

THE DENNING STORY

Introduction

This story is important because it is the junction between my career developing robots and my career turning around companies. During my robotics phase I was hired to fix many struggling robotics projects for clients, seeing them at the time as technology engagements. Fixing NASDAQ-listed Denning was just another one.

But by the end of my 4 years with Denning, I quit robotics forever and embarked on a new career of identifying failed technology companies around the world and turning them around. Denning was the catalyst to that transition. So it was a robotics project and at the same time a company turnaround. There is another reason. There are false stories about Denning that are stuck in cyberspace and cannot be removed or corrected, and this story acts to counter those sometimes deliberate inaccuracies.

Norman Conquest

In November 1992, while flying to Denver, Colorado to meet with Windsor Industries, Inc., a large manufacturer and international marketer of industrial floor cleaning equipment and supplies, my thoughts were on developing an introductory gambit.

Floor cleaning may not seem the sexiest industry in town, but a year earlier I had seen this company in Amsterdam with an amazing exhibit at InterClean, the industry's largest trade show. Taking pride of place in the trades hall was their RoboScrub, a beautiful blue and white robotic floor scrubber, cleaning a section of demonstration floor, by itself, all day long. Now that was sexy. At the time I had been living and working in France for a couple of years on another robotic floor cleaner

project, this one a household robot vacuum cleaner called D'Entrecasteaux for Moulinex, then an important European appliance manufacturer, so my mind was very much into floor cleaning robotics.

D'Entrecasteaux was the prototype of a low-cost autonomous appliance that the user would simply put down anywhere in a room and from where it would proceed to clean the whole floor without any human involvement. Not in a trivial random way, but systematically as a human would do it. It headed off to a home bay to recharge its batteries when they got low and returned to where it had stopped so that it could continue finishing the job once the batteries were recharged. Once finished, it would park itself in the same home bay and empty its dust bag into an attractive bulk collector. This was years before such products became commonplace.

D'Entrecasteaux was nothing like the simplistic robotic vacuum cleaners and lawn mowers that had started to appear on the market and which did their cleaning by random roaming or other inefficient and limited methods. We were very proud of it. Our robot had scanning sensors that built an internal map of the room, including the layout of the furniture, where people were moving around, and when things inside the room changed. It was not necessary to add or alter anything in the room to cater to any technical limitations of the robot. From this map, which was regenerated several times a second, the robot continuously planned what path to take next to systematically and efficiently clean all the floor space missing nothing.

Obviously I was excited about seeing RoboScrub, but a little apprehensive. That was until I saw it. This machine was priced at several tens of thousands of dollars, almost \$70K, and could only work between prepared sets of bar-coded reflectors installed by a surveyor at measured coordinates around the space to be cleaned. On examination of the machine, I was greeted with the technical complexity of dozens of computer boards, numerous sensor systems, masses of electronics and thousands of yards of cabling, all of which seemed to impress the staff around the booth, but which disappointed me. My thought was that this was the hard way to do it.

By contrast Moulinex's D'Entrecasteaux was designed to cost perhaps a hundred dollars in production, despite its advanced features and smart artificial intelligence. It had one circuit board with an innovative multiprocessor multiport-RAM design which shared the same computer memory housing the regenerated and accumulated room maps. In all, the development of D'Entrecasteaux, including the technology behind it which was accomplished between 1984 and 1987 in Australia,

had cost less than half a million dollars. With that budget we also developed Mr. Walker, a dynamically balanced 2-legged walking robot for the hobby market. A preproduction prototype of another device called Florbot which was developed for General Electric Plastics in 1989 in Pittsfield, Massachusetts, and which was subsequently released at Domotechnica, the giant appliance industry trade show in Cologne, Germany in 1990, had cost less than a hundred thousand dollars and was also part of that budget.

