyone's nerves. Imagine six adults cramped together in a two bedroom converted fishing shack, half of which was office and you'll have the picture. The location was beautiful, even gorgeous. Overlooking a crystal clear, glacial lake, surrounded by tall oaks and blossoming dogwoods. The living conditions were straight out of Tobacco Road. The Heaths finally went on their long awaited cross country trip—and in the process take their son Bill's private office with them.

## **How Will We Raise the Money?**

Cie and Colleen, for their part, were working doggedly to find money, but without much luck. They did unearth a key contact with a small investment banking concern from Boston, The BankHouse. This went nowhere because they would give us money only if we agreed to turn over the entire company—all of the stock—to them if we failed to meet their arbitrary, unmeetable deadlines. By this time our own carefully worked out schedules showed what they asked was impossible with the level of funding they were willing to provide. In addition, we would have to work for them for a period after they took over if they wanted us.

In a recent conversation, Bill Heath told me he believes we would have been better off if we had taken the 1986 offer of \$1.5 million from The BankHouse. We had not yet taken any money from small investors. I had not put in a single dime. There was only the loan to First Fidelity Bank, which The BankHouse would assume as part of their loan/investment. Bill contends that we would have worked like crazy for a year, been able to hire competent people with the exactly correct skills, and may have been able to figure out a way to cut corners in the development or reduce the scope of the design and get an income producing product on the market in time

to meet their requirements. We might have to work for them for a little bit but they would have paid us salaries. In any case, if we failed, he would have no debt, I would still have my life savings and my mortgage-free house, and we would have been able to get back to income producing careers seven years sooner. It's hard to counter an argument like that. At the time, all we could see was that they—the evil VCs—were trying to steal what we were working to build. We turned them down.<sup>1</sup> I say “we” now, since I was now fully committed to the project and giving it my full time and effort.

The inability to get investment from large investors left us with one choice. Raise money from small investors (with an eye out for the big guys) or close up shop. We were sure we had a good product idea, so we didn't want to quit. Cie and Colleen, therefore, started making contact with friends and acquaintances who might be willing to invest in a startup with lots of upside potential. It was tough going. Neither of them had much prior experience with sales nor did they know anything about finance and investing. Their biggest asset was the training they had each received working as vol-

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<sup>1</sup>In actuality, we did not receive a firm, ready-to-sign contract, only indication that if we agreed to the terms there would be one. I have learned from many years of disappointments that you must not spend the money until it is securely and irrevocably in your account.

unteers for Werner Erhard's Forum, the self-help, motivational program that became very popular and successful during the eighties. Their work at the Forum gave them the beginnings of the self-confidence and the sales tools they needed to raise money.

The second asset was Cie's college friend, Kevin Clancy, who was happily married to one of her two college roommates. Kevin had become a lawyer and was a partner in a mid-sized New York corporate law firm that had a heavy focus in securities law. Kevin himself was a tax attorney, but was an invaluable resource in our fundraisers' on-the-job education. Throughout the entire history of Touchstone and then Kyros, Kevin was always the voice of sober, reasoned advise. He never tried to dissuade us from our insanity, as I'm sure he saw it at times. He saw his position as legal advisor only. He rooted for us and even invested a small amount of his own money, but he never interfered in our business decisions. When we asked, he answered. Best of all—according to our theory—he never charged. Later, when we started to need heavy duty assistance with private placements and such, we racked up some hefty bills with Kevin's firm. Fortunately, or unfortunately, Kevin talked his partners at Holtzmann, Wise & Shepard into deferring payment on their bills until we had the investment in hand (and

later, when raising the money proved so slow, until we had income from operations). Kevin, himself, to the extent he could, always advised us for free.

Kevin told us we had to form a new corporation if we wanted to raise money from small investors. He patiently and carefully explained all the options. With a subchapter-S corporation, our limit was 35 shareholders. There were advantages; each shareholder was able to pass profits and losses to his or her individual tax return and we'd avoid corporate tax. We could always convert later to a regular corporation. But we already had at least ten shareholders who weren't investing any cash. How would we raise the \$1–2 million we'd need from the two dozen or so slots we'd have left in a sub-S corporation? We had to find quite wealthy investors to get between \$50,000 and \$100,000 from each of them. We knew a few who fell into that category but even with them, there was no assurance they'd choose our company to invest in. Subchapter-S was out. A limited partnership presented similar difficulties—unwieldy as soon as you get beyond a handful of partners, unless you have a highly structured organization. The only reasonable choice—if we were going to have lots of small shareholders—was the regular corporation. It didn't seem like we had any real choice. Kevin recommended that we incorporate in

New Jersey to keep it simple. Later, if the tax advantages dictated, we could reincorporate in Delaware.

Next, we had to deal with the SEC regulations. Kevin explained that we had to select one of the “rules” under which to conduct our fundraising. The choice for us, according to the experts in his law firm, was between Rule 504, Rule 505 and Rule 506 of Regulation D. Regulation D permits companies to sell stock and raise capital without incurring the high expense (hundreds of thousands of dollars) of official SEC registration.

Although Rule 505 would allow us to raise more money in one offering—up to \$5 million—it was a bit like a sub-S corporation in that we could tap no more than 35 individual investors, and every one of them had to be what the regulations termed “accredited.” An accredited investor, in SEC-speak, had to meet certain stringent requirements: net worth, excluding primary residence and automobiles of at least \$1 million, or annual income for the past three years in excess of \$200,000, or a profession that by its nature indicated the person was sophisticated in the ways of finance and the stock market, for example, lawyer, accountant, stock broker. That left out most of the people Cie and Colleen were planning to approach. Rule 506 raised the ante, allowing you to raise an unlimited amount of capital in an

offering, but still from only 35 accredited investors.

So, as you might expect, we chose Rule 504. Though we all wanted to get the money in one lump sum, we didn't see how we could pull it off. Under Rule 504 we were only able to raise \$500,000<sup>2</sup> in any twelve month period, but we'd be able to structure it so we could use the money as soon as we received it. We didn't have to hold it in escrow until we had collected the entire amount of the offering. Better yet, we could solicit from and sign up as many investors as we wanted and they didn't have to be "accredited" investors. This, we thought, is the regulation for us.

I clearly remember Kevin explaining the negative aspects of taking investments from non-accredited investors. No matter what you say to them, they very often still don't understand the risks. If they decide to invest, they're looking at the potential reward and often totally discounting the risk that they'll lose their entire investment. There will be lots of handholding required that will take up your time, and by and large they don't add any expertise to your business the way savvy, well-heeled investors do. As long as everything is going well, no problem. Watch out for the time when the venture turns sour. That's when the small, unsophisticated investor is likely

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<sup>2</sup>The SEC has since raised the Rule 504 limit to \$1 million.

to scream the loudest. Cie and Bill were both willing to take the risk. They were the ones signing the papers and taking the risk if anything went wrong. They were the officers of the company. At this point, I was just a worker bee. In fact, I saw the company as too risky an investment. I had no intention of putting any of my money into it. If only I had maintained that admirable resolve!

No matter which SEC rule we chose to guide our fundraising, we had to prepare what's known as a private placement memorandum. The private placement memo lays out for potential investors, in a form and with content acceptable to the SEC, the details of the business you are asking them to put their money into. In addition, it outlines the risks involved, in bold type and forceful language. After reading one of these documents, you might think only a fool (of the type that's soon parted from his money) would invest in such a flaky enterprise. Here's a sample of the mandated warnings:

**“THIS INVESTMENT INVOLVES A HIGH DEGREE OF RISK AND, CONSEQUENTLY, PURCHASE OF THESE SHARES SHOULD BE CONSIDERED ONLY BY PERSONS WHO CAN AFFORD A TOTAL LOSS OF THEIR INVESTMENT.”**

The document goes on to stress the various other principal risks. To paraphrase: your money is only a drop in the bucket, we need millions more that we probably won't get; most likely this company will never sell any products or operate at a profit (and even if it does, you won't see any of it); the technology needed to create this company is incomplete and unproven (and besides, even though we might get a patent or two, there's really no way to keep others from stealing it); the company is dependent for its success on certain key people who, bozos that they are, could walk out on the street the day after you invest and get run over by an 18-wheeler; success depends on market factors the company has no control over; big public companies with vast resources are going after the same customers and will most likely blow us away in the unlikely event we ever even get a product ready for market.

Get the idea? It's hopeless and you're a dolt if you want to throw your money down this drain. Now, sign on the dotted line. The private placement memorandum was not going to make it an easy sale.

Besides the SEC, we also had to comply with the securities regulations of any state in which we sold our stock. But, not to worry. Kevin got his company to do all the paperwork for us and we didn't have to pay un-

til we raised the money. We were very grateful to Kevin and his Holtzmann partners. We even tried to get them to take a stock bonus for deferring their payment. For some reason that I guess other lawyers will understand, they thought accepting stock was unseemly—a conflict of interest or something. We could just owe them the fees.

Naturally, getting all this paperwork together—incorporating a new company, writing private placement documents, complying with blue sky laws, and so on, was taking some time. We, however, were still spending. Most of the \$40,000 second bank loan was gone by April 7, 1986 when we officially became Clarion Corporation, a New Jersey corporation. The name was a placeholder—on short notice no one in our group could think up a name we all really liked. Clarion would do. It seemed innocuous enough and the word did mean “clear”—our phone was going to have clearer sound quality than any cordless phone that ever before existed. But we still had to have money. Fortunately, Cie and Colleen had been able to use our software simulator and the phone models to good effect in a presentation to a friend of Colleen’s who owned a local jewelry store. He liked what he saw and made a loan of \$10,000 with the agreement it become 200 shares of stock as soon as all

the legal details were complete. We had our first paying shareholder. It seemed so easy. At this rate we'd have all the money we needed by the end of the year.

### **Divvying Up the Stock**

We still had to deal with the transitional problem of transferring the liabilities and assets of the project, then owned by Touchstone, Bill's company, to the new company, Clarion. And we needed to decide, precisely, who would get what share of stock. There was very little in the way of hard assets in Touchstone that belonged to the Talkman project. The Apple computers, the Compaq computer, a printer, an inexpensive plotter, Autocad and some other software, a few pieces of furniture (homemade bookcases and the like), whatever rights Touchstone had to the Intel ICE system (you might also consider the right to buy the emulator a liability). The real value, to the extent there was any at that point, lay in the idea, the design, the software we had written, and the hardware prototype of the phone control circuit. There were liabilities too, of course, principally, the \$90,000 in bank loans and deferred salary owed to various participants. Clarion got all of this, assets and liabilities, in return for 5,000 shares, 5%, of its authorized stock.

As for the rest of the stock, Bill and Cie decided on

the initial distribution of shares. Their original stock plan called for distributing less than 25% of the 100,000 authorized shares. In addition to the 5,000 shares for Touchstone (that is, for Bill), there were 5,375 shares each for Bill and Cie and 3,125 shares for each of their parents (in return for putting up their house). Finally, they “reserved” 1,000 shares for payment to all of us, including themselves, for the work we were putting into the early stage of the project. The company was to dole out these 1,000 shares according to a byzantine formula Bill invented—we would submit detailed work logs and get stock credit for every hour worked. I absolutely hated this idea and told Bill that I probably wouldn’t continue working for him if he insisted on it. I felt it was micro-managing of the worst sort to review what an employee was doing minute by minute.

They modified that initial plan within a few months after we found out from Kevin Clancy that it was better for us all, from a tax standpoint, if we received founders’ shares at the outset rather than earning shares as compensation. The combination of my fierce dislike of the scheme and Kevin’s tax advice finally brought Bill around. He agreed to give us founders’ shares based on the potential of our contributions to Clarion, as he and Cie saw them. So we started life as a corporation with

the following top shareholders: Bill 12,375; Cie 7,375; Bill Sr. 3,125; Shy 3,125; Keith 2,600. Little did I realize how many years of work without pay I was agreeing to for my 2,600 shares! Colleen, Terry and Terry's husband Bill got smaller shares. The starting officers and directors were CEO Bill, President Cie, Vice President Bill Sr., Secretary David Griffiths (another attorney friend of Cie's from Fordham), and Treasurer Bob Geib (a retired banker from New York's Chemical Bank who was a family friend).

The relationship between Bill and Cie, in running the company, was a strange one. Neither of them completely and absolutely trusted the other. Cie believed that Bill wanted to control everything. Bill believed that Cie would give away the store if he gave her half a chance. Cie wanted to build a "company," Bill wanted to build a product; complementary but not totally compatible pursuits for an early stage startup. To rein in what each of them saw as the potential excesses of the other, they agreed to share power. Bill would be CEO and Cie President, but they created in the bylaws of the company an executive committee consisting of two individuals, the CEO and the President, that had final say on all actions. Since there were only two members of the executive committee, they both had to agree before the company

could take any action. In practice, the shared power of the executive committee didn't last for even half of the company's existence. Still, I believe that this mechanism, while on the surface seeming to work pretty well and keep open conflicts between two strong-willed people to a minimum, was actually a contributing factor to the inaction and repeated delays that early on helped seal the company's fate.

Another subject Bill had strong opinions about was patents. From the beginning we talked about a patent policy for the company. We instituted one before we had hired our first outside engineer. With his father's patent experience and counsel firmly in mind, Bill almost religiously demanded that we let inventors share in the profits of products that used what they had invented. Cie also thought this was a good idea but she didn't bring the same force to her arguments that her brother did to his. Their father had more than a dozen patents to his name—mostly relating to inertial navigation systems used in aircraft and space vehicles. His company had given him as reward for each of his inventions, I recall him saying with disgust, \$100 and a plaque. He considered the sum grossly unfair. Bill, being a very creative, inventor kind of guy himself, as well as dutiful son, also felt strongly that the creator should share in the profit. In principle,

I agreed with him, but argued that it was a nightmare to manage. How do you determine what is the contribution of a particular patent to a complex product that may, in fact, incorporate several patents with varying degrees of usefulness?

Despite the difficulties of the problem, we came up with a solution that we all agreed was at least workable from a management point of view. Of course, we spent a good portion of our time over several weeks hashing out the details. What a misuse of time to even entertain such a “big company” issue like patent policy. We should have been building a product, not deciding issues that might not come up in our company for years, if ever.

Our solution was to create a patent board. The board was to consist of members appointed by management and members elected by employees, in equal numbers. The patent board’s job was to determine two key issues.

- what percentage of the gross income of each product should go to patent royalties;
- what percentage of the total patent royalty from a product should go to each patent used in the product.

In short, the board was to decide the contribution each patent was making to each product the company sold.

We never got to try out the patent board, even though we later patented our basic system architecture, because we never got a product to market. And, even given all our thought and discussion about the issue in those early days, we failed to take into account a situation that actually applied to us. What if the company has a patentable invention that it chooses not to patent in order to keep its details proprietary. In 1992 we applied for and received a patent but we also kept another potential patent secret. The first patent was obvious to anyone who looked at our system so there was no way to keep it a secret. The second invention existed deep within the design of one of our custom integrated circuits and could easily be kept secret. If we patented it, everybody would know its details and be able to look for ways to circumvent our patent. So we decided it was best to keep it to ourselves.

Should the inventors of the second idea be left out in the cold just because business strategy dictated silence? You might argue that the patent board could decide such a case. Perhaps, but the point is that no matter how much forethought you give to a problem, you can rarely consider all the angles. Wouldn't it be better policy to just handle the make-or-break issues first—the ones that will help build your business—and leave the esoteric, non-essential issues until you have spare time?

One issue we did have to deal with right away was the question of raising money. We had two willing and eager but inexperienced fundraisers in Cie and Colleen Heath. In order to assist them, we quickly set up a policy for finder's fees for anyone who brought us investors. Later we used the Lehmann formula—a standard in the investment game. But we hadn't even heard of it in 1986. So we decided that any outsider who brought us an investor got a finder's fee equal to 5% of the first \$100,000 of investment, 2.5% of the amount between \$100,000 and \$250,000 and 1% of the amount above \$250,000. If the investment was less than \$50,000, the finder got stock only; if greater than \$50,000 the finder could take up to half of the fee in cash.

Our finder's fee policy—even when we instituted the more generous Lehmann formula—wasn't as successful for us as we hoped. In those early days, while we were quite enthusiastic about fundraising prospects, we entered into an agreement—for example—with a former sales manager for Mountain Bell who seemed like he'd be able to enlist the entire state of Colorado to our cause. We didn't get a single investor from his efforts. His was a typical case. There were a handful of small investors whom we enrolled as a result of recommendations, but on the whole finder's fees turned out to be a relatively

minor adjunct to our capitalization campaign. Virtually all the money we ever raised, we got ourselves.

### **Friends and Family**

From Lenny Arkin, the jeweler, our first Kyros investor, Cie and Colleen started to branch out. Working mostly as a team, because they complemented each other's strengths and filled in each other's weaknesses, the sisters Heath looked for other investors among family and friends, associates, and friends of friends. After the fact, reviewing eight years of fundraising, if you examine where the Kyros investors came from, you'll find three sources. You can trace virtually every Kyros investor—close to 150 of them—to one of these sources. The farthest you get from one of these primary sources is one person—in other words, no farther away than a friend or associate of someone in the primary group. The three groups of investors were 1) Heath family and friends, 2) people whom one or the other of us, mostly Cie, met in taking courses at Werner Erhard & Associates (WEA), 3) the Wayne (NJ) Rotary Club.

Most of the \$100,000 or so raised during 1986—the first eight months of Clarion Corporation—came from Cie's friends at WEA, followed closely by family members. The following year most of the investment came

from members of the Wayne Rotary Club, growing out of two key 1986 investments—Lenny Arkin, our first investor, and Tom Voelkner, our biggest promoter, both members of the local rotary club. But first, Cie and Colleen approached their relatives.

The Heath parents had come east from the Colorado plains when Bill Sr. went to graduate school at Columbia University in the late forties, after World War II. Successive jobs kept the rapidly growing family in the New York area. The rest of both parents' families remained in eastern Colorado, Shy's in Fort Collins and Bill's on the farm in Lamar. The Lamar farmers, in particular, prospered during the seventies and eighties as American grain growers began to export their excess output around the globe in huge quantities. Bill and Shy prepared a list of all the relatives they could think of who might be in a position to invest. They called each and explained what "the kids" were up to. Then Cie and Colleen hopped on a plane to Colorado to visit personally, to get to know the extended family they had never met and to tell them about the Clarion telephone. They scheduled about a week for their Colorado trip but ended up staying a month.

Colorado was the first sign they had of how difficult it was really going to be. Even with family members

who you might believe trusted you implicitly, it was a tough sell. The sales resistance to buying shares in a startup company is fierce. To sell someone who is not a professional investor shares of an untested company, you have to overcome layers of emotion.

First you need to gain their respect for your ability. They have to believe that you and your company know what you're doing. Without this respect you get nowhere. But respect will only open the door. It won't open the pocket book. The potential investor has to believe that your company is the best opportunity he or she can get at the moment. He or she has to believe that the risk is worth the reward. You have to show big potential reward with as small a risk as he or she can stomach. You have to show that market conditions are right for what you're making and big enough for you to make a business, that you can indeed succeed in making the product you propose and that your company will be able to sell it (or at least sell out to a bigger company for a good profit). You may, in the process, if you have a technical product, like we did, even have to explain to them how it works, only in the very simplest of language, but so they at least think they understand it.

Then, if you've accomplished all this, you still have to get them to trust you. You have to create relationships

with the investors that are so strong they think you can walk on water. Then and only then will they freely part with their cash. In fact, once you accomplish this last step—the trust step—the other steps won't matter much. It's just that you'll probably have to go through the other steps before you can get to the trust step. I don't believe there was a single investor who put money into our company who did it from any reason other than the relationship of trust formed with one or the other of us. They may not have been able to articulate it as such, but trust was the prime, underlying factor in each investment.

