Forbes/Wolfe Emerging Tech REPORT

Volume 10/ Number 3/ March 2011 www.forbesnanotech.com

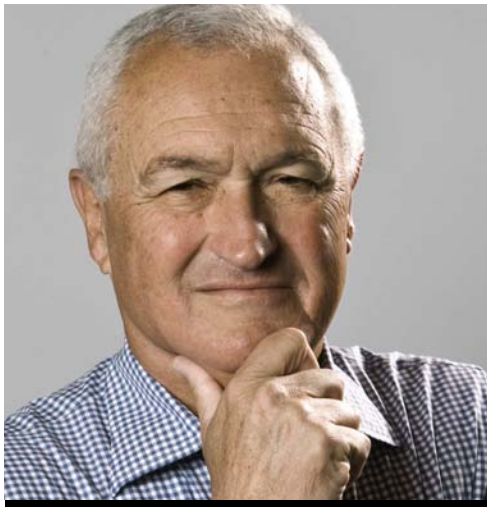
The Insider

JOSH WOLFE, EDITOR

This month we sit down for an exclusive interview with Paul Ferri, founder of legendary VC firm Matrix Partners. A true success story of American capitalism: Paul is a veteran of venture capital for over 40 years, having immigrated to the U.S. at age seven from Rome, Italy speaking barely a lick of English. Like fellow VC legend Eugene Kleiner, Paul went to Polytechnic (there must be something in the water in Brooklyn)—as well as Cornell and Columbia. Ferri teamed with another famed investor, Warren Hellman to fund companies. Hellman would later create private equity shop Hellman & Fried-

Continued on page 2

Paul Ferri: Morpheus Of The Venture Capital Matrix



PAUL FERRI

Paul Ferri is the founder of Matrix Partners, one of the most successful venture capital firms in the industry. Born in Rome, Italy, Paul immigrated to the U.S. at the age of seven. He could not speak any English. His family settled in Virginia, where his father worked for the government as an aeronautics engineer. They ultimately moved to the suburbs of New York, where Paul grew up. In 1977, Paul and Warren Hellman co-founded Hellman Ferri Investment Associates. The duo initially invested across multiple stages and in multiple sectors, and after five years they decided to develop distinct areas of expertise. Paul focused on early stage deals and established Matrix Partners in 1982. Paul has more than 40 years of experience as a venture capitalist and has led more than 20 portfolio companies to the public markets, and another 20 to profitable acquisitions. He continues to invest on behalf of the firm and guide his entrepreneurs through the ups and downs of start-up life on the path to success. He is an active board member of a number of private ventures, including Aylus Networks, Empirix, VeriVue and Veveo. Paul has a BSEE from Cornell University, an MSEE from the Polytechnic Institute of New York, and an MBA from Columbia University.

When you look back on in your childhood, what prepared you for the business world?

This was my childhood: we came to the U.S. from Rome, Italy, didn't speak a

Continued on page 2

CHARLES GRINNELL

Charles Grinnell: Turning Robots Into Teammates

Charles Grinnell is the founder and CEO of Harvest Automation, a material-handling company developing a new category of cooperative robots that operate in teams with human workers. Charles has been leading technology and product development projects and organizations for more than 25 years. Most recently he

Continued on page 4

DR. MARIA FREIRE

Maria Freire: Marshalling Resources To Vanquish Disease

Dr. Maria C. Freire is the president of The Albert and Mary Lasker Foundation, a not-for-profit organization dedicated to the support of biomedical research toward conquering disease, improving human health and extending life. Prior to her appointment at the Lasker Founda-

Continued on page 6

Paul Ferri: Morpheus Of The Venture Capital Matrix

Continued from page 1

word of English, didn't know anybody, and proceeded from there. If there was ever a person unprepared for the U.S. business world, it was me. Because my father was a worldwide expert in aerodynamics, I grew up surrounded by highly technical people, and I started out down that path too. I went to Cornell, studied electrical engineering, worked as an engineer for seven or eight years, and went to night school for a Master's Degree in electrical engineering. About halfway through that stretch of time, I realized I really hated being an engineer. I asked myself, where was I was going, and why? Eventually, I went to Columbia Business School for an MBA. At that period of time, people with engineering degrees rarely went to business school.

How did you transition from engineering into business?