I was to learn that RoboScrub had cost over a million dollars to develop. Nevertheless, RoboScrub was a competing product, and that remained at the top of my mind as I returned from the trade show to Caen in Normandy, home of Moulinex's European Research Centre. D'Entrecasteaux incidentally was named after a sea channel near my home town of Hobart, Tasmania, originally discovered by a French explorer, and we chose the name in respect for our French client. Unbelievably, like in a movie, the first female European to land in Tasmania was a sailor's girlfriend, onboard D'Entrecasteaux's ship, disguised as a male so she could travel with her lover! Very French.

Another One Bites the Dust

After another year, the D'Entrecasteaux prototype was successfully completed and it was time for my company to tackle the industrial segment of the floor cleaning industry. I believed that RoboScrub, which had been developed for Windsor by Denning Mobile Robotics, Inc., in Boston, could be done in a different and better way. Denning was the most prominent player in the mobile robotics market, and very visible. My plan therefore was to make my so-called parametric mapping technology known to and available to Windsor.

American fair trade law identifies a situation called "interference", where a company might interfere illegally with a competitor's business, almost indistinguishable from aggressive, competitive marketing practices, which are legal. I had to be careful. If I had suggested for example that Windsor should abandon their involvement with Denning and take my company instead, perhaps with some carrot to attract them, or with a statement for example suggesting that Denning's technology

was no good, I would be breaking the law. If I showed them an alternative technology, and they decided unilaterally to abandon Denning for me as a result, that would be good and legal business practice.

My arrival into Denver was greeted by some eight feet of snow reminding me instantly that this was indeed a mile high city. More alarming was the fact that my mind was blank. I had been unable to conceive a strong introductory strategy to ensure my trip would result in new business. From the beginning the meetings with their executive team and Chairman were reserved, with knowing looks shooting back and forth between them. I felt I had blown it. I also felt a little silly, believing that I was perhaps divulging information of great value to them and giving Windsor and their contractor Denning an advantage. It is not unusual for companies to use unsolicited approaches from companies like mine to simply absorb as much inside information about the company as possible, with no intention of undertaking any business with them. That had already happened when I presented to a prominent Scandinavian player in this market place, and it was a risk I had to calculate each time I met with someone new.

As it turned out, I had nothing to worry about. Soon the reasons for the quietness and interludes of groups stepping out to talk privately were made known to me. Denning was out of business! And Windsor had a significant investment in RoboScrub that now looked like being wasted.

I had known about Denning since its incorporation in 1982 and followed it as best I could over the years, as I did with all of my competitors. I had always been somewhat intimidated by its high profile, with founders from MIT and Harvard, including big names in the robotics research field like Dr. Hans Moravec of Carnegie Mellon University in Pittsburgh (CMU) where he was Director of the prestigious Mobile Robotics Laboratory. Denning started with a public float on NASDAQ, raising some \$20 million dollars, a large amount for then and equivalent to perhaps \$200 million in today's dollars. It was every bit as sensational a company as any dot-com was in the late 1990s or the social media behemoths this century, and it was impossible to open a magazine or journal in the 1980's without seeing some story about Denning.

Eventually Windsor's team divulged the incredible information about Denning's demise. They then relaxed enormously once they saw videos of my D'Entrecasteaux robot. The Chairman of Windsor said I had arrived at the most

fortuitous time, because they did not know where to go for help or what to do with their RoboScrub product line. This had been the reason for the knowing glances, not because I presented a threat, but because I introduced a ray of hope. The meeting ended positively but inconclusively, partly because they were understandably still wary of any robotics company, and partly because I also did not completely commit. In fact I now had the germination of an exciting alternative idea and was anxious to pursue that. We agreed to stay in close contact over the next few weeks, and I headed straight to Pittsburgh.

Mobile Robotics Laboratory

Hans Moravec was a good friend and colleague, despite his involvement as a technical advisor to my greatest competitor. At one time I had been his house-guest while spending a year as CMU's Invited Visiting Scientist in their Computer Science Faculty. Denning was far enough removed from the low-end mobile robotics markets on which I had concentrated that there was no overlap between our markets, and our friendship had been a strong one going back almost a decade.