### **So How Do You Build a Radio Anyway?**

While the sisters worked at raising the money, Bill Heath had moved on to the next stage in the technical development. We had completed a breadboard (a hand-wired functional prototype) of the user functions of the telephone, but we still needed the most important element of the design—a radio. This product, after all, was to be a wireless phone. Bill spent the summer and fall studying spread spectrum technology. There was actually little information readily available at that early stage in the commercialization of the technique. A few scattered monographs here and there. He read them all; everything he could get his hands on. Because we couldn't

find any company to build the complete radio for us, we had to develop a way to implement spread spectrum, out of necessity, that simplified the radio frequency engineering required in the system. Bill consulted with an engineer named Conrad Grimsby who designed spread spectrum systems. Conrad came up with the basic system architecture. Under this design, we didn't, for example, have to implement complex and expensive phase-locked loops to control the signals. Unfortunately, all this study took a lot of time and we were burning more money than Cie and Colleen were bringing in.

Conrad's technique shifted the analog<sup>3</sup> complexity of radio frequency engineering to a more manageable digital realm. This saved a very large portion of the cost of the final product and allowed us to proceed with the development with the skills we had in the company already. There was still a big cost to the development. We had to build a custom integrated circuit (custom chip) that incorporated this digital control design Bill was developing. Custom chips back then did not come cheap. I was contacting the various potential suppliers and finding out that it would cost us several hundred thousand dollars in upfront costs to make the chip. We had to raise

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<sup>3</sup>In engineering, analog refers to a physical phenomenon that varies infinitely, like the loudness of a sound, while digital refers to representing a phenomenon with ones and zeros by reducing it to a discrete number of steps.

that money before we could fully test our design. Besides that, it would be very slow going because we didn't have money to buy the expensive engineering workstation computers with sophisticated software usually used to do this kind of a job. On top of that, we still had to build what engineers call the radio front-end—the part of the radio that actually transmits and receives the signals.

We didn't let this stop us though. Personal computers were starting to come into their own. Engineering jobs that a few years before took a room full of computing equipment could now be done on the PC, albeit at excruciatingly slow speed. Here was another of our mistakes. We chose to continue working on this complex project without the correct tools. We were spending money at a rate of \$10,000 a month. With the right tools we could have finished the design work in a quarter of the time. Yet we didn't have money to buy the tools. Of course, the correct move would have been to switch to a simpler project that didn't need the expensive equipment. A software product would have been perfect for our first product. In our foolish commitment to an inadequately developed business idea, we plunged forward, admitting to ourselves and to our early investors and bankers that we had gone down the wrong path.

Once Bill had a firm concept of how to proceed with the design, he told me he had to have our own RF engineer. We needed someone like Conrad, who wasn't available. RF engineers are hard to come by. Many engineers call RF engineering a black art or voodoo because it is so difficult to quantify what is happening in radio systems. There is a lot of trial and error involved in developing an RF system. The good RF engineers have no trouble getting very good jobs at high rates of pay. All we could offer was a chance at the brass ring. We couldn't offer any cash compensation, let alone at the level such an engineer was used to. This of course limited the already narrow field to unmarried engineers who had saved and invested a lot of their earnings. Practically no one with a family could consider what we were offering. Bill asked me to see if I could find someone who would work for nothing. Of course, we'd give the person stock in our company, but who knew when or if that would be worth anything. It seemed like a hopeless task, yet I agreed to work at it.

While I was checking all the usual places you might find engineers lurking about, I decided to mention it to everyone I met. At the time I was singing in a choir at one of the local churches. I love music and this was the one recreation I had not removed from my schedule after

starting to work ungodly hours on this project. It turned out, in one of those amazing quirks of fate, that the fellow who sang next to me in the baritone section worked for Lockheed Electronics as a manager of RF engineering. He was about 65 and getting ready to retire. He and his wife planned to be really retired and he had no interest in working for a startup company. Besides, he said, he had been a manager so long he could hardly tell a volt from an ohm. But there was a guy who worked for him who might be interested. He was single, about 40, lived with his mother and was a first-rate RF board designer. He reported back to me at the next weekly choir rehearsal that indeed his engineer wanted to talk with us.

That's how we met Mark Rudy. I had an enjoyable conversation with Mark on the phone one evening. I explained what we were doing and what we needed him for. He agreed to come one day after work and talk to Bill and me at length. We both liked Mark right away—he was very straightforward and focused on the job at hand. Mark had a ton of experience with a half dozen big name defense contractors. He had gone to college and graduate school in physics and engineering after several years as a military antenna technician in remote places like Alaska. I think Mark liked the puzzle of trying to find an exact answer to a problem in the midst of the enormous pile

of inexact clues that radio phenomena presented. Fortunately, Mark lived only about 15 miles away from the Heaths' Pine Tree Road house and was, anyway, able to do much of his work at home. Not only did he agree to work for us part-time, wisely keeping his well-paying day job as long as he could, but he also offered to invest \$10,000 in the enterprise.

Though for our needs Mark had the shortcoming of not having direct spread spectrum experience, Bill (a non-believer) felt his appearance was akin to a miracle. All Mark had to do was design a standard front-end for our 49 MHz<sup>4</sup> radio. Our design had removed the control portion of the radio—typically part of the RF domain—to the more easily managed digital realm. Bill thought the two of them would be able to build a working radio, and, in fact, he was right.

Even though we were building a spread spectrum radio, we built our first prototype system at 49 MHz, the segment of the radio spectrum reserved by the FCC for cordless telephones. In 1985, the FCC had set aside three frequency bands for commercial spread spectrum development: 902–928 MHz, 2.400–2.4835 GHz and 5.725–5.850 GHz. It seemed to us that even though the regu-

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<sup>4</sup>MHz stands for megahertz, a measure of frequency that equals one million cycles per second; GHz stands for gigahertz that equals one billion cycles per second.

lations set aside special bands for spread spectrum, we were able to comply with the regulations at 49 MHz since we were building a cordless telephone. Bill concluded that we could meet the letter of the law. Our spread spectrum signal so spread out the power that we would be transmitting below the level the FCC considered noise. We chose 49 MHz because the lower frequency gave our system better signal penetration in an indoor environment where cordless telephones for business were likely to operate. Later, Bill found out from Mark that he couldn't make an antenna that worked for a wide spread spectrum band at such a low carrier frequency. This was an error, but not a costly one in terms of cash outlay. Mark built the entire 49 MHz radio from scrounged, surplus components, and he had it finished before Bill had finished the more difficult and expensive control circuit.



## Chapter 6

### “The Forum” Wins Over Kyros

Given that I devoted a large chunk of my time during the seventies to reading avant-garde poetry and modern literature, to studying Zen and the environment, to examining how to better myself spiritually, and to other eclectic sixties-like pursuits, it's surprising I never connected back then with EST, the Erhard Seminar Training. I had read snatches about EST in the popular press and had always come away thinking it was too flaky, even for me. Since it didn't come my way spontaneously, why bother chasing after it? By the time Clarion Corporation came into being, Werner Erhard & Associates was a well-established organization. They were presenting programs in all major cities, not just in the United States, but all over the world. A new keystone course called the Forum had replaced the EST training. Almost a million people had taken at least the introductory program

(either the Training or the Forum). Respectable corporations like AT&T regularly sent their employees to take the courses and their top executives for expensive sessions with Werner Erhard himself. Concepts developed by Erhard and his Forum leaders had made their way into American popular culture. Advertising slogans that used the word "possibilities" were rife and could often trace their ancestry to some ad executive who had taken the Forum and whose consciousness had consequently filled with the power of "positive speaking."

### **We Take *The Communications Course***

As a company group, our first experience of the Forum came in the fall of 1986. We had a little money in the bank from the good work Colleen and Cie had done the preceding summer among their relatives. While the money wasn't enough to complete the job, it was enough to build our confidence that we could get the rest. We were feeling pretty good about ourselves and what we could create. Cie came to me one day in October and said she was planning to have a friend who was a business consultant come and make a presentation to the company about a communications course Cie thought we ought to consider taking. The idea was to improve our ability to communicate clearly, directly and without upset. We

could then decide as a group whether or not we wanted to take the course. She and Bill both thought it was a good idea. They wanted to know how I felt about it before they went ahead and spent the company's money on the course. I could tell Cie was tentative about asking me but I didn't know why. Better communications between people is always a plus, so I said it sounded like a good idea if the course was good and wasn't too expensive. I asked Bill for his opinion about it. He told me about Werner Erhard & Associates and said he thought the course was worthwhile. I believe he said, "can't hurt," in the manner he has of giving a light stamp of approval. Cie had not mentioned Werner Erhard, but it didn't make any difference. Bill thought it was good and I trusted his judgment.

Barbara Fittipaldi, Cie's friend, showed up a week or so later. She was a tall, elegant woman who appeared to be in her late forties. Barbara had an extraordinarily clear and genuine way about her. No wasted words and she connected with you at once. She made one of the best presentations I had ever heard. The course emphasized listening more than speaking. The course taught that if we hold what we say to others as sacred, and treat what we say as a real commitment to the person we say it to, our lives will run smoothly, our communications will be clear, direct and powerful, and we'll be able to

accomplish great things. It showed you how to create various “conversations” you need to have to accomplish tasks with other people; for example, “conversation for being related” (getting to know other people and letting them understand that you appreciate them as people, not just as a tool to get something done), “conversation for possibility” (discussing freely, without any constraints, anything that might apply to the task at hand), “conversation for opportunity” (making a list of the best options available, usually chosen from the items you talked about in your conversation for possibility) and “conversation for action” (basically a step-by-step plan in which you lay out not only the steps each person has to take but also each person’s accountabilities to the project—by when will you have it done?).

It seemed to me that if this course she was touting could instill in the people on our team half the straightforward, no-nonsense communication skill she was exhibiting, we ought to be able to accomplish anything. Barbara also told us that Werner Erhard, who was responsible for the Forum and the Training (“EST” ), had designed this course. I discovered later that she was training to lead the course. In my arrogance, I believed everyone else on our team could profit from the course, but that I really didn’t need it. However, the only way it

would work was if we all took it together. I was happy to take the weekend course for the good of the group. I became an enthusiastic booster.

Prior to showing up for the Friday evening opening session of the course, the six of us who took it—Bill, Cie, Colleen, Terry and Bill Rickard (the other Heath sister and her husband) and me—each had a lengthy phone conversation with a WEA volunteer. The young man with whom I spoke (he told me he was twenty-one when I asked) impressed me with his maturity, sensitivity and, just as with Barbara Fittipaldi, clear, no-nonsense talk. He explained the course, repeating much of what Barbara had said, then asked me what I hoped to accomplish by taking the course. We talked for about a half hour about my aspirations for Kyros and the role good communication skills had in it. Politely but firmly, he wouldn't accept me into the course until he was sure that I had something personally at stake in taking it. It wasn't enough that I wanted the others in my group to get some value; not sufficient that I was going to do it to support our team. By the time the conversation was over, I had clarified for myself, with his help, not only what the course could mean for me but also the heretofore unappreciated level of commitment I had already made to the company and the extent to which I valued the friend-

ships I had built with my partners. As intended, that brief conversation with someone young enough to be my son, prepared me for the course and lifted my spirits.

Each of my subsequent contacts with people associated with this organization were equally positive. I was looking forward to the course and it didn't disappoint me. The leader, Mark Kamen, told us he lived in Texas. I guessed that he wasn't a native, since he had no Texas accent. As I had by now come to expect, he presented himself and the materials with self-confidence. The course itself was, as I discovered of all Werner Erhard courses, an eclectic mix of psychology, philosophy, Zen, sales pitch and revivalism without the religion. The Erhard technique brought you beyond mere understanding to a point where you could internalize the content of the course. You actually owned it to the extent that you could operate your life from its simple, humane principles of integrity, respect and striving for excellence. Always the goal was to provide the tools by which you might "transform" yourself into a being beyond what you previously thought possible.

I remember vividly, after twelve years, how Mark Kamen illustrated the power we all have but seldom use of making something so by declaring it to be so. He read us key passages of the Declaration of Independence. "We

hold these truths to be self evident, that all men are created equal....that these colonies are and of a right ought to be free and independent states...for support of this declaration, we mutually pledge to each other our lives, our fortunes and sacred honor.” There was no nation, no United States of America, until that ragtag band of farmers and merchants, in a supreme act of chutzpah, stood up to the British empire and declared it to be so. They put everything on the line. By the power of their *Word* and their words they created something out of nothing. We each have that same power if only we have the courage to use it. If we will put our sacred honor on the line, there is very little we can’t accomplish. The beauty of the idea and the power of the presentation moved me enormously.

Our appetites whetted, at the end of the course, Bill Heath and I both signed up for the Forum, the foundation course in Erhard’s program. Terry and Bill Rickard followed suit not long after. Cie and Colleen were already Forum “graduates.” Within a month I was also in WEA’s Forum leader’s training program. I didn’t last long there but over the next few years, in the midst of trying to make Kyros work, I took every course WEA had to offer, among them, the follow-up Communications Course, the Six-Day Course, the Introduction to the Forum–Leader’s Program, the Assistant’s Training Program,

the Presentation–Management–and–Enrollment course. And, I spent a good deal of my spare time, what little there was after 60 to 80 hour work weeks, assisting as a volunteer at the various courses WEA put on in New Jersey. Cie spent much more time than I did assisting with the Forum, in my opinion to the detriment of Kyros.

Personally the entire experience gave me a renewed zest for living. However, I also believe that my and our company's close connection with Werner Erhard & Associates got in the way of us making the tough decisions we needed to make. When we needed total focus on the job at hand, two of the key players in our management team had divided attentions.

## **The Forum**

The basic idea of the Forum, as I understand it, is to clear the cobwebs out of your brain so you'll be open to the beauty life has to offer, be mentally free to accomplish tasks you never dreamed possible. The course attacks the preconceptions and prejudices that keep each individual rooted in the past and unavailable to take part fully in what's happening right now. My experience of the Forum and the other WEA courses I took as a result of my association with Cie and Bill Heath, who introduced me to them, was completely positive. The prac-

tical effect on my life, however, was both positive and negative.

The positive effect occurred almost at once and has built steadily ever since. The Forum turned me in a direction that has let me continually expand my enjoyment of life. My ability to relate to other people improved dramatically. Since my first contact with a WEA course, I have found I am much less likely to jump to conclusions about someone's intentions, especially when he or she says or does something that rubs me the wrong way. I listen better; not just for the words that come out of someone's mouth but also for the meaning behind the words. I can recognize—not just intellectually—that our words carry a different set of associations for each one of us. I actually knew much of this before taking the WEA courses, but for some indefinable reason there was no connection between intellectual knowledge and my actions and responses. Now I interact more clearly and freely with most everyone. I have stronger, deeper friendships and better relationships at every level.

The negative effect on my personality was also immediate, but fortunately disappeared over time. Before the Forum I could focus on a task and get it done quickly, efficiently and precisely. After the Forum—particularly for the next year or so—it seemed I had forgotten how to get

things done. The opening line of Kurt Vonegut's *Slaughterhouse Five* comes to mind...Billy Pilgrim had come unstuck in time. It was as if I had come unloose from my moorings and was adrift at sea. The soulsearching and self questioning that the Forum prompted led to a disintegration of the emotional underpinning of my life. I needed to establish a new foundation from which I could operate effectively again. It took time. Eventually, I was as effective as before and at the same time freer and more open to what life set in my path. I enjoy life a hell of a lot more now and also make what I consider are better decisions about what to do with the relatively brief time we each are here. But not at first. Unfortunately, in that "unstuck" frame of mind that dominated my life for a year and lingered for several years beyond, I made some decisions that had serious lasting impact on my financial security.

I believe it's accurate to make a direct correlation between the financial choices I made from 1986 to 1990 and the effect of the Forum on my sense of judgment. You might interpret what I am saying as a criticism of the Forum. I don't mean it as criticism. On the whole, my contact with the Forum was one of the most positive events in my life. At the same time, while I was fishing around for a new model of how to cope with

life—a larger model that also included deeper, richer relationships—I lost sight of my long term financial goal, namely, financial independence.

After the Forum, I started spending money above my income level. I had significant, but mostly non-income-producing assets and very low fixed expenses. As long as I kept my spending in line and kept an eye on my investments, my asset base would continue to grow without me bringing in additional income. But now, even though I didn't have a paying job, I was increasing my outflow of cash in a major way. This was totally out of character for me. I had always been extraordinarily frugal. I once spent six months in Europe, including four months in Paris—one of the most expensive cities in the world—and spent less than \$500 including airfare to and from New York. And I had a wonderful—no, glorious—time of it to boot. Part of my portfolio came from an unexpected inheritance from a great aunt. Her handwritten will said she was leaving part of her estate to me because she had confidence that I would use it wisely. I had that reputation among my family and friends.

Now everything I did was upside down. I was viewing my life savings more as a Christmas present that I could spend at will, indeed even frivolously, rather than as the basis for my future financial security. Easy come,

easy go. Live for the day. Seize life. So I bought a new car though the car I had was absolutely adequate and I didn't need a new one. Then, not too much later, I bought an expensive sports car that I definitely did not need. I enrolled in just about every Werner Erhard program, including some that had me traveling all over the country, though the basic program really gave me everything they had to offer. In fact, although they undoubtedly disagree, I believe you can get as much value out of volunteering to assist at their programs as you'd get out of paying for and taking the programs. I could easily have limited myself to being the perennial volunteer. I wanted more. I insisted on paying. Though I didn't last long, I went so far as to join the Forum leader training program, thinking I might devote the rest of my life to spreading this powerful work. Before it was over, I had spent almost \$15,000 on WEA programs, all while I lacked "gainful" employment. I attended a fundraising party for hungry children and made the \$600 winning bid for a dance with the beautiful girl. This from a guy without a paying job. At least that money went to a good cause. I took an apartment even though I had a perfectly fine rent-free place to live—a house in an expensive neighborhood, with a workshop and a garden that I loved. My foolishness knew no end.

Then of course I began to support Clarion Corporation financially. At first I just loaned small amounts of money to Bill—who, besides having no regular pay, didn't have the assets to fall back on that I had. The theory was that I was allowing him to continue to work on the development with the minimum investment. If I had invested directly in the company, the money first had to go through the tax grinder—federal and state income tax, social security tax, etc.; it would take a lot more for him to end up with the same number of dollars in his pocket to live on. Just as important to me, it let me maintain the fiction that I wasn't really investing in the company, just helping a friend. I was kidding myself into believing that I was still keeping my distance from the company. I didn't want to commit. Actually, my loans to Bill, and then on a smaller scale to Cie, were drawing me in deeper and deeper. All the time I told myself I was just helping out some friends. In this state of suspended judgment I was operating in, I quickly graduated to investing sizable chunks of my capital in what was the most speculative investment I could have chosen.

### **The Positive and Negative Effects on Kyros**

As much as the Forum hooked me, it hooked the company even more. Cie, the first of us to connect with EST,

became the biggest promoter of the organization. She wanted us to hire only people who had completed the Forum as employees. Initially both Bill and I resisted this idea because we knew we wouldn't be able to find the qualified engineering staff we needed if we limited ourselves to Forum graduates. After a while, and especially after I became very entrenched in the affairs of the Forum, we relented and we all agreed that we insist that everyone we hired as a full-time employee complete the Forum as soon as possible after joining the company. The company, of course, would pay for the course as a condition of employment. We felt, with some justification, that the communications skills the Forum imparted to people were worth the expense in increased teamwork and productivity. What's the trouble with that? Well, we were again making decisions as if we were a big company and not the struggling startup that we were. An established concern can afford these expenses. We could not.

It was around this time, in 1987, that we changed the name of the company from Clarion to Kyros. In fact, we would not have found this new name for the company if it hadn't been for the Forum. Cie, Colleen and I were spending a large part of our time volunteering at the Forum. In the course of this unpaid work, we met

a massage therapist named Sol Trager. Colleen became good friends with Sol. He agreed to give the then small staff of Clarion massages in return for stock. Sol was so dedicated to us that, even though our staff grew, he continued the massage therapy for stock for more than five years. Not long after Sol started working with us, we decided we had to change the company's name. We were getting regular calls—many each week—from owners of Clarion car stereo systems complaining that their radio's quality was anything but clarion. We hadn't known about this other consumer electronics company with an established market presence. We were discovering not only that it existed but that perhaps its reputation was less than sterling. None of us had liked the name "Clarion" in the first place. So we were hunting for a new name. We had list after list of names to consider. Always someone had an objection; always some reason why it wasn't right. Then one week Sol came in with the name "Kyros." I forget now where he found it. Perhaps a Greek client suggested it to him or perhaps he read it in one of the new age books he favored. In any case, we all loved it at once. The word means crystal in Greek and gave exactly the connotation of clarity that matched the clarity of our phone. The sound of the word was strong and clear, like Exxon or Xerox.