When I graduated, I found myself in high demand. A variety of firms, from airlines to management consultants to **Exxon** [XOM] and **IBM** [IBM] wanted to hire me. I interviewed with everybody, still without a clue as to what I wanted to do. I was interviewed on campus from someone at an investment banking firm—I'd never heard of investment banking firms. In those days, Wall Street still clung to family-oriented hiring, so if your dad or your uncle wasn't working at one of these firms, it was very hard to get a job. Wall Street was just opening up and I was hired as a security analyst by a firm called Loeb, Rhoades & Co. It doesn't exist anymore, but it was one of the great firms at that period of time. Two years later, I went to work at a venture capital partnership that was seeking an individual with an MBA and a technology background. At the time, there were maybe 50 people in the business. Prior to that, venture capitalism was largely done through wealthy families such as the Rockefellers, the Whitneys and the Bessemers. The firm had raised $15 million—a huge amount of money in those days. I worked there for seven years and we funded projects including **Federal Express** [FDX] and several successful technology efforts that eventually were acquired by other companies.

Tell us about your work with Warren Hellman.

Warren Hellman had been president of Lehman Brothers in New York. He moved to Boston and I joined him there.Warren also had raised $15 million, and when we started our firm, we worked out a profit-sharing arrangement based on a sliding internal rate of return, so that the higher the rate of return, the bigger percent of profits we got. That's what we had to do in order to raise money in those days. We could get up to 35% of profits, based on the achievement level. Nobody had ever returned enough capital to achieve that 35% hurdle, but we probably could have extended that scale up to 70% of the profits if we earned 80% returns year after year. We weren't smart enough to realize that at the time, and as it turns out, that $15 million fund did achieve over 80% per year rate of return. We exceeded the high end of what we expected.

What types of companies were you investing in then?

Primarily computers, communications, software and semiconductors. Warren had been head of banking at Lehman, so we did one or two small buyouts, and we started a couple of very good companies. One was Apollo Computer, the first entrant in the workstation business, and then Sun Microsystems followed and eventually blew by Apollo. But Apollo was a big success and developed that market. We started Stratus Computer, which built large, fault-tolerant, fail-safe computers. That business probably generated $600 to $800 million in revenue, and was a big success. We had also been to see **Apple** [AAPL], when they were just starting out. It had already been financed, but we actually bought stock from Sequoia Capital in a private transaction. I think they made like 30 times their money in three years, and at the price we paid, we actually made a higher multiple than they did.

What level of involvement did you have with the companies you financed?

In Apple we were totally uninvolved but that was an atypical investment for us. Typically we were on the board of every company we financed, including Apollo and Stratus. There were others, but those were the bigger drivers of the game. Just to put things into perspective, both of those companies, if I remember correctly, raised $1.5 to $2 million to start their businesses, and that amount probably bought 40% of each of those companies. We shared those $2 million with one or two other venture capitalists.

What led you down the path to founding Matrix Partners?

Warren's family had been very involved in the growth in California. He wanted to move to San Francisco, and he wanted me to move with him to keep the partnership together. I had just moved my family to Boston and we were just settling in. Even though I thought Warren was fabulous, and we're still very good friends, I didn't want to move to San Francisco. Plus, his interest was focusing more on buyouts and not early-stage tech investing. So we agreed to part ways. I started Matrix; he started what became Hellman Freidman & Co. He and his family have invested person-

The Insider

Continued from page 1

man, while Ferri would launch Matrix Partners. Matrix would go on to launch the most important networking companies of the past few decades, including Cascade Communications, Sonus and Sycamore Networks. These companies and their technologies have truly been couriers of our collective future.

Speaking of the future, a recurring theme that we continue to focus on, bringing you the best and the brightest in something we call "unmet needs for unmanned systems"—Rosie the Robot this ain't. This month we bring you Charles Grinnell, the CEO of Harvest Automation, to reveal what this soon-to-be buzzed about startup in automation and robotics is working on.

And most impressively, we sit down with Maria Freire, president of the Albert and Mary Lasker Foundation. She was most recently the CEO and president of the Global Alliance for TB Drug Development and is an expert in immunology, virology and the most important global health and policy issues we face today.

As always here's to thinking big about thinking small...and to the emerging inventors and investors who seek to profit from the unexpected and the unseen.

Continued from page 2

ally in everything we've ever done at Matrix, and vice versa. It's been a very good relationship. There's no real story to the name Matrix—it's just a word that cleared in all the states where we wanted to establish a partnership name. I learned through Hellman Ferri that putting our names on the door can create a source of potential irritation, so we avoided that by going with a generic name.

When you set up the first fund, did you intend to focus on any one area?