I was first introduced to Hans in 1983, when I was head of technology at the Dallas research centre of Commodore Business Machines, and we had contracted an industrial alliance with Carnegie Mellon University in Pittsburgh to develop an autonomous navigation and guidance technology for a personal robot project called Chester (named after the location of their head office in West Chester county near Philadelphia). Commodore was the largest and one of the most important personal computer companies back then.

The technology developed at CMU worked in simulations, but when applied to a real-world robot, it got lost and was therefore of no use. The technology was abandoned so I took up the challenge from CMU, eventually detecting a fatal open-loop feedback flaw in the CMU system. The original simulations did not include simulated error, which masked the problem, but critically the mapping algorithm was unstable. The manner in which the system updated its global map as new sensor data came in essentially acted as if the world was moving around randomly instead of

being fixed as a stable reference. No wonder the system got lost. It was like roaming around intoxicated and disoriented on the deck of a ship in rough weather.

Determining why the algorithm, conceived originally by Dr. Jim Crowley, failed, and finding the problem and fixing it, was part of the work I had done between 1984 and 1987 in Australia. That and developing the robot Blinker to go with it. Blinker is named after a famous Australian children's book character called Blinky Bill, a Koala, but I also chose the name because the robot had a single ultrasonic "eye" which was meant to have a protective, solenoid-operated covering to "blink" if some object threatened to poke into it. As time went by we had no time to develop the blink reflex, but Blinker, with its technology audited by Dr. Philip (Pip) Hamilton for the Australian Government sponsor, is documented as the first truly autonomous mobile robot.

Moravec had worked from 1969 on what was called the Stanford Cart constructed in the early 1960's at the Stanford Artificial Intelligence Laboratory (SAIL). The Cart was one of only about three original mobile robotic projects in the world back then (the others were the Johns Hopkins Beast and Shakey). Moravec was a brilliant research pioneer, and in that regard, was one of my heroes.

Back in Pittsburgh I confronted Hans about Denning's status and he finally admitted that it had indeed collapsed and that although he knew it was drastic, he had little other first-hand information. Denning was based in Boston, but the only person who was still involved was Robby Long, a director who lived in New York City. So I flew to NY.

Big Apple

While en route to NY, I drafted a quick recovery plan that I believed might apply to Denning, although I was very much in the dark about Denning's status and did not know how appropriate my plan would be. Essentially I outlined a series of steps for Denning: controlling the decline, stabilizing the company, then implementing a re-build strategy. I did not call it a turn-around plan at the time, nor did I realize how generic the stages I identified were. This original turn-around plan had no real depth

to it. I just believed that with some funds, and my technical and business know-how, I would somehow gradually generate sales.

Especially relevant was my knowledge of the market: its size and shape, customer profiles, needs, pricing thresholds, and so on, things I knew from experience my competitors did not know. I had been the only robotics company to commission independent market surveys for example. Most robotic technologists believed that a mobile robot could command any price it wanted. And 30 years of evidence that this was not true did not deter them. Unlike other high technology solutions, say a guaranteed cure for cancer or a new communication technology with a thousand-fold increase in bandwidth, robots had a built in competitor, human labour, and a well established price had been established for that. Above that price and people still bought the labour, no matter how pretty the robot was. And that was not all. The functionality had to be as good as a human, or again the human was the default. These were tough specifications that were almost never met.