Even now I think Kyros is an excellent name. Again, though, we were making big company decisions on a small company budget. We probably spent more than 100 manhours working to find the new name. Bill and I could have used most of our name change hours more profitably working on the development; Cie and Colleen could have spent their name change hours contacting potential investors. By this time we already had seventy or eighty small investors. Each of them had a stock certificate with the name Clarion on it. We had to retrieve those certificates and issue new ones, another administrative task that did not advance the work of building a product.

By requiring employees to take the Forum, almost like a crusade, we caused our company much extra turmoil. A sizable number of potential employees, from that small pool who met our other unusual criterion of being willing to work for stock instead of cash, refused to take the two-weekend course and went away. We justified the policy to ourselves by saying that if someone wasn't willing to do this course geared toward communication and teamwork, that was a sure sign that he or she was not going to be a strong member of our team anyway. There was one time later when we hired four engineers within about two months of one another. All four did the Forum at the

same time. One of them was very negative about the program going into it and he poisoned the views of the other three who were initially open to what the course had to offer. The group got very little out of the experience, they wasted two weekends and Kyros footed the bill yet again for virtually nothing.

A significant positive effect of the Forum came from Cie's and Colleen's increased ability to present the company to potential shareholders. The two of them seemed to become more and more self confident with each WEA course they took. Also, during the first year of fundraising, a significant portion of the money they raised came from people they met at Werner Erhard events. The two sisters worked together very well. They were a special team. Unfortunately for our income stream, in mid-1987, Colleen decided she would rather work as a full-time staff member of WEA. That unique partnership ended, Cie's fundraising income slowed dramatically.

With our company in desperate financial straits and unable to continue without an infusion of cash, I loaned Kyros \$20,000 that fall. I believed we were developing a superior product and that we could succeed in getting it to market. The Forum gave me the stimulus to take greater risks. So, in order to succeed with those activities I believed in, I had, by this time, committed myself

to making Kyros a success "no matter what." I now had the title Executive Vice President. Big title, same job, but with this new sense of commitment and resolve. Despite reservations about the excessive overhead we were running, I thought I shouldn't let this effort die after devoting two years to it. A few dollars won't hurt me; just enough to tide us over until Cie can bring in the big bucks. She had several prospects lined up that seemed very serious. I could take a chance.

What I didn't count on was the collapse of the stock market a month later, in October 1987. The crash had a dual impact for me. It reduced the company's ability to raise money from outside sources, putting pressure on me invest more, and it reduced the value of my personal assets. I was not only fully invested in the market, I had margin in my brokerage account. My largest assets were the two houses I owned—the better one was the Pines Lake house I had lived in and that my parents were still living in, the other a rental that I owned with a partner. As with all residential real estate neither was very liquid. When my first \$20,000 loan to Kyros was gone, and I was thinking—without any logic—that I had to put more money into the company to "protect" my investment and to keep the operation alive, I panicked. Instead of waiting patiently for the market to recover, as I would have under

normal circumstances, I sold everything in my margin account at what, for a portfolio the size of mine, was a huge loss. At least I now had enough cash to live on and enough cash to put into Kyros when needed, as I could see it would be.

When the “big money” that had looked so promising failed to materialize in the Kyros coffers, I decided I better keep all the cash for my living expenses. I beefed up my cash a bit when I convinced my rental house partner that we should sell and get our money out since it only provided a minuscule positive cash flow. Then I took out a mortgage on my house and invested the proceeds in Kyros. I believed this money would give Kyros enough to at least complete our product prototype. We were sure that if we had a working prototype, getting the rest of the money we needed to market our product would be a snap.

Here I was, my assets drastically reduced by the market crash, taking out what ended up as a \$208,000 loan on my otherwise mortgage-free house to make the riskiest investment one could make. What could I have been thinking of? On top of that, Bill and Cie convinced me that options for 1200 shares of Kyros stock, at an average exercise price of \$300 per share, was sufficient compensation for my \$208,000, though their parents had

received 6250 shares—not options—for a much smaller \$90,000 loan. My one sop to common sense was insisting that we reserve part of the proceeds of the loan to make payments to the mortgage company, and that loan payments always be the number one priority when we paid bills. With our heads firmly in the clouds, we believed that Kyros would be able to repay my loan within a year or two. I was operating under the spell of the Forum's culture of "possibility" without having absorbed its equally strong call to ground yourself in reality!

The biggest negative of the Forum on our company was stealing time from our business. First Colleen, Cie and I, then after Colleen left us, just Cie and I spent large amounts of our time working for the Forum. It was as much a deficit in our focus on the business as it was a diversion of our time. Our primary attention was clearly elsewhere. Bill was furious at this turn of events. He reined me in by forcing me to choose between Kyros and WEA. It was fine with him, he said, if I chose WEA, but if I did he had to replace me. I had too much invested emotionally in Kyros to give it up, so I chose to cut back the time I spent on Forum related activity. Cie was a different story. She had a strong commitment to Kyros, but she had an equally strong emotional commitment to the work of Werner Erhard & Associates. Also,

she was Bill's big sister. It was mighty hard for him to tell her what to do, even though he was the boss. She spent a good part of each day on the phone with her WEA friends—admittedly a fair amount of the investment in Kyros came from these friends. But Bill and I were both continually telling her that sales is a numbers game. And she was definitely in sales, the toughest kind of sales. You have to make, let's say, a hundred contacts for every two or three sales. You can't spend all your time with the same people—in her case her WEA friends. You have to expand your contacts—you have to make cold calls when necessary. If you can't do it, then we have to rethink the whole premise of the company. She insisted that she could do it, but continued to ignore this advice. She kept up her pattern of contacting the same people over and over again. Over the years, very few calls to new people. It was a battle that lasted until Bill finally summoned the emotional courage to fire his sister in 1991.



## Chapter 7

### New Digs

We kept running out of space. It's an old story among fast growing businesses. The company started in Bill and Shy Heath's little house at Glenwild Lake. After all ten of their kids had grown and left home, they moved from their large house at Pines Lake, where they were my neighbors across the lake, to the little cabin. Shy was fond of saying three things about their new home...its just an old fishing shack...reminds me of Tobacco Road...there's nothing structural about this place. I'd say she was close to the mark on all counts. Soon some of the kids were back—tiny as the place was, built into the side of the hill overlooking the lake, only one and a half bedrooms—not just the kids, but the paraphernalia of their business as well.

## **This Old House**

Bill and Cie were only going to live there for a short “getting-started” stay. But as the weeks stretched to months, the desks and chairs and bookshelves and workbenches and computers accumulated, and more and more of the furniture got squeezed out to the garage and to the homes of siblings near and far. Then Bill and Shy themselves got squeezed out into the wide open spaces of the American West, a trip later cut short after a year when a freak tornado swooped down onto a highway in Arizona throwing them and the camper more than a hundred feet. That accident left the RV demolished and Shy near death. Now they were returning, but the kids had stuffed the fishing shack to the gills. The old house was simply too overflowing to contain both recovering parents and enterprising children.

That’s when we decided to move the company out. The tenement-like overcrowding wasn’t the sole reason for leaving the nest. Cie believed that unless we had a “professional” presence, she would always have trouble raising money. She needed a place to bring investors. She had to show them we were real. She attributed some of her difficulties in fundraising to the locale. The old fishing shack just didn’t cut it. Bill was an easy sale on this idea of a new office. All he wanted at that moment

was an office with a door that closed to shut out the hubbub so he could concentrate on his work. Ever since the parents had left town with the camper that had been his private office for those few gloriously productive months, he had had to work, however fitfully, in the same room with a half dozen of the rest of us.

They made their choice. To move as soon as possible. Money would be tight, but wasn't that how it was supposed to be with a new company?

### **A Place of Our Own**

We all set our sights on finding an inexpensive but presentable office as quickly as we could. I took Bill and Cie around to several places in the neighborhood I had seen while searching for a permanent location for Al Fielding's import business. One of these was a stately Victorian owned by a local church. The building would have made a wonderful office—just the right size for us—but the price was too high and it came with too much “baggage.” It seems its former owner had died and left it to the church with an armful of restrictions on how they could use it, including how much they could rent it for. I passed it every day on my way to work at Kyros. It was years before they found a tenant—a social service agency—willing to put up with all the deeded require-

ments.

We spent weeks looking for just the right place—yet another diversion of time and energy from the job of building a product we could sell. Eventually we settled on a place in the neighboring town of Riverdale, New Jersey, set back off the northbound lane of Route 23, the main local artery. The new location was about half way between the Heaths' house and my house. For the others, it was no more or less inconvenient than the previous location. Mark Rudy, our RF engineer, came the farthest, but he worked mostly at home so this was fine with him.

The Riverdale building belonged to Bill VanHouten, the scion of one of the old families of the region. VanHouten ran a trucking company out of the posh upstairs office. He rented out the two utilitarian downstairs offices, each about 1200 square feet, for about \$1000 a month. We rented the vacant one. The price was right. The offices were good-looking. Best of all, we thought, they came with built-in desks and the control box for a small PBX phone system, all left by the last tenant. Despite Cie's mild misgivings about the man, we thought the landlord a friendly enough chap, someone you could deal with, so we believed we had made a good choice.

Bill took the office in the back, against the mountain. There were no windows, which he didn't like, but he

could close the door, which he did like, decidedly. In fact, the only windows in the space were those that gave on the valley below through which the highway ran. After Bill got himself set up the way he wanted, with my help, he was happy as a lark. Cie took the other private office and immediately filled it up—much to my chagrin, fastidious as I am—with boxes and stacks of papers and magazines she had been squirreling away for the elusive moments when she got time to read them. Both Bill's and Cie's offices had built-in desks and storage cabinets.

We used a third room for a joint lunchroom/conference-room. The last of the four separate rooms, and the largest, I shared with the extensive engineering library (actually Bill's private library, plus the thirty or so industry magazines we tracked) and the "lab." The lab was the work-room where we stored components, built prototypes and tested designs. The front space—the large space with a wall of floor-to-ceiling windows that greeted potential investors and suppliers when they visited—had five built-in desks. Colleen and Terry (but not Terry's husband, Bill Rickard, who had since left Kyros to get a paying job), Lynn Dolan, our part-time receptionist/clerk, Tom Nelson, a part-time draftsman, and Mark Rudy, our RF engineer, when he came to the office, shared this space. We also had several

other part-time engineers who worked out of their homes and came to the office only for occasional meetings.

The office worked quite well even though the back rooms were a bit dark and needed continuous use of fluorescent lights that none of us liked. I remember that Bill and I were putting in 100 hour weeks most of the year we spent in the Riverdale office. We were working very hard and getting a lot done. Bill completed his study of spread spectrum modulation and designed the first prototype of the control circuit for a Kyros radio. I assisted him with all of that, but was now spending much of my time on “business” tasks. Consequently, most of what I was doing fell into a category I’d call “tasks better never tried.”

### **Whom Do We Impress?**

A prime example of one of the time-wasting tasks I took on was finding and dealing with an auditing firm. Our attorneys had told us that, if we wanted to become a public company, we’d have to have audited financial statements from the beginning of the corporation’s life or at least going back three years from the date we were to go public. They said underwriters don’t look favorably on financial statements coming from John Doe, CPA of Anytown, USA. If we were serious about going public,

and wanted to increase our chances of a successful IPO, we'd have to use one of the "Big Eight" accounting firms.

It's a little bit like my mother's favorite laundry detergent. She always bought Tide<sup>®</sup> to wash clothes; she never changed her allegiance. For her entire adult life, my mother let no other detergent in the house. It was almost a religion with her. No matter that other brands cleaned the clothes as well. Her loyalty was intense and unflappable. She knew what she was getting and "there's no need to take a chance with something else that I don't know," she used to say. She could count on the brand even though other brands might be just as good. She wasn't about to switch. The underwriters and their investor clients know what they're getting from the big firms. The work a lone CPA does is no different, just less expensive; but the investment community trusts the big firm.

The fallacy for us—and what our attorneys didn't point out—is that we really didn't need all that high-priced work while we were struggling to make ends meet. When time came for a public offering, we most likely wouldn't be struggling to put food on the table, and we could simply form a new corporation then to take over whatever assets the old non-audited corporation owned. The new corporation could take the same name and have

the same shareholders in the same proportion. Then we could start the expensive auditing. The attorneys were used to well-heeled clients. It probably didn't even occur to them that the extra expense and time would so distort our efforts.

Not aware of all this, we decided we'd better find a Big Eight auditor right away. Bill and Cie assigned me the job and I jumped right in. I spent weeks contacting and interviewing each of the possible firms. Names like Ernst & Whinney, Price Waterhouse, Coopers & Lybrand, Arthur Andersen. What intrigued me at the time was that each of these companies really wanted our business. It's true that I made a major effort to give them a good presentation of the market and the technology we were building and why these were going to make Kyros a winner. Although we didn't yet have a really well-conceived, slick business plan, what I presented was the foundation for such a plan. If Kyros became a successful company, it would be a nice business for one of their firms. In any case, either I was effective in what I said or our prospects themselves seemed extraordinarily strong to each of them. Without exception, the six new-business managers of these firms with whom I met offered to do the job for us at bargain basement price. Of course, their bargain prices were still many times higher than a com-

petent local accountant charged for the job, assuming we really needed to have the job done in the first place. They were getting these huge fees because the investment/underwriting community believed in them. Well, maybe it's more accurate to say they are like Tide. Underwriters and investors are no different than my mother. They know the "Big Eight" (or how ever many of them are left after their own round of mergers). The product is constant; it's the familiar detergent in their universe.

We chose Coopers & Lybrand. Their price for the job at \$4,000 was a tad better than the others, but the real reason we chose them was that Bill, Cie and I all so much liked Tom Colligan, the Coopers' partner who signed us up. As it turned out, we never saw Tom Colligan again. He was just the point man. We never regretted the decision to use this firm. They did an outstanding job for us. But I have often thought since how much better off we would have been if, with this decision as with many others, we had simply opted not to do it.

Once we had chosen the auditors, I had the task of spending weeks putting together the paper trail they needed, on top of the other product-related jobs I was trying to accomplish. Naive as I was about audits, I had thought that I just had to point them at the files and say, go to it. You would think they'd be doing something for

their big bucks! If I had known, I'm sure I would have fought with Bill and Cie against doing an audit just to avoid the huge, non-productive workload. As it turned out, it was most difficult to prepare for the audit that first year. We didn't yet have all our records in a single organized system. We had just started to use a computer spreadsheet to record our checking account entries, but for most of the year of our existence we dealt with paper checkbooks and deposit receipts. None of our shareholder or employee records were on computer, much less in a coherent system. Different people had kept the records at different times and there was no consistent system. These were the days before *Quicken*, the computer accounting wonder that, for pocket change, saved many small businesses, ours among them, from the frustration and hairpulling of making sense out of ordinary book-keeping.

During our stay in Riverdale, Cie, in spite of the fact that she soon lost her her chief assistant and support, sister Colleen, to Werner Erhard & Associates, was able to keep enough funds coming in to pay the bills. Nonetheless, Bill was unhappy with her performance because there wasn't enough money in the coffers to make long-range plans and because she was spending so much of her time working as a volunteer for WEA. There began here

a battle between the two of them over who was going to control the company that was to last for years. It became clear that sharing the decision making between them was getting in the way of building the product and the company, so Cie, reluctantly but to her credit, agreed to let Bill make all final decisions until the first prototype—what we called the “one-way voice link”—was complete and functional. She understood and accepted that we were in an engineering phase of the business’ development and that we should base our decisions on those factors that worked best to complete the engineering tasks. Bill was the only one with the requisite engineering experience.

My attitude toward Kyros changed during the Riverdale period. My commitment to the company increased dramatically. I didn’t start to invest my own hard cash, but I did agree to contact people I knew and respected about investing in Kyros, wealthy people like my ex-employers Dick Eck and Al Fielding. By now my skepticism had disappeared—not because of any carefully reasoned analysis, but simply because the project had caught me up in its glamor and I had begun to value the personal relationships I was developing here very deeply. Not that every day went smoothly. With the pressure of 14 and 16 hour days, Bill and I often lost our tem-

pers with each other. We'd yell and scream about trivial disagreements. Once, in a fit, he put his fist through the wall (better the wall than my face). Once I tore out of the office in such a rage that I drove the front wheel of my new sports car over a parking lot curb and ruined a \$300 tire. Lynn Dolan, our part-time receptionist and mother of young boys, said we reminded her to a pair of two-year-olds throwing sand at each other in the playground sandbox. Somehow both of us and our friendship survived the stress.

We had been in the office for about six months and had just signed a second six month lease, when we discovered that our landlord, in violation of a clear agreement we had insisted he put in the new lease, rented the office next door to ours to another company without first offering it to us. We never did find out why he did it, not even when he sued us for breach of contract. We knew we had to expand our engineering staff if we were going to get the product built before it became obsolete. We were going to need more space very soon but moving is always a major disruption. So after debating what to do for several months we decided that the only choice was to move yet again. Without the extra offices, space in Riverdale was too tight for what we were going to have to do. We had pulled in a few good-sized investments, enough to make

us feel flush—though none from any of my friends. One of my potential investors, former employer Dick Eck, sat through the usual investor show and responded with that single, prophetic question. Why do you need these fancy offices? (To which I replied, rather lamely, that we had to have offices somewhere and these weren't all that expensive.) In reality, I had no good answer for him because I agreed with him. We were spending our money and time on the wrong stuff. Al Fielding, my other former employer and the founder of Sealed-Air Corporation, wise investor that he is, suggested that I call him back when we had a product ready for market. Still, we would move to bigger offices. But where? The search began again.

### **Butler Center: A Home to Die For**

Butler, New Jersey, used to be a company town and still has the ambiance of a company town. In 1867, Harry Butler bought a few square miles of local countryside and started his American Hard Rubber Company in this cozy valley in the Ramapo mountains. The company prospered as Harry and his descendants and later outside investors sold, across the United States, millions of the ACE combs and other rubber products they made there. Harry built homes for his workers. During the numerous inevitable wars of the 20th century, the company

made war products as well as the combs that were its mainstay. The mill grew to a complex of more than half a million square feet. But as always happens, economic conditions changed. By the 1960s, northern New Jersey was becoming less and less hospitable toward heavy, smelly industry. Businesses like Harry's, that had done so well in the shadow of the Big Apple, found that moving south or even offshore could do wonders for the all-important bottom line. Those that refused to leave the Garden State, or were unable, were withering and dying. By the end of the decade all that remained in Butler was the hulking shell of the former glory. No more soot from the smokestack, no more workers streaming in in the morning and out in the evening.

For more than ten years the huge building sat vacant through the spring rains and the summer heat and humidity and the winter snows, rotting around the edges, home only to the occasional stray pigeon and squirrel. Then in the mid-eighties, three experienced local businessmen formed Butler Center Associates to revive the site. They bought the property for a bit more than \$2 million. To salvage the bulk of the facility, they at once demolished the buildings that were beyond repair, stripped the old glass and boarded up the window openings of the 80% that remained, and threw a new roof over the whole as-

sembly. The front building, overlooking the town square, got immediate attention. Revamped and refurbished, it rented quickly.