I started Matrix with a fellow by the name of Rick Fluegel, and from day one we established a bi-coastal presence. Rick ran our California office, and I ran the Boston office, and we each managed our respective portfolios. I raised the money, and by the time Matrix 2 came around, the industry was beginning to segment into different activities. Before that point, most of us in the business did a little bit of everything—the notion of specialization in one segment of the financing spectrum didn't exist. We all did some high-risk total startups, we invested in second rounds of other people's deals that had made progress, and we all did a few buyouts. The industry evolved quite a bit during these years. When I started in the business, finding enough sources of capital to start up a business was a unique situation. By the mid-80s, the world was changing and there were more investors with plenty of money, and so it became clear to me that we had to become very good at doing something specific. We needed to provide more than just money, in order to achieve our desired rates of return. Rick and I re-worked our arrangement so I became sole managing partner, and Rick worked on buyouts.

Did you change your strategies at this point?

We changed our focus from California to New England, because I saw a lack of good early-stage venture capital people in New England. We built up our staff, and I decided to only do our own deals—nobody else's. I also decided we had to be on the board of everything we invested in. This focus turned out to be a fortuitous choice, and we did exceedingly well. Matrix's third fund, Matrix 3, was about a $125 million fund. It had the highest rate of return on any fund up until that time. I think we had close to an 80% IRR.

Did that explosive growth continue?

We had two funds thereafter, Matrix 4 and Matrix 5, that both returned to our investors about 24 times their capital. Matrix 5 might still be the highest rate of return in the history of the venture business, on the order of 250% per year. We were in the right place at the right time, investing in more communications equipment companies that powered the Internet than anyone else in the U.S., just as demand for those products was exploding. I stepped back from serving as managing general partner at that point, which was another fortuitous decision, because the last 10 years have been very difficult compared to anything we had done in the past. But I realized we had done too well, too quickly, too easily, and that wasn't the real world. For instance, in the first three quarters of '99 I calculated that we had returned more to our investors than the prior 28-or-so years put together, and in the fourth quarter of '99 we exceeded what we did in the first nine months. I knew that wasn't the real world. So we talked seriously in 2000 about exiting the business entirely, because there was too much money coming in and expectations from investors were excessive due to the success of funds like ours.

"We were in the right place at the right time, investing in more communications equipment companies that powered the Internet than anyone else in the U.S., just as demand for those products was exploding."

How did Matrix influence its competition in the venture capital industry?

By restricting our capital to what we could manage, we basically put a lot of our competitors in business. We would get calls from many investors that wanted to invest in Matrix, but for about 20 years we didn't take any new investors, because all of our current investors wanted to allocate more than we'd let them. We kept the fund sizes much smaller than they could have been—our biggest fund was about $500 million. We could have raised $2 billion, if we wanted, but we wouldn't know what to do with it.

How do you look at the venture capital landscape today?

We've all struggled over the last decade. The environment is one of contraction, and the industry results across the U.S., particularly for early stage investors, have been very poor. There have been some home runs that provided very good results, but when you hit a home run, there's an awful lot of luck involved. You can't count on hitting home runs. I used to focus a lot on analyzing bad investments: what to do about it if we'd made a bad decision, and how to stop the funding if it no longer made any sense.

Are you active in foreign ventures?

We've started investing in India and China, and I spent a fair amount of time on both of those areas. Over the past four or five years we've developed partnerships in Mumbai, Beijing and Shanghai, and I'm very excited about those opportunities. Much of the excitement is because we're not competing with 700 firms doing exactly what we're doing. I only travel there every year or two, but we have monthly calls with the relative people. They're all native to their countries, so my partner Tim Barrows and I review and discuss every investment before they make it, but the decision-making is local, which I believe in. I think we're off to a very good start in both of those geographies.

Some people consider the venture business to be one of the last true apprenticeship businesses. Do you agree?

Yes. Very few people that come into this business thinking they know all the answers really know anything at all. There are only four or five firms that have been successful over the last 30 years. It's not luck—they have maintained a discipline and a culture that allows them to be successful. Moving into this upper elite category of firms is difficult, but falling out is easy. Why is that? I maintain a database of errors that we've made in judgment over the years that helps us achieve a repetitive model for our business. Other firms do it differently than we do—we're all slightly different. But the same five names were also the best performing firms 10 years ago, 15 years ago, 20 years ago. ET

Continued from page 1

served as head of engineering and operations at DEKA R&D. There he spent 10 years working closely with Dean Kamen, one of the world's leading inventors. Prior to DEKA, Charles was the president of a consulting company he founded in 1985 supporting technology projects across the U.S., Europe, Japan and the former Soviet Union. He has worked on a range of technologies and industries, from building-sized, high precision instruments used for basic research in high energy physics to medical devices for minimally invasive surgery and the precise mixing and delivery of medical fluids. He has extensive expertise in building, organizing, leading and coaching research and development teams to successfully create new technologies and products. Charles currently holds eight domestic patents, several foreign patents, and has two domestic patents pending.