Robby and I met at a little coffee shop near West 15th street and I showed him large numbers of robots from my portfolio. My company, Branch & Associates Pty Ltd, has been documented as a pioneer in the mobile robotics arena based on the release of the first commercially successful mobile robot product called the Tasman Turtle in 1979, with substantial help from Sandra Wills at the Elizabeth Matriculation College in Hobart and Professor Arthur Sale at the University of Tasmania. This was an educational robot, using the special language LOGO developed by Seymour Papert at MIT's Media Lab. The Tasman Turtle was not autonomous like Blinker, but tethered to a PC and separate power supply. (The Stanford Cart was also not autonomous, taking several hours to move step wise about a meter at a time through a path perhaps 20 meters long, taking long breaks at each step to process visual data collected anew at each stop. Similar limitations applied to Shakey. The "Beast" was more autonomous, but limited to a known and structured environment, roaming up and down corridors looking for special power outlets to recharge. Each of these were fantastic for their times despite these limitations and have been fundamental to the progress of robotics and artificial intelligence.) The Tasman Turtle was used in schools to teach mathematics, programming, and problem solving in general. The robot had a pen in its belly so that it could trace its path as it moved around, and even in 1979 it included artificial speech, speech recognition, touch sensors, an electronic compass for orientation, simple navigation and environment mapping, even some

learning behavior where it resembled Pavlov's dogs. Since it drew its path as it moved, students would attempt to program the robot to draw a square, a triangle, a circle, a flower; learning with strong motivation and instant feedback in the process.

In 1979 it was an instant technical success and as the only robot on the market, was purchased as a hobby and research device as much as for education. More importantly, it was a large financial success, more through serendipity than good planning, and because we were at the right place at the right time. My skills then were technical; business was new to me. But we were clearly a rare robotics success story. By that time my private company Branch & Associates Pty Ltd had conceived, invented, developed, manufactured and sold more robots than anyone else, and on a shoe-string budget. Robby Long was obviously comparing and contemplating what he was seeing in my portfolio with the performance of his company Denning.

I learned more about Denning. The company had actually been closed for nine months, and I had not been aware of it, so secretive had been the knowledge of its downfall. There were no staff and Robby as the sole remaining director on the board, (Hans Moravec had resigned his involvement), was the only person still involved with the company. In fact the company was insolvent. He told me that the last two workers in the company called him nine months earlier and asked permission to fire each other! Robby had been unable to attract a buyer although a few competitors had looked at it, probably only to inform themselves about the company's trade secrets, which as mentioned is a typical scenario in situations like this. In all reality Denning no longer existed, but it was still floating around like a ghost.

Robby had nothing to lose when I stated boldly that I could fix the company, so we decided to embark on a small round of meetings with major shareholders in the Boston area to see what support there might be for my plan. Robby in turn worked for and represented Mike Pisani Jr., the largest shareholder, whom I also met and who suggested an equity-in-lieu compensation plan. In a short time I had agreed to accept a controlling interest in the company in return for taking on the turn-around role. The skeleton of a company was \$20 million in debt and had no money, so it could not afford to pay me. I was appointed to the position of CEO and President and took a seat on the board of directors in December 1993, then elected Chairman of the Board in 1994 once the initiative was truly underway.

Paper Maché

While meeting with the shareholders in the Boston area I also visited the Denning premises. There I was introduced to the landlord John McLaughlin whose office building was on the same block of land, and learned more. Denning owed some \$330,000 in back rent and the landlord had taken the company to court. Since the company did not appear, he had been awarded all the tangible and intangible assets of the company. From the landlord's offices, I could see Denning's premises across the parking lot, and was amazed at this huge, modern, two-story brick and glass building, and pondered the concept of a garage start-up as portrayed with famous companies like Apple Computers, which literally began their lives in a garage. Today, again the hubris of dot-coms, two decades later, comes to mind with their rush to spend money before making any. In particular I recall the plush inner-city offices of these startup companies when I visited them.

Inside the Denning premises, I saw the worst mess I'd ever seen: scattered papers, disrupted inventory, abandoned technical work, total chaos like a war zone. During the Boston winter, the plumbing in the unheated and unmanned building had frozen and pipes cracked, then squirted water everywhere when they thawed in the spring. Staff had retained keys and had come at their leisure to take whatever they wanted, the landlord had taken filing cabinets and dumped the corporate papers on the floor, where they now formed a paper maché mat from being water logged and trampled on. It was the first time I had second thoughts about what I had undertaken.