The elder Heaths had always liked old buildings—looking at them, renovating them, dreaming about them. When they moved from their big Pines Lake house to the little Glenwild Lake shack in 1979, the first thing they thought about was renovating. They quickly came up with a beautiful design with a Japanese flavor and set about constructing it. But their eyes were ever on bigger projects even while in the midst of projects that would consume ordinary folk. They had started shopping at Taste of Dawn, the health food store in downtown Butler as soon as they moved to Glenwild Lake. It was only about two miles from their new house. The enormous old factory across the abandoned Erie railroad tracks, running the length of Main Street, naturally caught their eye. Sitting around the dinner table, by themselves or with guests like me or with visiting children and grandchildren, Bill and Shy discussed what a wonderful project it would be to reopen the old plant with shops and offices and theaters and even loft-style apartments. They had in mind a restoration to rival Boston's Fanuel Hall Market or New York's South Street Seaport or Baltimore's HarborPlace. Since they didn't have the resources to tackle a

project of this size, all they could do was talk. But it was so clear if you were there, what fun they had talking and planning. In fact, to an outsider, the talking and the planning, rather than the doing, seemed the point of it. The hidden away little town probably could never command nor even support the kind of traffic so grand a scheme demanded.

The years passed. Nothing happened. Then one day in the mid-eighties one of them noticed workmen traipsing around the site. New windows, a new roof; clearly something was up. Then, a high profile tenant—the U.S. Post Office, Butler, New Jersey—moved into the refurbished front building. Obviously, the place had a new lease on life. Still, when Bill, Cie and I started looking for our first office, Butler Center didn't even occur to us as a choice. Bill and Shy were, of course, out of town and so not able to remind us of the beauties of the old rubber mill. In fact, they were coming home and wanted their house back, so we had had to move quickly. Not much time to think or to search. We may also have thought that there weren't any real offices in Butler Center, just factory and warehouse space. For whatever reason, we looked elsewhere and found Riverdale. Now, however, that we had to move from the Riverdale office, Butler Center showed up dead center in our sights. There were

now a number of businesses renting both office and warehouse space, including *Trends*, the local newspaper. It had become obvious as you drove by that this was an office complex in the making.

We learned after we became friends with the landlords that their plan was to fill as much of the space as they could with any tenants who would pay the rent—auto mechanics, machine shops, light manufacturers, as well as the lawyers and accountants and other white collar business people whom they preferred. They worked to upgrade the space so they could upgrade the caliber of their tenants. Whenever an industrial tenant was leaving, they concentrated on replacing the low-grade tenant with the higher-grade office tenant, renovating the space as they went. They hoped to have the entire 450,000 square foot structure converted to first class office space within ten years. It was a sound business plan and they were pursuing it with steady determination.

Art Tyler and Clyde McBride were the two partners we dealt with during our four year stay in Butler Center. The third partner was basically a silent investor. Art and Clyde were a well-matched pair. Art, the more laconic of the two, took care of the details of construction and maintenance. Clyde managed the rentals and the administrative details. When we met with them for the first

time in the spring of 1988, they didn't have any offices of the size we needed ready for us to move into. We had decided we wanted about 3,000 square feet—enough for a private office for each of the three of us, plus lab space, lunch room, conference room and a large area for the troops whom we planned to start hiring as soon as we moved in. The center did have a few available offices of about 1,000 square feet, but nothing our size. So Art took us on the grand tour of the entire plant, to let us see for ourselves everything they had and so we could pick what we wanted from their potpourri of spaces.

We loved the first space he showed us. The second floor of a long building that looked out on Main Street. Yet he didn't want to rent it to us. The difficulty was that the 10,000 square foot floor, above the warehouse where the newspaper kept its rolls of newsprint, was totally unfinished. It still had the old wooden mill floors, uneven and in poor condition. It had no partitions, no ceiling, old boarded windows on the north side. It was very expensive to finish this into good office space. Art told us he preferred to give us something that was closer to ready—unless of course we wanted to pay for the renovations. We would have paid, too, had we only had the money. It was already a giant stretch for us to rent as much space as we were contemplating. There was no

way we'd we able to pay up front for the costs of building it out. Nonetheless, we coveted that space so much that, after we later got to know and trust our new landlords, we asked Art and Clyde to save that space for us. We needed it when we got a product to market. They had no problem promising to hold it until we were ready because it was part of their long, long range plans.

We looked over other spots, with Art, and occasionally Clyde as our guide, but each of them seemed either too close to an existing industrial tenant or too dark for us. We liked light, open spaces. Art even showed us a separate building, two stories, off by itself, complete with walk-in safe. As I recall it had been the company's administrative office and I guess that they stored the payroll, and their secret records, in the vault. We liked the building but it was 4,000 square feet and more than even our bloated budget could stand. Finally, he took us into a second floor space in the north building that seemed on all accounts exactly right. A private staircase, lots of lights from both sides. From Art's perspective—the two bathrooms already in place, the existing sprinkler system, the smooth concrete floor already poured over the old wood mill decking—made this close to ideal. It was in the area of the mill that they wanted to upgrade next. He only had to talk a current tenant into moving his ex-

cess storage to another location. We could divide up a 3,000 square foot chunk of this space as we saw fit and still have three or four thousand feet to expand into on the west end, as well as, jutting out to the north, adjoining our office, a lovely high ceilinged room of about a thousand square feet—the size of a small ballroom—that needed a lot of work but would be available later if we had the money and we wanted to expand there.

We all agreed. This was the place for us. It was a fine, kind of funky spot in which we could build our business. We quickly worked up a floorplan that looked really good to us but also kept within Art's budget constraints for \$10 a square foot office space. We had high hopes as we signed the lease. Art and Clyde even agreed to invest \$5,000 in our company (which came directly off the first two months rent). It was a very exciting time for us. There was one small hitch in our plans. Having made the decision, we wanted to move as soon as possible. But it would take four weeks to finish the office according to our plan. We happily gave notice in Riverdale that we were moving out in four weeks.

When it turned out that the construction took longer than anticipated, Clyde came up with a solution—less than optimum but workable. There was a small office adjacent to the high-ceilinged, unfinished “ballroom.” We

could move in there at no charge and store any of our stuff we wanted in the big room until our office space was ready. It posed yet another delay in our real work but it was a generous offer and we agreed. We ended up stuffing six people into a 15'x30' room for three weeks. During this time we got very little accomplished except preparing for the new office. In all, I think we lost the equivalent of six weeks of the entire company's time because of the move. Our Riverdale landlord, Bill VanHouten, sued us for leaving before our lease was up, even though he had broken the terms of the lease. Bill decided that we had to countersue as a ploy to get him to drop his suit. The ploy worked and he dropped his suit, but his breach of contract and our subsequent move cost us a bundle of money. Our lawyer did his work on our countersuit for stock in the company. Nonetheless, we lost more time. After we finally got ensconced in the new office, we were all quite happy. We paid a very high price in disruption and lost productivity.

Whenever visitors came to the Butler Center offices of Kyros Corporation, they invariably commented on the stark contrast between the exterior appearance of the drab old rubber mill and our swank looking interior. You'd park your car in the inner parking lot among pallets and crates and pieces of old machinery. Walk under

the drive-through archway between two sections of our building. Open the industrial grade steel door. Walk up a wide flight of concrete covered steel steps. At the head of the staircase, when you turned right into the short hall, you got your first clue that this was not just another warehouse. The new set of double doors, freshly sanded and painted, adorned with a raised-letter plaque, invited you to “Kyros Corporation.” A smaller sign informed you, “No Smoking.” But it was when you opened the door that the difference hit you.

The reception area boasted tan Italian leather sofa and chairs as well as teak end tables. Large, overflowing, floor-to-ceiling potted plants and windows festooned with weeping thises and hanging thats. The receptionist sat behind a wraparound teak desk, complete with sleek electronic typewriter, computer workstation, and modern switchboard telephone console. As you stood before her, your eye could scan across the open area of the office. The L-shaped open library nook with its five-foot round reading table and Breuer chairs occupied the left corner of the spacious room, concealing behind one wall of bookcases a well-outfitted lunch room complete with its own white leather sofa and coffee table in addition to the standard sink, microwave, table and chairs. From the receptionist’s desk you could also spy on the engi-

neers hard at work at their solid oak desks with matching file cabinets and waist-high rolling bookshelves, and, if the door was open—as it usually was—into the conference room, exquisitely appointed with 19th century oval mahogany table for 12 and Chippendale chairs. If you turned your back to the receptionist, you faced the three “executive offices”—one each for Cie, Bill and me. Bill’s—the biggest—sat sandwiched between Cie’s and mine. Equally attired in leather and hardwood furniture, our lush offices befit successful executives rather than the startup wannabes that we were.

The furniture—mostly purchased from Cie’s and Bill’s nephew in Ohio—arrived within days of our early summer 1988 takeover of the new office. The plants that gave our offices their really lush feel came mostly from Cie, who had been cultivating them for many years. The phone system came with us from Riverdale—half the free controller unit and half at a cost of \$2,500 for the eight individual phone units we purchased in Riverdale (we already realized it was one of those “bargains” that aren’t really bargains at all). The conference room table and chairs were Heath family heirlooms.

The engineers to fill the spaces at each of the desks took longer to accumulate than the furniture. The first of our new full-time engineers—Ed Wronka, a young

electrical engineering graduate of New Jersey Institute of Technology—came knocking on our door, unannounced and uninvited, before we had even decided we were ready to go looking for additional help. Until then technical development fell on Bill and on Mark Rudy. Bill had some part-time help from Dan Sullivan, a shareholder who was also an engineer, and from me. Mark handled the RF development task on his own.

Ed appeared in mid-August. He lived in Riverdale with his parents, the youngest of eight or ten kids, and had graduated in June. He was twenty-one. Ed was calling on every company within earshot of his home. His expenses were low so when we told him we couldn't pay a cash salary, he accepted. His job hunting had been slow and he had no other offers. We told him he'd have an opportunity to learn a lot more with us than with a larger company and that if we succeeded he'd make a lot of money. He accepted as long as he could have some spending money. I think Ed was very tired of depending on his parents for everything. We settled on the princely sum of \$50 a week, and set his "deferred" salary at, as I recall, \$25,000 a year.

The deferred salary plan gave Ed—and everyone else who accepted deferred salary (us managers included)—a credit equal to twice his salary of record. When the com-

pany had enough income, in the distant but we hoped not too distant future, to support paying back the deferred salary, he could choose whether or not he'd take it in cash or exercise the stock options he'd be getting in addition. He then could use the salary credit to pay the option exercise price.

Our deferred salary plan was somewhat complex—another example of our penchant for activities that consumed lots of administrative overtime. We justified it by saying that it was allowing us to hire people we wouldn't otherwise be able to hire and thereby complete our project faster. Actually, in my opinion, what it did was allow us to indulge in hiring people who were willing to work for nothing but who were not necessarily the best for the job. We hired eight engineers under this plan. All of them were great guys and most of them were good engineers but none of them had the exact skills or experience we needed to complete the job in the most expeditious manner. Several, like Ed, were young and inexperienced. Good assets for a company with a large engineering department—like Bell Labs where Ed went when he left us two years later—but not right for us. What we really needed was to raise sufficient money to hire the fully experienced people we needed. With a startup you have to get your product ready as quickly as possible.

Our offices in Butler made us seem to the outside world like a real company. They probably made us more attractive to potential employees like Ed and, as Cie had hoped, to the small mom-and-pop investors who supplied our meager level of financial support. But in the end all they did for us was forestall the inevitable reckoning with our inability to raise the funding needed to complete a project as complex as the one we had undertaken.

### **The Big Boys Visit**

Is it possible that the money we laid out renting and outfitting our offices—more than we spent on payroll—paid off in some hidden way? Here are two typical examples in which we brought major investors to our offices to impress them. The fine office suite let us think of ourselves as a real company and emboldened us to make contact and invite some of these “big boys.” Judge for yourself whether or not it did us any good.

During the fall of 1988, our friend and attorney, Kevin Clancy, ever on the alert to help us find funding, introduced us to Geraldo Rosenkranz, a consultant whom he knew through his law firm. Gerry Rosenkranz came from a well-to-do Mexican family, originally from Austria. Trained first as an electrical engineer at USC, he got an MBA at Stanford before working his way into a po-

sition as a vice president at GTE Sprint, handling international business. When the entrepreneurial bug struck, Gerry started his own consulting firm in New York, arranging licensing deals between young U.S. technology companies and overseas partners.

Kevin felt that Gerry could help us hone our business plan and then make contacts with potential partners. In fact, the first deal Gerry suggested was with a California venture fund in which he and his family had invested, Vanguard Venture Partners of Palo Alto. Vanguard specializes in seed funding for telecommunications and biotechnology startups. Its capital comes from pension funds and a limited number of individual investors. By 1988 it had achieved spectacular results.

Bill, Cie and I had our first meeting with Kip Meyers, a young Vanguard partner, at Gerry's Manhattan office in December. He seemed to like us, and, from what he said, he definitely liked what we were doing. We left the meeting encouraged about our prospects. Our next meeting, in February 1989, took place in our "lush" offices in Butler. With these professional looking offices and the clear presentations we were capable of, we thought we surely had a chance at some of that free-flowing California money. This time, not only Kip but also senior partner Jack Gill came calling. We spent the entire

day together. The Vanguard boys, although oblivious to the surroundings, asked penetrating questions about the technology and how we planned to fit into the market and to sell this new type of product, a wireless LAN.

At the end of the day, Jack Gill said, in essence, “you guys are light on experience but strong on determination. We like that. It appears you’ve got a great technology. Our big problem is that you’re 3,000 miles away from us. We like to monitor our investments closely, week-by-week. If you can find a lead investor nearby, we will invest, but we won’t do it alone.”

We never did find an east coast lead VC, though I spent virtually all my time on that job for the next few months. I have no way of knowing whether or not Jack Gill was sincere when he suggested he’d invest under those circumstances. He implied that if our company were in Silicon Valley, Vanguard would invest. We didn’t reply, “we’ll move to California!” Bill Heath still maintains that we missed one of our big chances by not saying this to Vanguard. I’m not so sure. I believe Jack was testing us. If we could come up with another VC, he might have surmised, we probably had what it takes to make a successful company. If not, Vanguard was better off passing. He came to us only because one of his investors asked him to. We failed to make a compelling enough

case to open his pocketbook. Given Vanguard's reputation and prior success, I'll bet that there was at least one east coast VC—Edison or Accel, maybe, among the dozens I contacted—who would have taken us on if Vanguard had called and said, "we're investing in Kyros, but we need someone local to keep an eye on these determined but inexperienced entrepreneurs."

Undaunted by the Vanguard failure, Gerry Rosenkranz started working on some foreign connections for us. He won us a meeting in June of that year with a representative of Intec, a mid-sized Japanese manufacturer of electronic equipment. Again, we met first in Gerry's New York office. Then we devoted many hours over the next few months developing a proposed licensing agreement under which Intec would supply us with \$700,000 in upfront money to complete our product. In return Intec would get a small equity position in Kyros and rights to manufacture and sell the product and its derivatives in Japan. A second New York meeting in September also went very well.<sup>1</sup>

Intec moved very slowly, we discovered. Making a decision took them many months. For our third and final meeting, at the end of March 1990, we brought them to

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<sup>1</sup>While these discussions were going on, I started lending Kyros large sums of money, convinced that my loans were short term and Intec's cash would pay me back.

Butler, to impress them with how substantial we were. We showed off our one-way voice system, developed for the original telephone product, but still an excellent demonstration of the basic spread spectrum technology in operation. The system did indeed impress them. As to investing, they were polite and noncommittal. The office did not seem to make one whit of difference to them. They did not invest because, according to the final feedback we got from Gerry, spread spectrum technology was too new to Japan. As a “small,” conservative company, they were loath to be the first.

## Chapter 8

### Changing Oars in Midstream

Cie got the initial idea for Kyros from her conversations with brother Bill about his work-for-hire in 1985 on someone else's 49 MHz cordless telephone. By the time Bill and I resigned from Kyros in 1993 we were on the verge of completing the prototype for a 2.4–5.8 GHz high-speed wireless LAN (local area network). The technical development of our product went through many twists and turns over those eight years, each twist and turn exacting its peculiar price. While the key change was our decision to switch from a cordless, hands-free telephone to a wireless data transmission product, the whole saga of those twists and turns is instructive of how technical products evolve—especially when underfunded. It's a saga that you want to avoid if you want your business to be a financial success. Each turn takes time and money, each twist so often takes its own emo-

tional toll. This part of the story further illustrates the need to have a coherent, funded plan before you start building anything—unless of course you can develop a product inexpensively in your basement and then get your funding.

Our original “talkman” telephone had the spiffy software Bill and I wrote in late 1985 and early 1986. It had a sleek black prototype case, though we never got the innards small enough to fit. It had a good trademark, “Pocket Remote.” What it needed desperately was working parts. The job of creating those real, working parts fell initially to Bill Heath—the digital control portion, and to Mark Rudy—the analog radio portion.

### **The System Takes Shape**

After Bill came up with a specification and technical plan for the product, the next task was to build the control circuit to test out the concepts. The biggest part of the control circuit was what engineers call a “correlator.”<sup>1</sup> You can make an electronic correlator out of either analog or digital components. Bill chose digital for two principal reasons. First, he knew more about digital control. Second, the digital components were less expensive

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<sup>1</sup>A correlator performs a mathematical matching function to make sure two elements are the same.

than analog and were rapidly decreasing in price.<sup>2</sup> When we converted to a custom chip for production versions of our product, the cost would be a lot lower and fall more quickly if we used digital techniques. In fact, Bill chose the basic spread spectrum technique we used in our system for the same reasons—he knew more about what he was doing and he avoided complex (and expensive) analog phase-locked loop circuitry in the radio.

The purpose of the correlator was to determine how well an incoming radio signal matched a predetermined “spreading” code—the code used to superimpose the real information you were sending onto the radio wave you transmitted. It didn’t matter whether the information was voice from a telephone, converted to digital ones and zeros of course, or a textual message made up of letters and numbers, converted to digital ones and zeros. What mattered was how well you could pick the transmitted signal out of all the electronic “noise” floating around in the air. That’s where the correlator came in.

Our system was to have dual correlators. The system

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<sup>2</sup>The price decreases were generally following “Moore’s Law,” the famous dictum of the computer business that the capacity of silicon components doubles every 18 months. Named after Gordon Moore, one of the founders of Intel Corporation, Moore’s Law has held true for the past 25 years. This phenomenal increase in productive capacity has been largely responsible for making the computer/electronic business the fastest growing industry in the history of western civilization.

sampled the incoming signal twice in one time period. One correlator looked at the incoming signal, starting at some arbitrary point in time. The other correlator began looking exactly one-half time period later. The length of the time period closely matched the length of the time period of the system that transmitted the signal. That way, one or the other of the correlators was always looking at a valid signal (assuming someone was transmitting). A very complicated synchronization and tracking circuit determined the beginning of a “packet” of information.<sup>3</sup> If one correlator found a clear match with the “spreading” code, the system started saving the signal from that correlator and ignore the other one for the time being. Other circuits then extracted the useful information from the “spreading” code.

Around the time we started design and construction of the first correlator, a new California chip maker, Xilinx, started marketing a new type of integrated circuit called a field programmable gate array, or FPGA. FPGAs have since become the bedrock of electronic R&D. The FPGA gave you, as designer, a way to program a hardware circuit from a computer, in much the same way you would program software. You could use the same device over

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<sup>3</sup>We divided the information we were transmitting into “packets,” according to a special protocol, to make it easier to handle.

and over again, changing just those elements that you wanted to. You'd no longer have to send your design out to a manufacturer to have it converted into a silicon chip before you tested whether or not it worked. The FPGA was basically a circuit with lots of transistors built into it in advance that you could "wire" together almost any way you wished, and then change the connections if you didn't like the way your wiring worked. Imagine. You could now create a design on your computer—even an inexpensive PC—then transfer the design into your FPGA hardware to test it. You'd no longer have to spend large amounts of cash for these non-recurring engineering expenses (called NRE in the trade). In those days chip NRE cost between \$50,000 and \$100,000 for almost any design worth turning into hardware. It was a great advance for everyone in the industry, but what a bonanza for the poorly funded startup!