What early career experiences ultimately prepared you for your current role?

I did many things early on in my career. I was in oceanography for several years, working with a research group at MIT designing and building specialty equipment. From there, I started working with MIT physicists designing what at the time was the largest experiment at CERN, the European physics research lab. I spent 12 years as the lead engineer and manager of the accelerator project. That was 20 years ago, and since then the new accelerator has once again become the largest high-energy physics project on the planet. I spent seven years living in Geneva, Switzerland, and had a business providing engineering services to the high-energy physics community. When I joined Dean Kamen at DEKA in 1995 I really didn't know anything about medical devices—DEKA's main focus at the time. I'd had a lot of experience in pulling teams of people together to design extraordinary technology products, so working for Dean was a fantastic opportunity and a great fit.

What was it like working with Dean Kamen at DEKA?

Dean is just an incredible guy. He's like a one-man army, with this extraordinary ability to explain the capabilities of the company, get people excited about his ideas, and bring in new projects. He's got a great business model, and he's in the fortunate position of being able to hire bright, interesting people. I think I was sort of in that category at the time, as I started out managing a couple of medical device programs for him.

The early development of the Segway was one of my first projects before it was spun out into a separate standalone company. That project took twists and turns along the way that no one could have anticipated. The Segway's balancing technology was also designed into a platform for the iBOT transporter, the wheelchair made by **Johnson & Johnson** [JNJ]. Gradually, I started taking on more responsibility at DEKA and became general manager and ran the whole business, from engineering to manufacturing, facilities, business development, etc. I had the opportunity to be at the forefront of all the new connections coming into the company. After 10 years I just felt like I had done almost every job in the building. I'm a person who loves having new challenges, so at that point it was time for me to go and see what else I could get involved with.

How did you transition from medical devices into robotics?

In 2005, I left DEKA and took a breather for a couple of years, and worked as a consultant for many different companies and industries—mostly medical products. In early 2006 I tagged along with a friend to meet with Colin Angle at **iRobot** [IRBT]. He and I hit it off immediately. In short, he convinced me to come and do some work for iRobot, and that was my first introduction to robotics. I found the potential of robotics extremely intriguing—it's an extraordinarily powerful tool, although one that is often misunderstood. Some of the technology people who had worked through the IPO of iRobot were interested in branching off into some new companies—and that was the genesis of my starting a robotics company.

"Let the people do what the people do best, and let the robots do what the robots do best. This combination is where you really get tremendous gains in productivity and efficiency."

Did you start the company with a specific market application in mind?

Not really. We wanted to do something with robotics based on the skillset of my founding partners, but we really had no idea what area to focus on, so we formed the company with a generic name—Q Robotics. We spent the first three months together investigating areas of industry that shared one common thread: the need for manual labor. Specifically, we looked for industries where labor was problematic.

Why did you focus on industries with labor difficulties?

Joe Jones, my principal partner in the business, was the driving force in that decision. Joe is a robotics luminary. He was the first iRobot employee, and worked in the artificial intelligence lab at MIT for years before that. He has this very practical approach to robotics, which is unusual because there aren't a lot of practical people in the robotics industry. People tend to be very starry-eyed and tend to overestimate the capabilities and underestimate the challenges of pulling technology together to make a product. Joe and I felt, at a very fundamental level, that we needed to be unbiased when we looked for robotics applications. Not taking a solution and going in search of a market, but exactly the opposite of that. With that approach in mind, manual labor was the natural place to start. The real value of automation and robotics lies in solving specific problems that humans encounter when doing manual jobs, particularly the ones they don't like to do. Our search for manual labor problems led us into areas like shipyards and meat packing plants, and all kinds of industries where a lot of manual labor is still required.

Which industry did you ultimately choose to pursue, and why?

Within a couple months, we'd come up with 15 different product ideas, and a fair number of them were in agriculture. I was completely unaware of the fact that in this country, according to USDA statistics, a full one-third of crop production still depends on vast amounts of manual labor—a lot of hand labor and stoop labor. It blew me away that a $50 billion part of the U.S. Ag industry could still have that much manual labor in it. Eventually we identified one sector as most promising: the production of ornamental plants. These are the kinds of plants you might purchase at a **Home Depot** [HD] or a **Wal-Mart** [WMT], or your local

Continued from page 4

garden center. It turns out it's a $17 billion industry in the U.S. I was also surprised learning that this industry is totally dependent on an exceedingly constrained manual labor force. The work is about as undesirable as it gets because it is seasonal, physically harsh, performed outdoors and often in extreme temperatures. The laborers (the growers) you can attract to this work are largely undocumented, which makes the labor situation very volatile. The labor pool is a huge, strategic problem for this industry.