Eventually the equity component was agreed, and I started to fix this failed company. Partly because of time constraints and partly because of my enthusiasm, I had not done a complete audit of the situation and soon discovered even more problems. Not the least was the unexpected difficulty in raising new funds. My turn-around plan called for around \$2 million, which, given the ease with which the company had raised money in the past, I thought would be a breeze. Particularly with me at the helm promoting my track record. For the next three months the private placement road shows were the hardest I have ever done, eventually generating only around \$47,000 in dribbles from existing investors. Nothing compared with the millions garnished in its early days. No one wanted to invest more money after bad, not that anyone could blame them, even to potentially save their existing investments.

However \$140,000 was more than I had had on any of my previous projects, so I believed it could be done. But first I had to get the landlord on side. Without that, there was nothing to work with. My main thrust was that with my background as a technologist in the field, and commercially successful, the chances of fixing the company with me were greater than with an alternative. An alliance between the landlord's company and the University of Massachusetts was being bandied about as a method of revitalizing Denning and I was competing with that idea. The hard sell was to convince the landlord of my plan, but gradually he came to the same agreement.

Premises, Premises

The largest part of the new money went to the landlord, to pay him off. He was a tough nut. It was a part payment of his back rent bill and in part a good faith gesture. To convince him to let us continue trading, we entered an agreement to repay the remainder of his debt (which had increased dramatically through interest and awarded damages) through monthly instalments. I also donated a portion of my hard won equity to the landlord as an additional sign of good faith and to appease him, bringing me well under the 51% level, but still leaving me as the largest shareholder.

During those same three months I worked out of my NY apartment dealing with all matters related to Denning's shareholders, vendors, customers, creditors, legal matters, regulatory, and so on. It was an intensive time of negotiation, appeasement, networking, fast talking, further due diligence and constant endeavours at reversing the bad-will I found associated with the company's name. I still had no access to the premises because of incomplete negotiations with the landlord, who was extremely resilient. I wonder what Denning's callers would have thought when they contacted the company if they knew they were speaking to a single individual in a private apartment who couldn't even get into the company's building.

There was a major problem. Boston was way too expensive an area for Denning if I was to get it restarted with a much lower budget, so I looked at other locations that might be suitable, like Dallas or San Jose, cities I had worked in before. Eventually I selected Pittsburgh, a fascinating city with great life style, excellent

colleges and universities from which to recruit technologists, lower wages than in Boston, central to the mid Atlantic industrial region, and with low rent and a low cost of living in general. It was also a city I knew well of course, being the home of CMU and Hans Moravec.

For the second three months I based myself in an apartment in Pittsburgh while searching for suitable premises, and still interrelating with the stakeholders of the company. I had retained counsel to deal with the numerous legal matters, especially the delicate negotiations with the landlord. Even the lawyer's services had to be negotiated as a fee conditional on my success. To illustrate the difficulty and importance of these negotiations, at one time I was threatened with contempt of court for simply sending mail out on Denning's letterhead, an intangible asset owned by the landlord. I had started to interact directly with the existing customers, even to the point of personally repairing and maintaining products already sold. I had started to restructure much of the company's debt, by converting some to equity and deferring or renegotiating others, and ended this period by hiring my first new staff member, a part time office administrator cum receptionist named Denise O'Hare. I have a photo of the two of us, in our sparse office, with borrowed deck chairs and a trestle table the only furniture, my personal computer, and a telephone on the floor, in a vast open space, looking sheepishly at the camera obviously wondering if we knew what we were doing.

Maintaining and servicing robots Denning had already sold was an adventure in itself during this re-start phase. The source code for the robot software was unavailable, stored on a Unix minicomputer that no longer worked. So it was impossible to change or repair any programs. Several times I created hard electronic fixes to circumvent or supplement the software in the robots. Most of these were for RoboScrubs, and it helped my relationship with Windsor that I had in a short time since meeting with them, taken control of Denning and was slowly but surely dealing with its problems. One time it became necessary to add a short time delay between the shutting down of the water pump on RoboScrub, and the lifting of the rubber squeegee bar and its associated water return vacuum, so that no traces of water would be left on the floor. To do this I designed a small electronic time delay that maintained the electrical signal to keep the vacuum on and the squeegee down despite the absence of the software signal. A circuitous way of solving the problem, but my only option, and it worked.