We could have built our correlators, and other circuits, using "discrete" (that is, individual) components, but it would have taken a huge number of components on very large, expensive printed circuit boards. Then, if we'd made anything more than a trivial mistake we'd have had to redo the boards at additional expense. We might have had to do that several times. With Xilinx we had an alternative. It seemed clearly the only way to go.

Bill, however, being a meticulous engineer, was not about to rely only on a system designed with this new technology, no matter how good. He wanted a backup system in case we couldn't raise the money to turn a Xilinx design into a custom chip for production. He started on Xilinx development of his correlator—full speed ahead, but, at the same time, he had me investigate other options. We found a British manufacturer, Inmos, that made an off-the-shelf correlator. It wasn't exactly what we needed or we would simply have bought that and forgotten about the complex Xilinx development with its associated “learning curve.”<sup>4</sup>

An Inmos system would be expensive in production. To make the Inmos correlator useful for our particular application, we would have to build a printed circuit board with additional components. That meant more cost. Even then, it didn't have the low cost we needed for the market we wanted to sell to. It would suffice for prototyping—testing our concepts and design—but not for units we would sell to a broad market. The Inmos correlators had the advantage that we could put together from off-the-shelf components a complete system we might actually sell to a small niche market—expensive

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<sup>4</sup>Engineers use the term learning curve to describe the amount of time it takes to become proficient at using a new tool, such as the Xilinx development system.

but salable. Once the Xilinx system worked, we never went back to the Inmos system. We looked on it primarily as insurance. In case we didn't have money to go to custom chip, we had a backup. What we should have done was take a day to block out the design on a sheet of paper that we could return to later if needed. Building a second prototype system seemed like a very prudent move, but, yet again, we were operating as though we were a big company—or at least a fully funded startup—that could afford the luxury of such “insurance.”

While Bill began work on his Xilinx and Inmos developments, Mark was designing a 49 MHz radio. Mark used a software program called “Touchstone” that allowed him to model the joint behavior of the various resistors, capacitors, filters and other components he needed to make the radio work. The Touchstone program cost us \$10,000. This type of design is extraordinarily painstaking work. It's a work of trial and error. You make an educated guess based on your experience of what has worked in the past under similar conditions. However, there are so many variables that no two designs are really very close in the interactions of their physical characteristics. You try a simulation. You see what results you get. Then you change a resistor value ever so slightly and try again. Over and over, until you get

something that appears to the very imperfect simulation as though it may work. Of course, you don't know for sure until you reduce the design to hardware.

With radio design, a very tiny change in the width of a trace<sup>5</sup> can mean the difference between success and failure. You must match impedances and other esoteric parameters with great accuracy. Mark's job was even more difficult because he was using a computer that was woefully inadequate for the job. In the late eighties, unless you were able to buy a \$50,000 engineering workstation, you were stuck with a PC powered by an Intel 80286 processor, or a little later, the more powerful but still far too limited 80386. These machines were fine for word-processing and simple spreadsheets, but they were pitifully underpowered when it came to complex engineering tasks like modeling the physical characteristics of radio components.

Mark stuffed as much memory as he could fit into his computer box to ease the task. Still, he was finding that a single simulation took the computer all day. At times, more than a day. This time delay wasn't unbearable when Mark was working at his full-time, paying job and doing our Kyros work during off hours. Working at

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<sup>5</sup>Traces, in electronic design parlance, are the strips of copper on a printed circuit board that carry the electrical signals from component to component.

home, he'd start a simulation run on his way out the door in the morning. When he returned in the evening, he'd check the results, do some figuring and start another simulation. The computer chugged away overnight while he slept. And so on. The task did become unbearable, however, after he decided to quit his day job and work for us full-time. The only way he could keep his sanity was to buy a second computer and keep them both running day and night. With careful scheduling of his time so that long jobs ran mostly during the night, Mark was able to make steady progress, even if slower than we all wanted. If only we could have had several Pentium computers back then!

Mark completed his Touchstone designs for the 49 MHz system and built the boards while we were still in the Riverdale office. But he never fully perfected that first radio. The antennas, he said, were his main problem. We had chosen the 49 MHz frequency mainly because radio signals penetrate noisy, obstructed spaces—like the insides of office buildings where we hoped to install most of our “pocket remote” phones. After Mark had his system together and we had moved to Butler Center, we could see that it was going to take a lot of tinkering—and expense—to get the antennas right. We had already spent several thousand dollars for what turned out to be

useless antenna prototypes. It's all part of normal R&D, but we could ill afford the extra expense. So we decided that we should switch to the 900 MHz frequency—one of three bands the FCC had set aside exclusively for commercial spread spectrum products. Mark told us—correctly—that antennas were easier to design and make at 900 MHz.

So our RF designer went back to the drawing board and to his Touchstone simulations, this time working at 900 MHz. Bill, in the meantime, had completed a 32-stage correlator for the digital system (the more stages a correlator has the more reliable it is, but also the more expensive). We still needed to show our investors something that worked. Some of them were getting edgy about what they perceived as our slowness in getting a product prototype ready. Cie reported that she would have a lot more trouble raising money if we couldn't present something concrete. That's one of the major problems with depending on the small, amateur investor. He or she usually doesn't understand the complexity of the development process. VCs will put tremendous pressure on you to perform, but they typically know what can and what can't happen with a given level of funding.

Even though he was already working on the 900 MHz design, Mark said he could get his existing 49 MHz radio

to work well enough to demonstrate for the shareholders, who, by this time, numbered more than 50. He worked day and night through the fall of 1988, trying different antenna options, modifying this or that part. Finally, just a few weeks before our postponed annual meeting was going to take place, in frustration he scrapped all the sophisticated antenna designs and expensive hardware. Drawing on his long-ago experience as a military antenna technician, he mounted a couple of coffee cans on wood poles and ran a length of coax cable down from one can to his transmitter and from the other can to his receiver. These new “antennas” worked perfectly. We got our first real transmission through the air, across the 75-foot length of our unfinished “ballroom” (that extra space adjacent to the office that our landlords were letting us use for storage). Coffee cans, obviously, weren’t much good as antennas for a commercially saleable telephone, but they were adequate to show our backers we were making real progress. They also made a down-to-earth, gee-whiz demonstration for our mom-and-pop investors of how technical development really happens (this time with a happy ending).

During the previous May, Bill had integrated his 32-stage correlator with a relatively simple control circuit and with the then already-working “back-end” of Mark’s

radio.<sup>6</sup> We were then able to send a spread spectrum signal over a wire. Even though we weren't actually transmitting, we considered this a major milestone. After we were settled into our new offices, he then whipped together the Inmos "insurance" design and set his sister, Terry, our technician, to building it. Terry worked conscientiously and methodically, completing the Inmos system by mid-September. We never used it. By the time we had completed it, it had become obvious that we didn't need it. The Xilinx system worked and was superior for our needs. It was cheap enough to convert to an inexpensive custom chip for production. By this time the fundraising irons we had in the fire seemed like they would pan out. So much for insurance.

Even though the correlator Bill had built was only 32 physical stages, by a trick of mathematics, it was mimicking a 63-stage correlator. Bill had chosen to use a 63-stage "maximal" code<sup>7</sup> for the telephone product af-

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<sup>6</sup>The "back-end" of the radio was the part that connected it to the digital system. The back-end required only minor changes when we changed the frequency of the "front-end"—the actual transmitter and receiver.

<sup>7</sup>Maximal codes are spread spectrum codes (that is, sequences of bits) that have good cross-correlation and good auto-correlation properties. That means it is easy to match (or, correlate) either two different mathematical functions (crosscorrelation) or to match a single mathematical function to itself (autocorrelation). For the correlator of our Kyros cordless phone we needed good crosscorrelation because we were matching the radio signal received at the remote unit of the phone to the predefined "spreading" code that we had permanently stored there—the same

ter he discovered that correlations with an even number of stages had adverse auto-correlation properties. So, in his hardware design he summed the results of the real 32 stages and then extrapolated what an additional 31 stages would show, adding those results to the total. This method worked fine. He wanted as long a code as we could afford in order to boost what engineers call “processing gain.”<sup>8</sup> Since he didn’t know how much gain he needed, he settled on 63-stages to give us as high a level as we could pay for. If it turned out we didn’t need this much, we could always reduce the number of stages in a second generation prototype. Much later we found out we would have a sufficiently reliable signal with as few as 11 stages. At this early point in development, however, we were only guessing. There wasn’t much readily available literature on the subject in 1988. As I understood the method, with my minimal technical competence, our fake 63 stages were considerably better than using only 31 stages but not quite as good as if we had 63 real stages in the correlator. In any case, we eventually

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code we used to create the signal we transmitted from the phone’s base unit. The code you stored was different than the received code because, first, you didn’t know ahead of time whether or not you were receiving a valid signal, and, second, because even if you were receiving a valid signal, noise and interference during the transmission added differences.

<sup>8</sup>Processing gain increases the ability of the radio signal to penetrate obstacles and to reject interference or “noise.”

reduced the number of stages for the telephone prototype to 31. We never tested a system with 63 stages because of the expense. While 63 stages was always better than 31 stages, we assumed that the smaller number of stages was adequate for our system.

Thanks to the tremendous effort Mark and Bill put in during the weeks before the November 1988 shareholder meeting we were able to demonstrate one-way voice communication for the 50 or so shareholders who came to the annual get-together. The sound quality was extraordinary. We put on a “Come here, Mr. Watson” type demo. One of our outside directors, Red Collins, affecting his best distinguished-elder-statesman voice, gave the assembled investors a short sales speech over the wireless link in which he touted the marvelous “studio” quality sound they were hearing. Indeed, it was superbly clear, totally static-free reproduction of his voice. We, who were working with the fledgling enterprise every day, knew major difficulties that could scuttle the project lay ahead, both technically and from a business viewpoint. But, for the outside shareholders, it was a peak moment in the history of Kyros. It was easy, at that point, to overlook the difficulties—mainly the result of lack of capital—and see only the rosy success scenarios we all wanted to believe.

## **Is There an Easier Way?**

Even before we had successfully demonstrated our voice transmission, we recognized that, if we could send digitized voice signals with our spread spectrum system, we could certainly also send data signals. Data signals start out their lives as ones and zeros; no conversion required. Back in 1987, Bill and I first talked about building a data product because it was looking like it would be very expensive to miniaturize our system to fit into the palm-sized package we had designed. Bill thought it was a good idea to turn the software we had written for our telephone simulator into a pocket address book and telephone autodialer. We had just started getting outside investors. One of our more important investors—who probably had invested in large part because the “sex” appeal of our telephone attracted him—objected when we suggested the simpler product. Your investors, he warned, put their money into the cordless telephone with its big potential. They will be mighty disappointed if you abandon it. So we set aside that product idea, but continued to talk privately about how to cut the cost of development. The discussion repeatedly returned to data transmission products.

By March of 1987, we had decided to add a simple low-speed data product. At first, we thought of the

new product—which we called “Datalink”—as insurance against the difficulty of raising enough money to complete the cordless telephone (in much the same way as the Inmos prototype system was later insurance for the Xilinx development). We even thought, at first, that Datalink would get us a quick product and its income would provide working capital to supplement investment for the telephone. A preliminary development schedule, however, within a few days had disabused us of that naive idea. There were no shortcuts. As first conceived, Datalink was a wireless modem<sup>9</sup> with a data rate of about 19,000 bits per second. Although this speed didn’t let the product compete with high-speed wired local area networks (LANs), it did permit cable-free file sharing and printer sharing in a small office. We figured there was a niche market among small businesses like law and accounting firms. Typically, such businesses didn’t have enough computers to justify installing a LAN, but they had enough to share files and to send files to the printer. Cables were always a pain in the neck.

Of course, you can’t simply start sending a file from

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<sup>9</sup>Telephone modems are common now because we need them to connect to the Internet and the World Wide Web. Virtually every computer now has one. The word “modem” actually stands for modulate–demodulate. Modems take data of one type and convert it to data of another type by a modulation process. The data conversion most modems perform changes data from analog to digital or from digital to analog.

one computer to another computer or printer. You have to have some clue what's going on over there. You need to know if the other machine is free to receive what you send. You have to know when to start sending, when to stop and when to resume. All of these housekeeping chores fall into the category called "protocol." If we were going to create a data product, we'd need a data transmission protocol. In fact, LANs are really just a complex set of such protocols. We might develop a simple one ourselves—a time consuming task as we later learned from first hand experience—or use someone else's protocol. We decided that since Datalink was only an insurance product—we'd be making our real money on the wireless phone—we should use someone else's protocol.

We hunted around and discovered a very inexpensive LAN called Lanlink that operated over the computer's existing serial port. Lanlink didn't require a special network interface card (for example, an Ethernet card) as did more sophisticated LANs like Novell's Netware. Lanlink was a small computer program that ran in the background on each computer you wanted to link together. It allowed simple sharing of files and printers. You didn't need an extra "file server" computer to coordinate activity on the Lanlink LAN. Though limited in function, it was exactly what we were looking for.

Our wireless Datalink was going to replace the cable that connected serial ports together in a typical Lanlink network. Except for a straightforward audio circuit, the first phase of our development wasn't going to be much different whether we were building a voice system or a data system. What did we have to lose? Nothing, we thought. Yet it is clear now—and should have been then—that every change, every addition to our plan exacted a cost. Those small added costs accumulate until you end up accomplishing nothing.

That's how it started. Datalink was to be insurance. By the summer of 1988, we had moved to Butler Center and were well along with development of our one-way voice prototype. Datalink had transmogrified into a much more complex product. We were now calling it "SpectraNet," a name Bill came up with, combining spread *spectrum* and *network*. The data rate was significantly faster—at least 256,000 bits per second (256 Kbps<sup>10</sup>). At this rate, we could actually have a *real* LAN. Not as fast as high-speed wired LANs like Ethernet, Arcnet or Token Ring, but fast enough to accomplish real work. At the suggestion of Ron Ball, one of our marketing partners, we scrubbed Lanlink and de-

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<sup>10</sup>The *K* in "Kbps" stands for "thousand." Bps is the acronym for "bits per second."

cided to make our wireless network a Novell compatible network. Ron and his partner, Deborah Allderdice, ran a large LAN installation and maintenance company in Manhattan. All of their customers—including many Fortune 500 companies—used Novell LANs. Ron said we'd never have a market that amounted to anything unless we were Novell compatible. It's like being Windows compatible nowadays. Compatibility with the industry standard is an entrée. We bought his analysis.

By the end of September, when Cie wrote to our shareholders inviting them to see our voice link in operation at the November annual meeting, she also told our supporters that we had decided to focus all our efforts on the data product instead of the telephone. We risked upsetting them. Our justification? Cheaper and quicker to develop; competition not so entrenched as the big phone companies. We'll make you more money with greater assurance. In fact, the history of the personal computer business that we were now proposing to enter was a history of garage shop companies with an idea and a few bucks. There was great diversity and at that time no consolidation. Hundreds of small and medium sized companies, many of whom, it appeared, were making money hand over fist. Eventually we intended to bring out the cordless phone as originally conceived, but we had a bet-

ter chance of success, we believed, with a data product in this new industry. Not one of our shareholders, not even the one who had objected before, raised as much as a whimper of complaint.

### **We Become a Wireless Network Company**

Now we were a local area network company—lock, stock (as small as it was) and barrel. Our first “SpectraNet” development plan specified a 2.4 GHz spread spectrum radio with 127 bit spreading code and 256 Kbps data rate. Since it was to be Novell compatible, we had to develop a proprietary protocol and a software program called a communications driver to allow our system to talk to the Novell software.

The 128-bit code soon became a 63-bit code, doubling our data rate to 512 Kbps. Then Bill discovered he could do some fancy footwork with his control circuit and push the data rate up to 768 Kbps. By the end of 1989, we had decided that that a 19-bit code was long enough to give us sufficiently good interference rejection. One of our engineers, Herman Grampp, suggested that we could avoid the monumental effort of developing our own proprietary protocol and instead use the Arcnet protocol, already fully developed and well established with communications drivers available, not just for Novell, but for all

the major LAN software.

Arcnet is what they call a “deterministic” protocol. Deterministic, in this case, means that you always know who is on the network and who is talking to whom. With Arcnet, there’s a token that gets passed from station to station. You can only talk if you hold the token. This protocol matched perfectly the type of spread spectrum communications we were doing.

In the Arcnet system, only one controller may transmit at a time. Any of the other controllers connected to the network may receive the transmission. The controllers take turns sending data packets. If a controller, in turn, has information to transmit it sends a packet. It then passes the right to transmit on to the next controller. The controllers use message packets to verify that the destination is ready to accept a transmission and to insure that the next controller receives the right to transmit. If transmission is unsuccessful, the sending controller simply waits for its next turn to rebroadcast the packet.

Arcnet required us to supply a raw data rate of 1.8 million bits per second (1.8 Mbps) from our wireless system to keep up with its nominal speed of 2.5 Mbps.<sup>11</sup>

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<sup>11</sup>Every protocol has overhead that doesn’t contribute to the throughput of the real data. Arcnet sends an extra 3 bits of control information with every 8 bits of real data; that makes it about 72% efficient. Ethernet, on the other hand, is even less efficient. It allows the packets of information it sends to collide and get

Herman's suggestion indeed saved us many man-months of work on our own protocol. Bill and I had already spent much time discussing the pros and cons of how to develop a new protocol. When Herman came up with the idea, four engineers, including Bill, had spent a number of days working on the protocol development. They had many more months of architectural design and then still would have to convert the design to a hardware implementation. Initially, our proprietary protocol was going to allow the system to change speeds depending on how much interference existed in the environment where it was transmitting. If there was a lot of interference, the system automatically slowed down and used a longer code, thereby increasing "processing gain." With less interference, it could speed up, using fewer code bits and producing less processing gain. This variable speed architecture was ideal for our system, but also was very complex to implement. After not too many weeks, our engineers suppressed their natural tendencies to go for the elegant solution and set "variable speed" aside for a later, perhaps third, generation system. They adopted a

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lost, more and more as the traffic increases, which in turn requires resending the packet. It turns out that although Ethernet has a nominal speed of 10 Mbps, by the time you get through all the overhead and collisions, the actual throughput is usually less than Arcnet for a typical installation. As long as our RF system kept things moving at the slower 1.8 Mbps, we wouldn't fall behind and lose data.

simpler architecture and worked on that, until Herman came up with the Arcnet idea, effectively ending the immediate need for any proprietary protocol. Yet again, we had devoted unproductive time to a development that didn't get us closer to a product.

How did we end up with a 19-bit spreading code for our wireless LAN prototype system (the system we planned to take into production)? We started by planning for a 127-bit code—lots of interference rejection, relatively low throughput. Then, 63 bits—cheaper but still enough gain. Next, 31 bits—cheaper still and finally getting significant speed. When you're transmitting a digital voice signal you don't need as high a data rate as when you're sending many large computer files. Consequently, for a phone, you want your spreading code length to be as long as you can afford, so you can have the maximum number of wireless units operating at the same time in a given environment. The large processing gain created by the long code not only gives you this interference rejection characteristic but also permits many units to work in the same space. It's also a factor in improving your transmission range. However, a greater range means more potentially interfering units similar to yours.<sup>12</sup> On the other

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<sup>12</sup>Interference takes several forms. There is "jamming," the kind of interference that intentionally tries to block your signal (like radar jamming). There is noise, the kind of interference that happens randomly and over which you have no con-

hand, for a wireless spread spectrum system in a computer network, you want to keep the spreading code as short as you can get away with. That way you'll maximize the data you can send.

Once we had built a 31-bit Xilinx correlator and proved that we could get good communication with its 31-bit code, the next step was to manufacture a custom chip for production. We knew from our tests that a shorter code was also okay—we just didn't know precisely how short it could be. Ray Chadwick, our young but very skilled digital design engineer, under Bill's direction, started designing the custom chip logic for a system with a 15-bit correlator (using a 15-bit code). If we had had more time and money (they really were the same thing in our case), we would have built Xilinx prototype correlators for the different possible code lengths (7, 11, 15, 19, 23, and so on), and then tried them out. But we didn't have the money. Bill got scared that 15-bits might not be enough. We didn't have the resources to experiment and test each option fully. A full mathematical analysis of the RF characteristics required supercomputer power. So Bill wrote a simpler computer program that determined not only which code lengths were best

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trol (like electric motors and microwave ovens). There is interference from other transmitters that have as much right to be there as you do, and in fact may be part of your system.

but also which codes (that is, which combination of zeros and ones) had the ideal properties—good crosscorrelation, for example.