What labor problems are fundamental to the ornamental plant growers?

To produce ornamental plants, laborers pick up and move the plants in their plastic containers many, many times over the course of their production. Many plants require time outside on gigantic farms before they are sold. Picture a 1,000 acre farm with hundreds of workers that have to lay out millions of plants, in containers, along a very accurate rectangular grid out in the fields. They use wagons to distribute the containers to drop-off points, then the field workers pull the plants off the transport wagons and arrange them, with very specific spacing from one plant to the next. Workers use sticks and ropes and pipes in order to measure out the spacing along very accurate grids. It's amazing they can do it as well as they do without more advanced tools, but it is a lot of very hard work.

What approach did you take to solve this problem?

On a generic level, what we've developed can be characterized as a material handling system—moving material from one place to another. Our technology starts right at the point that people would start: with moving the containers. We make teams of small, completely autonomous, mobile robots, each about two feet in diameter and 50 pounds in weight. Our machines are not like the classic John Deere-esque solution, where one big machine does the work of 100 people, or 100 people at once, and this difference is key to our technology. Instead, we re-solved the problems from the ground up. Each of our machines only does the work of a fraction of a person but does it so efficiently and so flexibly that it's the perfect solution.

So the robots work together?

I hesitate to use the word "swarm" because it's misleading in this case, but yes, we use teams of robots, each able to navigate the big fields and figure out how to create very accurate patterns of containers. This eliminates the vast majority of the hard work that the people were doing. Finding workers who will bend down and pick up 15-pound containers all day long for eight months a year is the biggest challenge our customers face. These are the jobs that we focused on—the ones that people just don't want to do.

"There aren't a lot of practical people in the robotics industry. People tend to be very starry-eyed and tend to overestimate the capabilities and underestimate the challenges."

What is the status of your developments to-date?

We're at the point now of having units just about ready for our first customer field trial and our customers are literally lining up. Everybody wants to be an alpha site tester. It's just one of those very fortunate positions to be in—to tap into this legitimate problem that's creating tremendous market demand for the great technical ideas that we offer.

What are some of the big milestones you're shooting for over the next year?

We plan to start alpha trials in the next couple of months, and as with any technology product startup, our commercial release really depends on how successful we are at getting those alpha and beta trials completed. If things go well, we could potentially release a product for sale by the end of this calendar year, which should be a really exciting milestone for us—getting the first products out in the field. From there, the ornamental plant industry holds potential for multiple products. The European market represents an even bigger opportunity, as the ornamental plant industry over there is double the size of the market in the U.S., and the labor rate is on average twice as high. We're also looking at agricultural products for other crops that are grown close to the ground.

In many ways, your company's products sound similar to those offered by Kiva Systems, another robotics company. How are you different?

Kiva offers a fantastic product that is already big in the warehousing industry. Its system uses multiple robots to fulfill product orders. Basically, instead of people filling orders by walking around a warehouse, picking items off shelves, the Kiva robots bring the shelves to the people. In some aspects, we are similar to Kiva, but we also intentionally chose to optimize our product around a few fundamentally different design points. Our customers can decide their purchase limit—they can buy just one robot, or they can buy hundreds of robots to meet their needs, whereas the Kiva solution requires a fairly significant size warehouse refit for the economics to make sense. The other key fundamental difference: Kiva robots are much larger and more powerful than ours. It puts its machines in a class of vehicle similar to most classical industrial automation where you then have to segregate the robots and the people for safety reasons. We specifically limit our solution to small machines to keep low mass, low cost, and to stay flexible and more inherently safe. This allows us to integrate people and robots, which we believe will provide a very powerful overall solution in many applications. Let the people do what the people do best, and let the robots do what the robots do best. This combination is where you really get tremendous gains in productivity and efficiency.

You mentioned that many people have misperceptions about robotics. Can you explain?

The field of robotics is extraordinarily misunderstood by most of the general population, and even by many of its practitioners. People on the outside generally have the perception that we are much closer than we actually are to realizing the tremendous capabilities that robotics may hold. Certainly, movies like *Star Wars* help reinforce these ideas. I actually heard on NPR the other day that the *Jetsons* cartoon was set in 2011. When the *Jetsons* came out in the '60s, it didn't seem unreasonable that in 2011, we were going to live with robotic maids in space. That's a good example of the huge gulf between where people think we're going to be with robotics at some near point in the future, and where we're actually going to be because of inherent limitations. ET