By this time I had a clear idea of how to fix the company, but there was even more to discover, which brought me one day to utter despair because of the enormity and apparent hopelessness of what I had embarked on. Alex Vail, my general manager from Australia was brought over to assist in the relocation of Denning from Boston to Pittsburgh. First he arrived in Pittsburgh to examine the simple but cheap and functional space I had just rented, 1,000 square feet of office and 6,000 square feet of unheated warehouse, altogether a fraction of what Denning had in Boston. Then on the way to Boston the company car's transmission packed it in, and the car had to be left behind for repair near Allentown while we continued in a rental. While at the premises in Boston, the first time I had been allowed to examine them in detail, I was suddenly overwhelmed with the mess at the place. My agreement was to remove all material so the building could be re-let, and I had three days to do it. With just two people and a car, this was impossible. At one point I called my lawyer who was nearby in Boston and said to him, "What have I done, this is hopeless!" I was essentially in tears, but with support from some local Denning shareholders including the supply of a couple of semi trailers and a clean up crew I determined to continue. My lawyer did not know what to say and I think he probably had the same misgivings about his newly negotiated deal with me. I had sunk to my knees on the floor like in a theatrical movie scene, but gradually I composed myself while Alex looked on, very quiet and perplexed, and very pale.

One important and fervent supporter of Denning lived nearby and had invested in the new round to help save the company. It was his generous contribution of a car that we had been driving. It was his private company that was able to supply several workers and hired the semi trailers which appeared at the building the next morning. We now had 2 days left to empty the building and leave it clean for the next tenant, so we worked through the nights. If we missed the deadline, or left any mess behind, the landlord's deal was off. Two days later the semis and Alex and myself headed across country to Pittsburgh, with newfound enthusiasm. We had done it. But of course we had done nothing yet.

Break Even

In Pittsburgh, we keenly emptied the contents of the semis into the warehouse. We learned that the trailer part of the tractor trailer load was exchanged to different drivers at some point in the journey, so while the same trailers we had loaded in Boston arrived, they were attached to different trucks with different drivers. This is how contract drivers get to avoid long trips away from home.

Denning had a long, huge and extremely heavy, solid wood boardroom table and it was stacked on top of everything else in one semi, so several of us manhandled it out. I was at the end of the table standing on the trailer drop tray 5 feet off the ground, when suddenly the table started to slide. There was no way I could stop its momentum, and it shoved me off the truck to the ground, landing on my back, and jamming my elbows into the concrete floor. Within minutes both my arms were swollen and sore, blue and bruised, but we continued on. We were glad to see all the furniture coming off because we wanted to make our offices presentable. The next day while carrying some filing cabinets up the stairs, I stopped and threw my end of the cabinet into the air to get a better purchase. When the cabinet came back down into my hands, my elbow snapped, and instantly some pain from the previous day's accident disappeared. My left elbow had been dislocated from the fall and I had not been aware of it. Catching the filing cabinet put my joint back in its socket.

Now we had an office with furnishings, but there were still only two of us. The control of decline had been done. Alex returned to Australia as soon as the move was completed. The next thing was to actually do some business. But how? By now it was clear that the company's technology was obsolete and the products did not work. This hugely visible company, my envy, had never built any product that had been truly successful. Its first product, a robotic security guard called Sentry, never ever worked properly, always running off course because of a flawed navigation system. The files contained numerous log books filled with details of service calls and faults, which petered out as each robot was returned by the customer to the company. No wonder the company went broke. The store of returned robot chassis was then turned into general purpose research vehicles and sold to universities. Research robots are the easiest to design and build, because they do not need any functionality, (the researcher wants to add that capability), but it is the smallest market segment in the

industry, so while this generated some revenues, it was miniscule compared to the projections in Denning's business plan. Even its RoboScrub was only a mediocre success. There were few actual sales and little profit margin on a retail price of close to \$70,000, necessary because of the complexity and cost of the technical solution. My task was to determine what the company was going to do for business.