We chose the longest code length that gave us the data rate we needed to keep up with Arcnet but stay within the speed limitations of custom chips at the time. Fortunately, the code length we chose also gave us eight excellent codes (that is, eight of our wireless networks could co-exist and co-operate in the roughly  $\frac{1}{4}$  mile transmission range of our system). That code length was 19. Ray began again, this time designing for a 19-bit code.

With Arcnet we were dramatically increasing the speed of our LAN to match wired LANs. To accomplish the higher speed we had to decrease the length of the spreading code. However, we had now decided to increase our code length from 15 bits to 19 bits. When you increase the code length you also increase the radio frequency band you are using to send your signals. Our custom chip now had to operate at a code rate of 47.5 MHz (19 bits times Arcnet's 2.5 Mbps). Because of the physics of radio, our RF band had to be twice as wide as the code rate, namely, 95 MHz. Now we had a problem. The FCC only allocated 84 MHz of the 2.4 GHz band for spread spectrum. With these new parameters we were using more bandwidth than was legal. How would we meet

the requirements of the law? As it turned out, Bill found a solution. By “trimming” the edges of what is called the main lobe of the spread spectrum signal, we could fit a signal that normally took up 95 MHz of the frequency band into the 84 MHz band that the FCC had allocated at 2.44 GHz for commercial spread spectrum.

Although we didn’t actually file a patent application for our system until 1992, we came up with the idea for the basic architecture in the fall of 1988. One of the big technical problems with a radio local area network is the interference its many transmitters cause to one another. At high frequencies radio waves, especially in an enclosed environment like an office, create a phenomenon called “multipath fading.” High frequency radio waves tend to bounce around and ricochet off objects, running into each other and cancelling each other. The higher the frequency, the more multipath fading occurs. In addition, even using spread spectrum transmission, by which you are lowering the energy density at any particular frequency, the more transmitters you have the more radio energy you are sending out. The FCC was limiting us to 1 watt transmitted power, but even that much energy could potentially obliterate the signals of neighboring wireless LANs. We wanted to keep such neighboring LAN interference to a minimum.

The scheme we came up with, and later patented, involved using a centrally located relay for each LAN. It also required that we use the higher two of the three spread spectrum frequencies. The FCC has allocated three different bands for spread spectrum radio communication, 902–928 MHz, 2400–2484 MHz and 5725–5850 MHz. Our SpectraNet was to use the 2400 MHz (2.4 GHz) and 5725 MHz (5.7 GHz) bands because they are bigger and therefore permitted greater bandwidth (that is, greater speed).

Here's how it was to work. There are two kinds of units—the relay and the satellites.<sup>13</sup> You place the relay unit centrally with respect to all the satellites in the network. The satellites transmit to the relay on the 5.7 GHz band. The relay receives on the 5.7 GHz band and rebroadcasts to the satellites on the 2.4 GHz band. The satellites use highly directional antennas both to transmit and to receive. The relay uses omnidirectional antennas for both receive and rebroadcast.

Here are the advantages of the relay system over using individual omnidirectional antennas at each satellite without a relay:

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<sup>13</sup>The term satellite here does not refer to satellites in the sky, though our patent also covered that type of satellite. Here, satellite simply means a device that communicates with a central unit (the relay).

1. First, the focused antennas on the satellites achieve greater signal penetration through office walls than omnidirectional antennas.
2. Second, the directional antennas on the satellites focus most of the radiated power toward the center of the network. This reduces interference between neighboring networks.
3. Third, and most critical to the functioning of the network, the relay system solves the problem of multipath interference. The high frequency radio transmissions reflect off physical objects and can create multiple pathways through which a transmitted signal can reach a receiver. Signals received from different paths can interfere with or even cancel each other. As a result of this interference there are some placements of transmitting and receiving antennas for which reception is poor. An antenna position that produces excellent reception may be just a few inches away. For a single pair of omnidirectional antennas it is not difficult to find relative positions for which reception is good. However, as you add additional antennas to a network, finding a position for each antenna that provides good reception with all other antennas in the network becomes more and

more difficult. In a relay system each satellite has only one point of focus, the relay antenna. Thus, each satellite antenna added to the network is no more difficult to position than the first. Moreover, a focused antenna on a satellite is less susceptible to multipath interference than an omnidirectional antenna because it is not sensitive to radiation received from a direction outside its narrow angle of focus.

When we came up with this design, Bill, especially, didn't think it was patentable. It's obvious, he said. To engineers, I learned, all clever, simple systems seem obvious. Of course, as usual we didn't have any money to hire attorneys to apply for a patent. We decided to keep our eyes open for some patent attorney who might do the job for stock in the company (our typical approach), and in the meantime go about our business of trying to build the system. It turned out to be an excellent system design for which we ultimately received a patent, working through a local patent agent, retired from Westinghouse, whom one of our shareholders told us about.

## **Microsignals**

We lost Mark Rudy, our RF designer, in September, 1990, to the frustration of working without the right

equipment. We needed to find a replacement quick because we still didn't have a production version of our RF subsystem. Looking back at the difficulty we had in finding Mark, Bill and I agreed that it was a waste of our time to try to locate another highly skilled RF engineer who would work without pay. Mark had been the proverbial needle in the haystack. Our best bet, we decided, was to find an RF subcontractor who could not only complete Mark's designs but also build us a production system based on them. Bill set me to work calling all the manufacturers' representatives we knew. These salesmen and women travel from company to company and usually know everything that's going on locally in the industry. One of them recommended we try a small Queens, New York, manufacturer to whom he sold RF components.

Bill talked to Microsignals and liked what they said. Their chief designer, James Penny, had more than 25 years of RF experience. Penny explained that he could develop a system for very low cost production—less than half what we had anticipated. His method, to simplify, was to use inexpensive ceramic oscillators<sup>14</sup> and other low cost parts rather than the highly precise and equally expensive components Mark had been using. Though

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<sup>14</sup>Oscillators determine the transmission frequency of a radio.

cheap, through some clever design work they did the job. He said he had done it many times before. When we asked Mark his opinion of the approach, he told us that he didn't have any direct experience with it, but that in principle it sounded reasonable. Microsignals had to design two radios, one at the 2.4 GHz frequency and another at the 5.8 GHz frequency. Our technology required transmitting on two frequencies and Mark had only designed a 2.4 GHz radio before he left. Bill believed Microsignals could do the job and their price of \$20,000 for production prototypes seemed just about as low as we were going to get. They said they would produce the radios for us for \$125 in small quantities, much less as the quantities increased.

Since we needed an RF system fast, on October 9, 1990, the day after my 44th birthday, we signed an agreement and paid Microsignals \$10,000. The money to cover this initial payment came from my personal savings. I still believed that we could make a successful company if we could only get the product completed. We had the control portion of the system pretty well in hand. A working, manufacturable radio on two frequencies was the missing link. In addition, I was still making one of the big investment mistakes. I was "throwing good money after bad" in an effort to save my previous

investment. Foolishly, when I started investing cash into Kyros, I set no limits. When the company was in desperate straits—as it often was—I handed over yet more of my dwindling reserves.

The Microsignals contract had three milestones. The first milestone, delivery of pre-production prototypes was to take eight weeks. Milestone three, enough production units to fully test the system, was to take 21 weeks. I knew we were in trouble when the proposed deadline for milestone one came and went with neither prototypes nor explanation. Penny became difficult to get hold of and when we did, even more difficult to pin down. He always had an excuse. Yet we went along with each delay. What choice, we told ourselves, did we have? We had no money at that point so we couldn't really go anywhere else.

In the end—January, 1992, 15 months later—we only got possession of our non-functioning prototypes and their associated design files by paying the other \$10,000 stipulated in the contract for delivery of working units. We raised that money from some of our loyal investors who also hoped to salvage their investments. Why did we pay? It looked to us, at the time, like Microsignals was never going to get the units to work but that someone else probably could. We were afraid that we'd end

up with nothing but a 15 month delay for the \$10,000 we had already paid.

There are lessons here. Always do thorough investigation of any unknown contractor. Unless you know the contractor really well, don't pay in advance. Keep the milestones frequent so you can make sure the contractor is performing. Make him or her produce in order to get paid. Keep tight tabs on what the contractor is doing, from the beginning, and check up, in person, at least every week. If they don't give you straight answers, drop them. We neglected these steps and this neglect put another nail in the coffin of our business.



## Chapter 9

### Business Plans Galore

When I joined the Kyros project in the fall of 1985, long before there was a Kyros Corporation, my first comment was, “where’s your business plan?” What Bill and Cie showed me was the presentation that Bill and his father had put together to convince the local branch manager of First Fidelity Bank to lend them \$50,000. It was an impressive presentation, but it wasn’t a business plan. They described the product in glowing detail and they told how they would spend the money. The idea was to get enough money from the bank to let them create an even more elaborate presentation, complete with real-time simulation of how the ultimate product—the hands-free, cordless telephone—was going to work.

My second comment—a bit too late by then, but still to the point—was, “you shouldn’t spend any money until you have a well thought-out business plan.” I wasn’t

so interested in a professional looking document, nice as that is. I knew that to build a successful business you had to first answer the basic questions. What exactly is the market you will sell to? Are you aiming at the right market? Is it big enough? Who will be your competitors? How will you position yourself to sell against established competitors? Is this really the right product for this market? How much will it cost and how long will it take to get your product to market? Where will the management skills you need to run a rapidly growing company come from? Do you have them yourselves or will you have to find the key people? Realistically, what's the potential return to an investor who puts in money? What are the risks?

These are the standard questions any new business must ask itself. Unfortunately, they hadn't asked them. I knew that to answer these questions well required in-depth analysis that none of us had the skills and experience to provide. Still, I decided to get involved because it was fun, because I could learn some technical skills that fascinated me and because I thought that eventually, if the project went anywhere, we could find the right people to make it happen. Eventually we would have to ask, study and answer these questions. For now, I could just enjoy the fun.

I knew we had to ask the questions, but I really had no idea how difficult it was to come up with a coherent set of good answers that would get us whatever amount of money we were going to need to build whatever kind of company and whatever type of product we were going to build. By the time we abandoned our eight year odyssey, we had written the equivalent of 10 business plans, if you include these early bank “presentations”—which were, after all, a stab at making a business plan—and include the two private placement memorandums (PPMs) under which we sold stock in the company to small investors. Indeed, each PPM included a business plan, though not as thorough as VCs might like. By the beginning of 1991, we had really gotten our act together. The two companion business plans we “published” that February were truly our chef-d’oeuvre. Among the many compliments we got was one from a partner at Coopers & Lybrand, our auditors, whose job it was to review business plans from startups all over the country. “This is the best business plan I’ve ever seen,” he told us through our Coopers partner. Too bad we were never able to translate the purported quality of the plan into dollars in the bank. I learned a lesson there too. The quality of the business plan as a document does not mean that the business case is compelling. You can have most of the right elements

in your business case, but if you're missing just one or two, the money people will walk away. They are a lot of opportunities for them where all the elements, without exception, seem ideal. They just won't bite at yours unless you have everything in place.

### **The Bank Presentation**

Our first attempt to define the business was that bank presentation that not only impressed Sam Wilson, the banker, but a few months later hooked me. All the presentation amounted to, when you reduced it to its essentials, was an outline of the features the product included and the sketchiest of ideas about making and selling it.

That was the extent of the business “plan” in August 1985, after they had already spent \$35,000. I do know that Bill and Cie recognized the holes in their analysis and planning. They simply had no prior experience. Bill left the business planning for Cie. As Bill said to me, “there's only so much time. I have to totally focus on the engineering or I won't get it done.” Cie said that a business plan was her next priority.

When I started working on the project that November, there still wasn't a business plan. I didn't think too much about it then, though, because my job—and the reason I was spending so much of my time there without pay—

was to help Bill get his software simulator running, and in the process learn how to write computer programs. However, when January came and the last of the first bank money dissolved into the ether, all of us stopped what we were doing to help prepare the second presentation for the bank. The second presentation was fancier than the first. It had more visual aids and a good piece of the software simulator working, but it didn't add much hard business detail. It did include the beginnings of a development schedule. With the added whiz-bang, Bill and Cie were able to give a very professional demo for Mr. Wilson. He gave them another \$40,000. We even prepared and bound a document for the bank that described much better than before the business case for our hands-free cordless phone. But even this document was light on detail about marketing and possible financial results. The details just hadn't been thought out yet. We had started asking the questions, but, except for the engineering schedule, hadn't yet started analyzing the details of how we were going to make a company happen.

Cie, and her sister Colleen, first started working on a business plan during 1986, but they spent the bulk of their time working to raise the day-to-day cash we had to have to continue operating. The immediate fundraising task left them little time for writing a plan. The Heath

sisters had decided early on that they would have most success with small investors. Since it's only the large investors who really care about looking at a business plan, writing the plan became a secondary priority. Cie and Colleen had to go to relatives and friends for the money we needed immediately. The company incorporated in April 1986 to facilitate raising that money in \$5,000 and \$10,000 chunks. It took them until the fall of 1986 before they had put together anything that even looked like a plan we could show people outside the confines of our small group.

The first outside expert to look at the business plan was Charles Biderman, one of the Heath sisters acquaintances from Werner Erhard & Associates ("EST"). Biderman volunteered at the Erhard programs like they did, but more importantly he had an MBA from Harvard and traveled in New York investment banking circles. His comments divided into two areas of concern: not enough concrete data and not enough background planning. For the marketing section of the "plan," he suggested that we give real numbers for the sales of cordless phones, cellular phones and beepers—our chief potential competitors. Describe in detail, he said, the potential new markets we were creating. Tell, in detail, how we'd sell our phone and how we'd advertise it. He said we needed to plan

for 150% a year growth—describe how we would accomplish that level of growth. If the competition tried to leapfrog us, how would we keep our competitive edge. For the financials, Charles asked us to lay out the cost reductions that would take place over time, what cash we'd need to sustain the plan, what was our manufacturing plan, how would investors get an annual return of at least 30%. Basically, he was telling us to be thorough and specific.

### **A Private Placement Memorandum**

Biderman's suggestions never got translated directly into a real business plan. In fact, we didn't have a *real*, complete business plan until 1990, and by that time we weren't even planning a cordless phone in the near future. The document we used throughout 1987 to explain our company was a minor expansion of what we showed First Fidelity Bank. We did include some more statistics about the market. We gave this document, with its full-color, glossy photograph of our phone on the cover, to people who might invest big bucks, along with our first private placement memorandum.

If you've ever seen a private placement memorandum, you know how daunting a document it can be for even the best of salesmen and saleswomen. Ours was no less

frightening to the new investor. But it did supply some rudimentary information about the business and the people and some of us considered it a business plan, of sorts.

Our first PPM, under SEC Rule #504<sup>1</sup>, allowed us to raise no more than \$500,000 from an unlimited number of investors. Fortunately, we didn't have to hold the money in escrow until we fully subscribed the offering. We could spend it as we raised it. This was essential to our well-being.

While we were still working on that first private offering, our attorneys started preparing a second offering document. The new offering, at the beginning, was to be a placement of stock for a total investment of \$5 million. We figured it was finally time to get serious about fundraising. In order to ask the public for \$5 million, under Rule 505 (another rule that provides exemption from registration), the SEC said, we had to limit the number of "unaccredited" investors to 35. This meant that if we used Rule 505, it was much more difficult to raise money the way we had been raising it. We really had to go after the bigger and more demanding investors. But we knew that we needed to raise a lot more money if we were going to succeed. I worked with Alan Bernstein, the attor-

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<sup>1</sup>Rule 504 provides an exemption from registration with the U.S. government normally required by the Securities Act of 1934

ney who drafted the second document for us, for many months to get the details, especially the business details right. In the end, because it had taken us so long to sell the first \$500,000, we decided to continue with another 504 offering. We hoped we could snag a VC or a corporate partner and we wouldn't need a 505 offering to raise the millions we were obviously going to need.

By the time we issued our second PPM, toward the end of 1988, we had shifted direction. We were no longer going to build the miniature telephone—a complex engineering feat that pitted us against the telecommunications giants. Instead, we would build a wireless LAN. We were in a market in which we were right at home with the other computer peripheral startups—though at a disadvantage we discovered because we operated in New Jersey rather than in Silicon Valley. In the final version of our second private placement, Alan and I decided to include only a minimum amount of detail about the business itself. All business details were in a separate business plan document that was, nonetheless, an integral and necessary part of the PPM. This strategy minimized additional, expensive legal work on the memorandum when it came time to change or update the business plan. At the price the lawyers were charging and given how slowly we were raising the money, I wanted to make

sure this memorandum lasted us a very long time. Fortunately for us, and thanks to the good graces of our friend, Kevin Clancy, his firm wasn't asking for cash payment for their work.

### **The SpectraNet Development Plans**

The first business plan we included with the private placement was still not a full plan. We called it the *SpectraNet Development Plan*. Bill had come up with the name, SpectraNet, shortly after we decided to switch to a wireless LAN product. Bill and I worked on this detailed description of the engineering development during August and September. For the PPM, we planned to supplement it with a product description and a modicum of financial data. Our marketing partners, Soma Technologies, were to develop market analysis and a complete marketing section for the full plan. We finished the first version of the SpectraNet Plan toward the end of September.

All that fall, I struggled to put together a spreadsheet for the company's financial projections. It could have been a relatively simple job. In fact, it started out simple enough. A few formulas with most of the real financial information "plugged in." The kind of spreadsheet every accountant and CFO is familiar with. Then Bill

suggested that we would have a really powerful tool if we built our spreadsheet so that we only had to change a limited set of assumptions when we wanted to consider new parameters. We would “fix” all the formulas and other spreadsheet setup and formatting when we wrote the spreadsheet. Then, we’d only have to build the spreadsheet once; after that, we’d just change this or that assumption and instantly calculate a new set of projections.

With such a spreadsheet we could perform every variety of “what-if” and recalculate instantly to see what kind of return we’d get. When we appeared before a VC, or other potential investor, if they asked what would happen to our bottom line when our material cost decreased to \$125 from \$150, or if it turned out we needed 20 engineers instead of 15, using a portable computer we could tell them on the spot. Oh, yes, we would say, in that case our breakeven point will come after 20 months instead of 18, and your ROI<sup>2</sup> will be 60% after the third year. Instantly! Isn’t that what computers were supposed to be good for?

Well, that was the theory. This was both one of Bill’s best ideas and one of his worst. The trouble was

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<sup>2</sup>ROI stands for *return on investment*, a measure of how well your capital is working for you.

that PC-based spreadsheets were still in their infancy in 1988. The electronic spreadsheet makers promised you the world. In many cases they could deliver. However, there were many hidden bugs in the programs that only showed up when you tried to do something truly complex—something that used many of the infrequently used features in an interconnected way. And, of course, Bill, being a highly trained engineer, could not resist using all that power. Not only that, in 1988 PCs just didn't have the power to run multiple complex calculations through a generalized program like a spreadsheet. There were so many extra functions the spreadsheet was doing, in the background, that made it usable for many different tasks, but that also slowed it down for any particular task.

I worked on and off on the financial projection spreadsheet for almost a month by myself, making it more and more complex, as Bill wanted. It now needed complex recursive formulas way beyond the knowledge I had picked up in high school math. I had to go back to Bill and tell him that if he insisted on us creating such a complicated spreadsheet, he'd have to help me. I meant for him to say, "let's forget the whole idea." I hesitated in asking him because I knew he might say yes and that any such diversion delayed work on the engineering. Still,

the project frustrated me no end. In a weak moment, I asked and he agreed. Ultimately he insisted on doing it, thinking it would only take a few days. He underestimated the perversity of the program we were dealing with.<sup>3</sup>

Bill spent a good part of the next six weeks, with my help, reorganizing and rewriting my spreadsheet. He fixed my formulas very quickly. Most of his time went to fitting what we were trying to do into the undocumented limitations of the program. In the end, it was indeed a thing of beauty. We had also, in the meantime, received marketing data from Soma and had reworked it into the spreadsheet. The spreadsheet could react even to changes in industry sales projections. We could change not only about 40 financial assumptions, but also almost 20 marketing assumptions, easily and quickly.