I felt that some of Denning's business plan had been valid, just implemented badly, so part of my strategy was to re-release the same products, but really working and at a better price. There was no money for research and development. To do this I brought over 2 engineers from the Australian office with the agenda of stripping the guts of Denning's robots, and replacing them with the Branch & Associates technology. Since we had no other technical staff, we arranged for a graduate student at the University of Colorado at Fort Collins to build a state of the art research robot I had designed in return for a free one for his university. And we negotiated with Windsor to build the next generation of the RoboScrub, to cost not much more than a manual machine and with a higher profit margin. Development costs were significantly amortized. We now had several products in different market sectors with the same low cost, highly competent, central technology core. The few funds we had went into marketing. An industry wide promotion campaign supplemented the re-releases: advertising, trade shows, conferences, media releases. Suddenly, in 1994, after more than 12 months out of the scene, Denning's products hit the market place again with a resounding boom. Our competitors, who had been glad of our apparent failure, were caught by surprise. Joe Engelberger, the "father of robotics" was a friend and colleague but also a competitor. His own company was called Transition Research Corporation at that time, later to become HelpMate, Inc. Joe told me years later that his board of directors kept calling him into the board room and asking him, "Why can't you do advertising like this Branch guy?" He said that no matter where he looked I was there.

The market for new category advanced technology products has a specific shape, and by ignoring this, it is possible to spend millions on marketing campaigns and sales strategies that seem text book right, but which are exactly wrong. A new category is sold one-on-one, one customer at a time. So the limited people resources, essentially just me as the sales and marketing person, was not too far removed from what was actually needed. Much of my time was spent visiting and revisiting customers, educating them about the new products and their functionality and

advantages to them, reeling them in a foot at a time like a marlin. At times I would travel across country overnight in the company car because there was no travel budget. A quick wash and shave in a service station rest room and then be ready for a 9 a.m. meeting. When these scattered sales were finally closed, almost all of the receipts were profit. There was also no real marketing budget, so my first lead list was simply extracted from existing Denning customers. I called everyone who had had anything to do with this company in its past, and from that originated my early sales contacts.

By the end of 1994, Denning had broken even on (insignificant) sales; a few research robots here, a few maintenance contracts there, some retainers from Windsor and others. It added up. It was the continuation of the reversal, it signified the completion of the stabilization phase of the turn-around plan. Denning was no longer losing money.

Profits

The next year I started writing content for trade magazines, which was essentially free advertising for Denning, wrote some papers to be delivered at conferences, and opened a web site. With this type of continued free promotion and continued release of Denning's products as next generation versions, the revenues climbed dramatically. At all times the company was operating and growing purely from sales and other revenues such as services, because there was no money of any consequence left from the initial fund raising. In other words there was no capital to fund a growth strategy, so growth was what today would be termed organic. Revenues now reached a little over a million dollars, not much but more than the company had sold in its entire history before, but sufficient to give us a true operating profit for the first time because of the skeleton operations and lowered expenses. It is even more spectacular considering the lack of capital and heavy losses and debts the company had been carrying. At this point we had about a half dozen staff, Denise had been promoted rapidly because of skills and talents she did not realize she had, (Denise was eventually to become the company's COO), and we had hired our first sales person. In fact the company's first ever designated sales person. In the past when asked about

sales and marketing activities and staff, the company had said it did not need them, people came to them!

To drive these sales, I devised a new strategy. I wanted immediate and global visibility. My private company, Branch & Associates had a good reputation in the mobile robotics industry, but we had concentrated on different parts of that industry from Denning, which had been addressing high end segments. We also had a network of agents around the world, which Denning did not. Denning had a poor reputation but wide recognition in its segments. Our products were mostly in the low end sectors such as education, hobby, toy robots, and domestic floor cleaning. In retrospect this turned out to be a great advantage compared to our competitors, because it had taught us to design and build robots with advanced features and capabilities for extremely cost sensitive markets, and this expertise came to play as we redesigned Denning's more expensive high end robots in its industrial and military sectors.

It was important to have two additional things in addition to a global presence: a solid product mix and a healthy margin. So we aligned the two companies by retaining their corporate independence and shareholding, and agreeing to use the same business name. We called our two companies Denning Branch International, thereby retaining the good will of the Branch part and the wide recognition of the Denning part. My hope was that the bad-will would soon disappear.

We similarly divided the world market into two equal sectors, each exclusive to one of the companies, so that the name Denning Branch International could be seen around the world. This gave Denning a global presence that it could not have otherwise enjoyed. Then we made both sets of product lines available to both companies. So now suddenly Denning Branch International was not only a truly international company, with agents and distributors around the globe, but a company with mobile robots ranging from low end educational and hobby versions to heavy duty industrial materials handling versions. All at reasonable cost and with healthy profits. We blew the market away.

Soon Denning was giving keynote addresses at conferences and trade seminars, was guest speaking at international venues, was featured on national television and in the financial newspapers, was on internal committees in trade organizations and generally acting as an industry spokesperson. There can never be enough promotion and publicity, and we took on all of it with relish.

Regulatory

There was one more important step though. I discovered that Denning had not done its SEC returns for the three years before I came on board, and had been de-listed from NASDAQ as a direct consequence. The previous CEO had commuted several days a week from Canada, but his trips to Boston became less and less frequent as the futility of the task became apparent, and eventually he just didn't show up at all. No one could blame him. From a high of \$14, its stock was unlisted and valueless when I came on board in 1993. When I did the private placement in Boston, I used a book value of 5 cents for the price of the shares I was selling, in one sense practically giving them away, but still a hard sell since there was as yet no market for the scrip. My task was to bring the company up to date with its regulatory and statutory requirements.

All the office records had been destroyed in the water damage from the burst water pipes, so I had nothing from which to prepare the financial reports. My only solution was to conduct a forensic audit; a method of trying to reconstruct what business had taken place from secondary sources such as customer lists and vendor records. It is tedious and incomplete, but it allows a legal re-entry to the accounting system, and allows a company to become current in its financial reporting. So three years of painstaking and time consuming back accounting had to be done, with a team of three accountants including an auditor working nights for months. With this done though, our stock started trading again on the OTC market, and after hovering around a dime, reached a respectable \$1.16. Even at a dime though, the investors funding my turn-around had already doubled their money, and some took their profits at that point, showing some healthy volume in trading of Denning's stock. This independently valued our company at around the \$10 million mark, not too bad considering the immediate history.

I left Denning in July of 1997 after almost 4 years, leaving it with book orders of \$46 million, and learned soon afterwards that it had been doing better than any of its competitors. My initial agenda on my departure was to retire from robotics since this was a culmination of sorts of a 20 year career, but when I decided to get back into the work force a year or so later, it was the turn-around of Denning and not the

technology that excited me the most. By pure chance, I had already conducted my hardest and longest corporate turn-around, one where essentially everything was wrong, and developed along the way the necessary skills. The commercial skill had been developed already at Branch & Associates, but the change, risk and turn-around management came through working at Denning. Almost single handedly in the beginning I dealt with sales, marketing, operations, manufacturing, R&D, administration and finance. I also saw first hand the fundamental mistakes made by technology startups, still continuing today. It is hard to see in hindsight, how Denning even classed as a company when I took it over in December 1993, so bad was its position, and I have not seen one as bad since, but the techniques I learned have proven invaluable since then across industries and across problems. Across continents and cultures.