Instant recalculation in front of investors? Forget it! Using the fastest PC we had, it took the spreadsheet more than 30 minutes to recalculate. It was a good tool, but at what price? Later, for our next business plan, still enamored of the idea of responding at once to investor queries,

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<sup>3</sup>No, it was not a Microsoft product. Though it could have been. Most electronic spreadsheets of the era were similar in their functioning and limitations. But these were the days before Microsoft's complete hegemony. It was not even *Lotus123*. We used, instead, Computer Associates' *SuperCalc*.

Bill rewrote the spreadsheet as a Pascal program.<sup>4</sup> The rewrite took him about a week, worked flawlessly and recalculated in less than five seconds. He did a superb job, as usual when dealing with engineering detail, but why do the job at all? We never had occasion to use the program's instant financial projection capability in front of an investor, though it saved us some time once or twice internally.

The engineer in Bill had overcome the executive. He couldn't leave the job alone. I could have stopped it at any time, but didn't. Here was our most valuable engineer, spending a big chunk of his time on a job that didn't forward the development. Though the return could not possibly justify the cost in business terms, the personal satisfaction of finally doing the job well clearly outweighed all other considerations. I have to admit that I was in awe of his programming skills, and still appreciate the beauty of what he did, but it was a twice-made mistake (for which we both share responsibility).

The second *SpectraNet Development Plan*, finished in March, 1989, was much like the first. What had changed was the number and the timing of various engineering tasks. As our small team of engineers lived with, thought

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<sup>4</sup>Pascal was a widely used computer programming language that has given way to other languages, such as C++ and Java.

about, discussed and worked on various initial parts of the plan, they refined it. Schedules always change. In this case, for the most part, they shrunk the length of time from funding to completion. For example, they replaced the 14-week task of building, in hardware, an automatic gain control circuit (don't worry your pretty little heads about what that might be or do, my dears) with the quicker 8-week task of writing an automatic gain control program to run on a dedicated microcontroller. The system we actually completed two years later didn't even include this function. It worked perfectly well without it. Who knew?

About this time we also developed our elaborate marketing spreadsheet that we incorporated into the financial projection spreadsheet. Combining data from a January 1989 IDC<sup>5</sup> report and customer surveys that Richard Close of Soma did for us, we determined what the wireless LAN market "opportunity" might be (remember that wireless LANs were a new idea in 1989). With this market opportunity figure as a base, we looked at what percentage of potential customers had heard about wireless LANs and, of those who had a need and knew about them, how many might be confident enough wireless

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<sup>5</sup>IDC is International Data Corporation, one of a half dozen or so premier market research firms in the United States.

LANs worked that they were willing to buy them for their companies. Finally, we speculated that since there were no existing competitors, we were one of three (an arbitrary choice) vendors to get a share of that still tiny market. As the market grew and competition increased, we assumed that our share would inevitably decrease. Our business, we thought, came from four basic customer needs.

1. Customers who didn't yet have a LAN and saw that our low priced wireless LAN—no more expensive and in many cases much less expensive than a wired LAN—was a good alternative to putting in a standard LAN.
2. Customers who were moving their network connected computers—as companies do with about 25% of all connected computers each year—and recognized the big cost savings our product offered.
3. Customers who wanted to add wireless nodes to their already installed base of wired LAN computers and printers to give them increased flexibility.
4. After our business got off the ground, customers who were adding additional wireless nodes to the wireless LANs they had previously bought from us.

On March 27, 1989—four years after Bill and Cie agreed to join together and develop a product, almost three years after we incorporated as Clarion Corporation, six months after I had started pouring my life savings into by then renamed Kyros Corporation, and after having spent approximately \$700,000 (not including deferred salaries and deferred lawyers' fees)—we finally had a business plan worthy of the name. Not the perfect plan, mind you, but one that you could show your cousin, the stockbroker, without fear of becoming the family laughingstock. This plan had all the basic elements.

This first *real* business plan consisted of a reasonably good introduction to the business opportunity, a detailed description of our product, *SpectraNet*, as well as brief descriptions of a low speed data modem and the hands-free telephone that we hoped to introduce later as follow-on products. There were the obligatory resumes of the management team (our lack of depth here haunted us throughout the history of the company), the detailed market analysis buttressed by the marketing spreadsheet. We included, of course, the financial projections and summaries we had slaved over for so many weeks—worked out for five years into the future. To cap it off, two appendices, one explaining direct sequence spread spectrum

technology—the heart of the Kyros product line—and the other, a complete glossary of those technical terms we couldn't avoid using in the document. Much of the plan migrated directly from the *SpectraNet Development Plan*. We had a local quick print shop reproduce and bind about 20 copies. VCs and wealthy potential investors to whom we had promised a business plan for months—and in some cases for years—along with our cadre of loyal consultant supporters, received these first copies within just days of the printing.

### **We Start to Get Good at This**

We revised the plan again in December 1989. This plan also served as the business section of our private placement memorandum until the beginning of 1991 when Bill and I produced what was clearly the best plan in Kyros' history. The 1991 plan came in two versions, published at about the same time. We called the second of these the “Chinese” version because we changed the timing of when we received investments under the plan to match the needs of potential investors from mainland China. In the original version we asked for an immediate commitment of \$7 million in venture funding so we could start right away on three concurrent developments. The smallest portion of the money went toward

completing our basic wireless LAN product. We were going to need a larger amount—about a million—to start marketing and to launch the product. We had earmarked the bulk of the \$7 million for developing and launching two follow-on wireless LAN products with greatly improved performance that we called *SpectraNet-II* and *SpectraNet-20*.

Given the delay in getting the money we needed, we had begun to worry about the inexorable march of technology. The market might easily pass us by. We worried that by the time we got to market our costs would be too high and our speed too low. People were already beginning to install 100-Megabit Ethernet<sup>6</sup> systems and other super high-speed networks. While customers might tolerate a slightly slower speed in order to get the advantages of wireless, we didn't want to take a chance, after all our years of work, of being left in the dust because technology had passed us by. So we conceived of *SpectraNet-II* as our answer to the cost issue and *SpectraNet-20* as our answer to the speed issue.

*SpectraNet-II* was to be a plug-in PC board instead of a separate box. We'd avoid the extra cost of the box and separate power supply, of course, but more impor-

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<sup>6</sup>Ethernet had, by 1991, taken over as the standard network protocol; its nominal data rate is 10 megabits (million bits) per second.

tantly we reduced our radio to a few inexpensive custom chips, dramatically lowering the manufacturing cost of the product. As for SpectraNet-20, it was close to 10 times faster than our base product and comparable in speed to 100-Megabit Ethernet.

The basic version of the 1991 business plan and the “Chinese” version differed simply by when we started developing these second and third generation products. By waiting to start the advanced development, we didn’t need so much money so quickly. We’d need only about \$2 million right away to complete and launch our first, already partially complete, product within a year of funding and to do some very modest work on the advanced products—just enough to keep from falling behind technologically. Then we could get the balance of the money after we had launched SpectraNet I. As it turned out, other investors besides the Chinese liked this multi-phase approach and the Chinese version quickly became our standard plan. Like the plan though they did—in fact, everyone who saw it raved about the quality of the work and thought that went into putting it together—not a single investment, as far as I can tell, came our way because of this or any other business plan we wrote.

## **The Chinese Invasion**

One of our young engineers in 1989 and 1990 was JiaJing Zhang, a Chinese national who had received his master's degree from New Jersey Institute of Technology. Four of our engineers were graduates of NJIT, one of northern New Jersey's two engineering colleges. We called him JJ at his request. He was special in that he was our only non-American employee. We interviewed many foreign engineers—U.S. engineering students are predominantly foreign born—but JJ was the only one willing to take the entrepreneurial risk of working for a startup. He could do so only because his wife already had a paying job. In hiring a non-American, even at zero cash pay, we took on an extra burden of paperwork. He needed, for example, an H-1 foreign workers' visa, with its intrusive level of government meddling. Again, for a small company like ours with no income, each extra administrative step we assumed meant it would take us longer to complete our primary task. Nonetheless, JJ was a steady worker who almost succeeded in getting us the funding we needed.

In June 1989, we anguished with JiaJing over the events of Tiananmen Square, in which many of his former classmates from China were taking part. We all huddled around the portable shortwave radio he brought into

work, listening to the news of his government's repression and trampling of its own people. You can imagine our surprise when, in August 1990, only a year later, JJ announced that his family friend, Professor Hua, president of Shanghai's Fudan University, one of the country's most prestigious schools, had uncovered Chinese investors interested in making an investment in Kyros. None of us would ever have guessed that there were any capitalist strains running through communist China, let alone investors willing to think about making foreign investments. Yet here it was. A seemingly bonafide, out-of-the-blue proposal.

For several months we exchanged faxes with mainland China—ours in the simplest language we could muster, theirs in perpetual broken and at times unintelligible English—feeling out how we might structure such a deal between parties divided not only by oceans but also by diametrically opposed political and economic systems.

At one point Bill and Cie's sister, Colleen, though no longer working for our company, visited a representative of the "investors" during an unrelated trip to Hong Kong. She reported that their intent appeared serious. We still didn't know who these investors were, but we welcomed their interest and invited them to visit and check us out. To our delight, they agreed to come. We could not pay

their expenses, of course, but we could “sign” for them with their government—that is, officially invite them, so they could get exit visas from China. We were desperate for their money.

The Chinese came in January 1991. By this time, JJ no longer worked for us—he had moved to the greener pastures of Silicon Valley. Yet we finally discovered that our potential investor was a Shanghai firm named SUNY Company, Ltd., that, among other enterprises, operated the largest electric light bulb factory in the People’s Republic (funded in large part by the Dutch conglomerate, Phillips, N.V.). Now the possibility of money seemed real.

SUNY’s representative, Mr. Zhou Jun, and his translator and technical expert, Mr. Zhang Shiyong, a computer science professor from Fudan University, spent five days with us. Negotiating interspersed with sightseeing in New York interspersed with negotiating at our lawyers’ offices on Fifth Avenue. By the time we put them on the plane at Newark airport for their return trip via Los Angeles (they had to see Disneyland before going home), we were sure we had a deal. All our headaches maintaining JJ as an employee, we thought, were going to pay off.

We had agreed to send them our business plan, revised

to their criteria, the “Chinese” plan, within a week. We had reluctantly agreed to put our technical documents—the sum of our intellectual property—in escrow, so that if we didn’t live up to our part of the bargain, they got rights to use the technology on their own. Mr. Zhou asked if we could put up real property—United States real estate—as collateral, but we informed them it was impossible. We had none to offer. We agreed to structure their investment as a loan. They wanted this, probably to circumvent government currency export restrictions. By this agreement, we got \$400,000 at first, then \$1.25 million after we had created a functioning production prototype. They got a fixed return of \$3 million, payable at the rate of 50% of profits, and a seat on our board of directors, with veto power over financial decisions, until we had repaid their “investment.”

We all agreed to the terms, subject to board approval. Mr. Zhou assured us that approval by his board of directors was a mere formality. We heard from Mr. Zhou only once more, through Mr. Zhang, the translator. He again asked for real property as collateral. We again told him that we had none—everything we owned we had already mortgaged to the hilt. We told him that our board of directors asked for two items before issuing its formal agreement to the deal, 1) a copy of SUNY’s incorpora-

tion papers and list of principal owners, and 2) documentation from the People's Republic of China that SUNY was a company in good standing. We never heard from them again. Perhaps we had asked for too much!

## **Our Grand Plan**

The 1991 plan was 100 pages long, half narrative and abbreviated tables, half appendices with detailed tables on marketing, financial projections, manpower needs, equipment and product costs. It contained more than 20 illustrations, both charts of plan details and drawings to elucidate the technology. The analysis of every aspect of the proposed business was meticulous. In a word, the plan was thorough. We went too far.

Why such a painstakingly complete and detailed plan at such an early stage in the business?<sup>7</sup> Bill and I—the two who did virtually all of the work on the plan—discussed this at the time, in depth. We agreed that our biggest obstacle to funding was our management team—ourselves and his sister, Cie. It wasn't too hard to sell ourselves to the small investor; we were all personable and articulate. It was the big investor whom we needed and whom we had been unable to attract. None of us

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<sup>7</sup>While it was clearly not an *early* stage in our effort—we had been at it for four and a half years—it was just as clear that as a “business,” with product and income, profit or loss, and cash flow, we had hardly begun.

had the experience that venture capitalists are looking for when they fund new companies. None of us had done it before—though I came closest, having worked with Al Fielding on Steelboard Corporation, his unsuccessful attempt to duplicate his Sealed Air home run. Nor had any of us held big jobs with fast growing, high-tech companies, startup or otherwise. We had nothing to inspire confidence in the typical VC, except our “presence” and whatever we could show them about our ability to plan a business effort and perform. Unfortunately, we couldn’t perform at a level likely to catch their attention until we had their money. A classic Catch-22. All that was left for us to make our mark was the business plan. We knew it was a long shot. Business plans don’t sell businesses any more than resumes get workers hired. Still, we decided that to have any hope of success, our plan had to be superior to anything they had seen. So a superior plan was what we set out to produce.

Our plan outlined how we’d spend the \$7 million we were asking the investors to give us and what kind of a business we’d build by spending that money. We planned to complete the basic SpectraNet product in five months. Then we would start in earnest on SpectraNet-II and SpectraNet-20. We figured that if we had the entire \$7 million it would take an additional year to finish

SpectraNet-II, the reduced cost version, and 20 months to get our high-speed SpectraNet-20 to market.

Competition and marketing took up the bulk of the plan narrative. We talked at length, for example, about competition. The only serious competition in wireless local area networks that had developed by 1991 was from NCR and Motorola. These two established companies had products that were inferior to our SpectraNet in one way or another.

NCR's 2 Mbps<sup>8</sup> "WaveLan" wireless LAN is a direct sequence spread spectrum system like Kyros'. At that time, it operated in the 900 MHz band and cost \$1,400 per unit. With WaveLan the customer needs one unit for each connected computer. Even figuring our initial production costs (always higher than when you're in full swing), we would be able to sell our units for about \$1,200. More important, SpectraNet allowed clustering a number of computers around each unit. So if you had a group of cubicles in your office setup, for example, you could connect as many of the computers in those nearby cubicles, or other work spaces, as you wished to one SpectraNet unit, using simple twisted-pair telephone extension cords, dramatically cutting your cost per computer. You probably didn't want to wire together

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<sup>8</sup>Megabit per second—million bits of data per second.

more than seven or eight computers to one of our wireless units, even with this easy telephone cord wiring, because you'd start to defeat the purpose of having a wireless LAN—but you could. It wouldn't take more than five minutes to connect eight computers together in this way. We figured that the cost per computer for our system, if you had the typical office environment of a mid-to large-size company<sup>9</sup> was \$300 or less. This was only one-quarter the cost of WaveLan. In addition, our SpectraNet had an *actual* data speed of about 2 Mbps, while WaveLan, with its nominal 2 Mbps, was actually performing, in real world conditions, at around 500,000 bits per second—about one fourth the performance of SpectraNet.

Motorola, on the other hand, had an Ethernet-compatible system called “Altair” that had the standard Ethernet rate of 10 Mbps. There was, however, lots of data showing that the nominal Ethernet rate was really only about 2 Mbps—the same as SpectraNet—in all but the most unusual, atypical LAN setups. Altair cost you almost \$4,000 per computer, more than ten times as much as SpectraNet. The system was very complex and cost reductions did not come easily. Not only that, Altair required lots of permanent wiring to connect its con-

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<sup>9</sup>We were assuming a mix of private offices and shared work spaces.

trol units together, partially canceling the value of being “wireless.” The only reason we had to fear Altair was the strength of the company behind it.

There were also a few slow-speed wireless products—more like modems than true LANs. They didn’t worry us. Others might come along, and undoubtedly would, but for now the competing products were not technically strong. We honestly thought that, if we could get our product to market, our SpectraNet would blow the competition away. What we really ended up fighting against, we thought, was wire itself, or the perception of wire. We had to convince customers that our product was as reliable as wire and no more expensive. If we could do that, we felt we had it made. Since it was true, how hard could it be?

Our 1991 business plan went into great detail about our marketing and sales strategy. We planned to sell to corporate LAN managers through a network of resellers culled from among the most successful computer resellers in the United States. We would worry about Europe and points beyond after we got ourselves established. Resellers, we were confident, would jump on our bandwagon.<sup>10</sup> The resellers our distribution sales

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<sup>10</sup>We were offering them a product that gave them a bigger profit margin than installing a wired LAN with a lot less work. Installing wire is very labor intensive and you can’t add as much markup to your labor charges as you can to the cost of

force would target were the so-called “LAN-100” (the 100 largest resellers in the U.S. as compiled by LAN Magazine) and Novell’s “Platinum” and “Gold” resellers (their 2,500 best). Our sales force was not going to sell to end users except to help a reseller get started selling our product. The Kyros sales organization’s job was to 1) sign up resellers, 2) create demand among resellers for our product, and 3) use reseller demand for the product to persuade the big distributors—companies like TechData, Ingram and Merisel—to carry SpectraNet.

We planned to build up this sales force methodically, district by district. In our plan, we broke the United States into four regions, each with a regional manager and four or five districts, representing the major metropolitan centers. So, for example, the western district managers were in Los Angeles, San Francisco, Seattle and Denver; the midwest in Chicago, Detroit, Saint Louis and Minneapolis. We would start selling in the East, in the New York area, because it’s the largest and because Soma—our partner—could handle the initial sales even before we were able to hire any sales people of our own. We would soon hire district managers for Philadelphia, then Washington and Boston. Step by step we would build our sales force, picking off the big

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a product.

areas first—L.A., Chicago, Houston. And so on. For this plan, we even included detailed justification for how fast our sales managers could sign up resellers and how many sales we could expect from each reseller, both initial and over time. All these assumptions came together in the computer generated sales model that was integral to the plan.

On the technical side, our 1991 plan described SpectraNet in layman's terms, avoiding details that took an engineer to understand. We believed—and our advisors concurred—that technical people won't be reading the business plan and the investors didn't understand the technical detail anyway. When the time came for technical "due diligence," as surely it would when we had hooked a big investor, the experts would sign a non-disclosure agreement and we'd let them in on all our secrets, or at least as many of them as they forced us to disclose. Though it scared us a bit to reveal our intellectual property to those who might have the resources not only to steal it from us but to implement it and get it to market before us, it was a risk we had to take. That, or no money. By 1991, we had already taken this risk many times.

We consciously omitted from the plan one key technical detail that truly distinguished our system from any

others we had seen. A non-technical person could easily grasp this idea and any competitor could easily have copied it. We had started the process of applying for a patent (which we later received), but our lack of money had stopped us. We didn't want to publish this invention until we could patent it. Our best protection for the moment was silence. The idea, of course, is the central relay I've previously mentioned. In the SpectraNet system, information from each satellite unit, transmitted via a directional antenna, travelled to the central relay on one frequency band and return via an omnidirectional antenna over another frequency band. We included a diagram of a typical office layout without any indication that there was a relay unit. When we discussed costs, we spoke of "other system costs" to cover the cost of the relay. We only had to go into more detail once or twice in the days before we got the patent.

It became apparent after a few months that, despite a huge effort in contacting more than a hundred of them, VCs and corporate partners were not knocking down our doors with wads of hundred dollar bills in their carpet-bags. Our plan writing gave us an extraordinarily, if prematurely, focused view of our business, but no additional money. The accolades that rolled in did not put bread on the table. As good as it seemed to get at this point, we

still weren't able to obtain the funding because of those old holdover problems: too many stockholders, all that complexity of the deferred salary and options, our lack of a track record. VCs, after all, had a lot of other very good choices when it came to spending their money. One item on their laundry lists of pluses out of place and you were history.

We needed to do something to get money. The \$230,000 I had lent the company was gone. Though small investors were as hard to find as big ones—we had long since run through all our friends and relatives—we'd have to go back to looking for them. It seemed like the only option left.

So we added two pages to the front of our plan describing a minimum funding scenario for getting SpectraNet to market. We were tantalizingly close. We calculated that, with absolutely no frivolous spending and no increase in staff, we could get the product ready to sell in less than a year and a half. This approach cost \$320,000. We'd let Soma do all our sales—New York only until cash flow let us expand our sales effort. No more hiring, minimum equipment even though it might take longer. We'd give Ray Chadwick, our one engineer who hadn't already left for a paying job, a small subsistence wage to help him continue with us. We weren't going to give

up looking for the big guys, but we would redouble our efforts with the small ones, this time using the detailed plan we had slaved over as additional ammunition. With luck the big numbers in the plan wouldn't scare too many small investors away.

Around this time—April, 1991—we also wrote a proposal for a government grant (we were desperate enough to try anything). We applied to the U.S. Department of Transportation (DOT) under the SBIR<sup>11</sup> program. The DOT, it seemed, wanted a way to monitor the condition of the thousands of highway and railroad bridges across the country. The vast majority of these bridges were old and many were in need of repair. If they could track the physical condition, we surmised, they could repair the bridges “just-in-time”—that is, just before they collapsed! Lest you take this too seriously, that was a joke. Our proposal was anything but a joke to us. We thought we might have a chance at one of these grants. Our spread spectrum technology was perfect for the type of telemetry<sup>12</sup> system they were looking for. We could implement a slow speed, high-reliability version of our system that had an inherent ability to reject the high RF noise level of the highway environment. The DOT peo-

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<sup>11</sup>Small Business Innovation and Research.

<sup>12</sup>Telemetry is the communication over radio waves of remote data measurements.

ple could then individually select and analyze data from many low-cost sensing units located at various critical points on a bridge. They could also use such a system to monitor the physical well-being of other public structures and even use it for flood control monitoring, a major problem in many areas of the country. It was a good proposal. We did not get a grant.

### **Bob Caploe's "Interim" Business Plan**

When we added the minimum funding insert to the business plan, we also mentioned our new director of sales and marketing, Jack Barton. Jack was a Californian with good credentials for whom we had both high hopes and some misgivings. He had agreed to work for subsistence until we got funding. Kyros would have been better off if we had not brought Jack on board. We needed to complete our product. We thought Jack's participation would let us refocus on development. It didn't work out that way.

Jack's first job was to fund our plan. He was going to finish raising the money we needed. By that summer, Cie had left the company. She was handling her personal affairs. Bill and I were doing the fundraising as well as the development. During June, July and August, we raised close to \$150,000, mostly from current investors, at the

cost of stopping all development. When Jack came along we turned the job over to him so we could get back to the product. Unfortunately, he was unable to raise money. Instead, he found a business plan “consultant” of the pay-me-money-now kind we had so carefully avoided for all those preceding years.

Bob Caploe, Jack’s “find,” had spent years as a financial manager at large companies. His resume was impressive and showed that his last job before he retired and became a consultant was as CFO at ITT. He told us that he was good friends with Herman Fialkov, one of the principal investors in Standard Microsystems Corporation (SMC), an important company in the computer industry. Caploe swore that he could get us all the money we needed. Neither Bill, Cie nor I fully trusted Bob but it didn’t seem like it hurt to let him try. So we told him that if he wanted to work on getting us funding, we wouldn’t stand in his way. He just had to understand that there was no way he’d get any cash money from us. He’d just have get his compensation from whomever he brought in as an investor. Jack objected vehemently to this approach, contending that we had to give this man whatever he wanted. If it hadn’t been for Jack, we probably would have shown him the door. But Jack was resting his success on Bob and we didn’t want to undermine our already shaky in-

vestment in Jack.

In the end, after much wrangling, Bill, Cie (advising part-time) and I capitulated to Jack Barton's entreaties— influenced in part by our own dire financial situation— and signed an agreement with Caploe that gave him and his partners a 10% finder's fee for any investment they brought into the company up to \$350,000. They got the Lehmann formula thereafter.<sup>13</sup> We also agreed to give Caploe \$6,000 for preparing the interim business plan if he brought us at least \$100,000 in investment. We had wanted to structure any investment so that Caploe had to negotiate his fee with his investors. We thought that was a cleaner approach for us and gave us more distance from someone about whom we were a bit uneasy. We gave that up because by this point we didn't think Jack was going to bring in any money on his own, and Bill and I didn't want to go back to fundraising. We felt we had to keep technical progress on track.

With Jack's help, Bob wrote yet another business plan during the Fall of 1991, much shorter and less complete than our "Chinese" plan. Bob called it the "Interim Business Plan" because he intended to write a full plan once he had signed up Fialkov. Bob's plan, with our

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<sup>13</sup>The Lehmann formula for investment finders' fees is 5% of the first \$1 million invested, decreasing in 1% increments for each additional million to a minimum of 1% per million.

agreement, asked for a lot less money than our last plan. There was no immediate funding for follow-on products. Just the basic product. Bob also figured Fialkov's SMC would handle the manufacturing for a big savings of up-front investment capital. He wrote the plan with that in mind.

Caploe aimed his interim business plan primarily at Herman Fialkov, who, we later discovered, was his only real contact. The plan purported to raise \$450,000 to complete SpectraNet development and produce a full business plan that the company would use to secure more substantial funding of \$7 million. The same \$7 million and for the same uses as our "Chinese" plan. This plan was essentially a summary of the previous one with a new schedule based on receiving only \$450,000 right away. Caploe did get us an appointment with Fialkov's chief lieutenant but, as it turned out, they weren't interested in investing in the wireless area. After that Bob Caploe just faded away. He never gave us another lead or introduction. The episode wasted a good deal of my time, some of Bill's time and most of Jack Barton's time for about three months. The lesson is to go with your instincts. If your gut reaction tells you that someone isn't going to help your business, chances are he or she won't. Don't waste your time—it is more precious than you re-

alize.

Again, the money had dwindled to practically nothing. Jack fled back to California. Our last engineer, the ever faithful Ray Chadwick, got himself a good paying job. Bill and I—now the only two employees left at Kyros—at the gentle urging of our landlords, moved the company offices to the house Bill had been renting only a few blocks from Butler Center. Not yet prepared to give up on our dream, we figured we could regroup, finish prototype integration and maybe—once we had a working prototype—get enough money to put it on the market. We had lined up a board manufacturer who would make system printed circuit boards for deferred payment. We still needed to produce another prototype version of one of our custom chips and to find someone who could fix the subsystem that Microsignals, our RF contractor, had botched.

As bad as our financial situation was, in addition to carrying through with our patent application—which cost us a bargain \$2,000 thanks to our wonderful patent agent, Al Hill—we foolishly took the time and another \$200 to apply for and get a trademark for our product. It didn't seem to matter to us that at this point the chances of us actually getting the product to market were practically nil. We had a good idea for a trademark and we

wanted to make sure we protected it. Someone else was already using our original product name, “SpectraNet.” To a certain extent coming up with a new name was fun and a form of relief from the tedium of our more serious job. We talked about it at lunch breaks, and in the evenings, as well as during the work day. Still, too much of our creative energy—energy we really needed to find a way out of the hole we had dug ourselves into—went into developing a new name. We came up with the name “Air-Wave” that Bill, Cie and I all liked (though retired from Kyros by this time, Cie was still helping out, especially with such fun projects as finding a new product name). The U.S. Patent and Trademark Office requires that you use a trademark within a year or lose it, unless you apply for a six month extension. We, of course, never used the name and, when the time came to apply for the extension, we were finally looking at matters more rationally and decided not to waste any more money on a trademark we might never use. The point is, this was one more example of how easy it was for us to avoid focusing on the truly essential jobs in favor of the unnecessary.

### **The ICS Business Plan: Our Last Hurrah**

Somehow—it was probably through a manufacturer’s rep whom we knew—we got the name of an RF contrac-

tor from eastern Pennsylvania, less than a hundred miles away. I think the rep told us that this fellow, Larry Zuckerman, might be able to help us with our RF problems. That's how we came to produce our final business plan.

Larry had been running his own RF contracting firm in Allentown, Pennsylvania for many years. By the time we contacted him, he had just sold his company to Integrated Circuit Systems (ICS), a small chip manufacturer in Valley Forge. He had invented a system that attracted the attention of ICS. As I understood the matter, ICS bought Larry's company that was having some financial difficulties in order to get control of his invention. They also hired Larry as their chief scientist with the charter of building up an RF division to diversify the company product offerings. ICS had a highly-profitable, but one-dimensional "dot-clock" business.<sup>14</sup> In August 1992, when we first met Larry, he had just started his new job and was looking for properties, such as Kyros' wireless LAN, that might fit into the new RF product line he was creating for ICS.

ICS, being a chip manufacturer, wanted the manufacturing rights to our system control chips. They wanted to turn our control chip into a commodity item, like cornflakes, so anyone who wanted to build wireless products

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<sup>14</sup>Dot clocks are the timing controllers for computer graphics.

was able to buy off-the-shelf the difficult-to-design part of their system. We spent many weeks supplying first Larry, then others at ICS, with details of what we were doing. We wrote a business plan for ICS detailing the proposed joint venture between our companies, including the detailed engineering and spending schedule. We worked to get each detail right. We spent every waking hour working on this attempt to save Kyros. At each step of our disclosure, it looked as though they liked what they saw. We had some fear about selling rights to our technology as a chip-level product. How would we be able to make any kind of a business if we were only getting a small percentage royalty on each chip they sold? How, with this small licensing income, would we manage to get our own products built when others with much more money were able to buy our technology from ICS almost as cheaply as we could? Despite these concerns we were able to work out a very complex transfer-of-technology agreement with ICS, with terms that seemed to us adequate to protect our interests. They were to give us \$450,000 in staged payments as our development progressed. We agreed to assist them in converting the control circuitry to their chip manufacturing process. We were already diligently working on simulating the functioning and on defining what engineers call “test vectors”

for determining whether or not the chips ICS built were going to work as designed. We thought that, at last, we had a solution that let us salvage what we had worked so hard for.

ICS began making payments to Kyros in October, 1992, even before we came to a final agreement. The payments continued until February, 1993, a total of just over \$50,000. Then, as abruptly as they came into our lives, they disappeared. Unknown to us, it seems there was internal dissent at ICS about this new direction. They killed our project, they fired Larry, they discontinued their efforts to build an RF product line.

And, that was the end of us. We had staked everyone on the ICS connection working. It was our last chance. We had no money and no way left to get money. Bill and I decided within the month to disband our effort to keep the company afloat. I put my house—with its \$208,000 Kyros mortgage—on the market. We both resigned our positions at Kyros and wrote a letter to our shareholders explaining the situation. Bill gave up his rented house (out of which we had operated Kyros for the past year) and moved into my basement until we both had to move out when the sale of the house closed in July.



## Chapter 10

### Calling it Quits

Managing a startup company has all the difficulties and challenges of managing any organization, with a couple of zingers thrown in for good measure. The “zingers” of course are raising money and getting by with no income. Now, if you’re a well-funded startup with lots of venture financing, these zingers don’t apply. However, thousands of successful companies started the way we did at Kyros, with nothing more than an idea, chutzpah and hard work.

The most successful example I know of from my immediate experience is Sealed Air Corporation. Sealed Air now has billions of dollars in annual sales and a very highly regarded management. Year after year the company’s value grows at a 40% annual rate. Yet, when my friend, Al Fielding, and his partner, Marc Chavannes, started Sealed Air in the late fifties, they had no out-

side funding. They struggled for years—until the late sixties—when Charlie Engelhard got interested in their venture. But they struggled within manageable bounds. I contend that most of the successful startups—like Sealed Air—survive because they don't overextend their reach. A man's grasp may indeed exceed his reach, but a business enterprise needs to stay just within its reach. Building a business is not gambling. It's steady, step-by-step work. The successful enterprises, with few exceptions, wait until they have the money before they spend it. This is a simple, one might say obvious, principle, but also a principle that's easy to overlook. Al and Marc were able to last for ten years without funding because all the while they were developing their product, testing this method and that, they were only spending from funds they had. They made sure first that they had food on the table for their families. They lived within their means.

On the other hand, we managed Kyros Corporation in exactly the opposite manner. We managed it as though we had already built the grand enterprise, and operated the company as though it was AT&T when we really hadn't even gotten to first base. We quit our jobs before the company could support us. We hired people we couldn't pay or even properly equip. We took on lawyers, accountants and numerous shareholders, all of whom un-

wittingly drained the company's meager resources and our productive and creative effort. We moved into ever fancier offices and spent our time dealing with peripheral and premature issues such as company name changes (Touchstone to Clarion to Kyros) and product names and trademarks (Pocket Remote, Datalink, SpectraNet, Airwave) before we even had a product to sell. We picked one product after another that was beyond our means, then tried, by working 100-hour weeks, to make up for our mistakes. Kyros didn't fail because the technical development failed, it failed because the business failed.

In the course of eight years, we employed a total of 50 people, but paid out not much more than \$100,000 in salary. We contacted thousands of potential investors, including more than 100 corporations and about 30 venture capital firms—a Who's Who of American technology. Yet, except for a handful—myself included—who invested more than \$50,000 each, we were able to entice fewer than 150 very small investors, mostly family and friends, to put up their money to make our dream come true. With hindsight, it's easy to see that from the start there was no chance of building and selling products as complex as those we tried without huge infusions of cash. We raised, and spent piecemeal, more than \$1 million but needed more than five times that sum to do

the job right.

On five occasions during the eight year saga of Kyros, we thought we were close to getting substantial funding. Twice with VCs (The BankHouse and Vanguard), twice with foreign companies (Intec and SUNY), and once—so tantalizingly close—with an American company (ICS). Yet always and for varying reasons, the deals never came to fruition. What was missing? To me, it is clear. As a group, we did not know how to structure, fund and run a business. We were fumbling around. Learning here and there, true, but the people with the money—though they never said so directly—could, I am certain, sense from their experience and training that we presented an unacceptably high risk. It's possible to speculate over other reasons—self-justifying reasons—that also have some element of truth in them. Venture money was tight in the late eighties. Technical companies won't easily accept a new product “not invented here.” And so on. I believe that the truth stares you straight in the face. At that point we were not the right people to accomplish what we set out to accomplish. It is not a question of intelligence or hard work, both of which are also essential. In any endeavor, the match of the people to the task is the single most important element in the successful completion of the work. Given the opportunity again, a

few of us have probably learned enough that we could succeed. But would we do it again? As exciting as the experience was, speaking for myself alone, the answer is a definite no. Once burned, twice wary. It takes a certain naiveté and arrogance to try to build a major company from scratch, without resources. The arrogance has baked out of me. This is a game for the limitless energy of youth. By the time you're over fifty, you may have experience and even wisdom, but you'll undoubtedly succeed at this game only if you first have all the money you need. There's a reason why children are born to the young.

### **Titan Securities: Cie's Last Stand**

Bill Heath and I finally gave up during the spring of 1993. We were both broke and disillusioned. Within a year, however, we had happily reestablished ourselves in San Diego, California. I've worked as a technical writer and Bill as an engineering manager. Bill still dreams of starting his own company again, or perhaps getting an established company to put him in charge of developing a design he's worked up for a gigabit wireless network.

As soon as we decided we had had enough of Kyros, Cie—our temporarily sidelined partner and the real author of Kyros—decided to come back and keep the com-

pany alive. Ever optimistic, Cie has never given up on her brainchild. It was she who put the framed slogan in our Butler Center lunchroom that proclaimed, to paraphrase, “brilliance soon dies, persistence and hard work win out.”

For a while, Bill and I agreed to stay on the board of directors, along with Cie, Deborah Alderdice and Red Collins. Cie still thought she could, against ever lengthening odds, raise enough money to get a product completed and on the market. Neither Bill nor I thought there was any harm in letting her try. We voted with the other directors to elect Cie president of the moribund Kyros.

In the spring of 1994, a friend of Colleen—the other Heath sister who had worked with Cie on fundraising in the beginning—introduced Cie to Bob McAllister, a would-be investment banker with some years of experience selling securities who was in the process of starting his own underwriting firm, Titan Securities. McAllister, I learned from Cie, thought Kyros was the ideal candidate for his company’s first public offering.

I talked this new development over with my friend, Bill. Though we didn’t really think there was much chance of a Kyros IPO<sup>1</sup> actually happening, again, nei-

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<sup>1</sup>Initial Public Offerings sometimes, but rarely, succeed for companies that have good market prospects even if they don’t already have products and sales.

ther of us saw how there could be any harm in letting them try, as long as Kyros didn't pay any upfront money. The idea even briefly rekindled for me the hope that I might recoup some of my life savings.

Alas, this effort too was doomed to failure. It turned out that McAllister didn't have enough money of his own—or that he could raise—to pay the SEC fees for the appropriate license. It also took him months and months to meet the qualifying requirements, a development that made me even more doubtful of his chances of success. Nonetheless, Bob talked Cie into paying his SEC fees. Cie used money she had raised—on the prospect of this potential public offering—from some of the more affluent Kyros shareholders. These shareholders were now investing this additional money, Cie told me, in order to complete the second iteration of our custom control integrated circuit. With that job complete, we would be in a stronger position than we had ever been in. We might even get someone to buy the technology and finish the radio part with their own resources. Bill and I objected strongly to spending this Kyros money on expenses for an IPO that might never happen. If the shareholders invested for development, we should spend their money only for development. We had no clue whether or not this guy McAllister could make good on his promises.

That's what Bill and I thought. Outvoted by the board, three to two, we resigned in protest.

Cie turned over about \$25,000 of Kyros' money. I don't think Titan Securities ever got its license, but, if it did, it certainly never took Kyros public. I didn't bother to follow the details of what occurred after I resigned from the board of directors. For me, Titan was the last straw. All we ever had was our technology. I believed time was against us; the technology was becoming obsolete. Cie, on the other hand, to this day believes that somehow, some way she can make a go of Kyros.

### **Looking Back**

How to explain the whys of Kyros? Why did we do it? Why did I do it? Why did I suspend my normal skepticism and jump in to such a high risk investment? Why does anyone do it? There are simple answers to these questions: excitement, distraction, foolishness. But the simple answers don't tell the story. Perhaps there is no way to tell the real story.

The real question is why does an otherwise seemingly sane person take a large chunk of his or her life (and even a large chunk of his or her savings) to chase after a goal that, if looked at rationally, is no more attainable than winning the lottery. I can report what others have told

me about their experiences... It was a chance to build something of truly lasting value. It gave me a reason to get up in the morning. It was a challenge like none other I've had before or since. It was a chance to be part of a close-knit team focused on a single goal. I wanted to get rich and this seemed like the only way to accomplish that goal... Every one of these reasons went through my mind during the eight plus years of my Kyros adventure. But even after years of thinking about why I got into this venture and a year of writing this account, I still don't know what possessed me to do it. I can tell you why I quit. That one is easy. I was frustrated and broke. But what made me go on year after year, in the face of impossible odds, with mounting evidence that we would not succeed?

The one thing I can say with certainty is that I would not trade my Kyros experience for any other job-related experience of my life. It was wonderful, exhilarating, stimulating, gratifying and life-altering. I believe that any individual can turn the right idea from the vague and ephemeral into the concrete and income-producing if he or she is willing to work hard, work smart, and follow some simple steps. If you keep that in mind, you'll do okay. We who participated in Kyros Corporation failed to follow these simple steps. We let ourselves get carried

away and we lost focus. You don't have to make the same mistakes. I have attempted to lay out, by telling the story of our mistakes, an example of what to avoid. If you've read this story carefully you've probably found a dozen other mistakes that I've either failed to highlight or don't even see myself.

The key lesson I've learned from my effort to build a business is that the journey is every bit as important as the destination. Good Luck.