

Star Gazer Charlie Harris – Chairman of Harris and Harris

Charlie is Chairman of the Board and Chief Executive Officer of Harris & Harris Group, a publicly traded company that operates as a venture capital firm. They invest in tiny-technology-enabled companies, including nanotechnology, microsystems, and microelectromechanical systems (MEMS) technology.

Prior to Harris&Harris, he had an eighteen-year career in the investment industry, including serving as Chairman of Wood, Struthers and Winthrop Management Corp., the investment advisory subsidiary of Donaldson, Lufkin & Jenrette.

[start box] “Defining nanotechnology is the best starting point, so I’ll start first with tiny technology. MIT defines tiny technology as Microsystems, micro-electro-mechanical systems, which are also known in short as MEMS. A very simplistic definition of Nanotechnology is simply working with particles and devices at the nano-scale. The nano-scale is defined as having one or more critical dimensions that are between 1 to 100 nanometers in diameter. Usually nanotechnology is considered to have more defining characteristics than just size. For example, one might look at quantum effects, or one might look for size-dependent characteristics in a particle or device in order to call it nanotechnology. Also, the nanoscale is too small for mankind to interact with directly. Typically, devices and materials at the nanoscale are going to be part of a larger system which will extend to the microscale and then to the macroscale in order to make up a useful product or device. That’s another reason why we feel the descriptive term “tiny technology” is particularly appropriate when you’re talking about commercialization of nanotechnology as opposed to nanotechnology per se.

In 1994 I looked at a venture capital deal which was built on a cornerstone of nanotechnology and intellectual property called NanoPhase. Around 1991, it had been spun out of Argon national Labs, which was managed by the University of Chicago and Arch Venture Partners. I had never looked at a nanotechnology deal before, but in the course of doing the due diligence on this opportunity, I got more and more intrigued and realized that nanotechnology was going to be something that literally changed the world.

The reason I say that is at the nano-scale, literally every substance has totally different characteristics than it does at the macro scale. We realized that #1, it was very early in the development cycle for nanotechnology, but that in the long-run, this was going to be revolutionary in the most literal senses of the word, that it was going to give mankind a totally new tool kit from which to operate and from which to build things. So we invested in NanoPhase, and as good luck would have it, it went public three years later in 1994. We were fortunate enough to make some money on that investment, but the main thing we got out of it was the beginnings of an education. Starting in 1994, I looked at every deal that I could identify that was based on nanotechnology, but back then, most of what we saw was essentially a series of science experiments that weren’t really ready for commercialization.

By early 2001, we realized that a pipeline of opportunities was building up that answered the characteristics of classical early stage venture capital investments. We made our second investment ever in a nanotech company in the middle of 2001, a spinout from Harvard University called Nantero, and whereas Nanophase is a materials company. Nantero wanted to make memory devices based on utilization of carbon nanotubes, a more complex exercise and one that is successful promised much greater rewards because it was addressing a very large market. Their technology would enable memory devices to be instant-on so that there would be no time wasted in booting up computing devices with this memory device, along with its other potential advantages.

What we realized was that because Nanotechnology, which is really just a set of enabling technologies, eventually was going to be made part of any field that we could think of. We realized that we could wind up with a lot of diversification in our portfolio because we were lined up with many different products addressing many different markets.

There’s a peculiarity with nanotechnology which is because it doesn’t fit into any of the conventional science disciplines, as you get down to the nano-scale, the traditional demarcations between physics and chemistry and material science and biology, software, all start to blur. Since the patent office is organized along conventional disciplines, that patents are being issued in nanotechnology that in fact probably won’t hold up once they are challenged. We need the ability to assess intellectual property validity on our own in order to comfortably invest in nanotechnology. We completely recast the firm in order to have

appropriate personnel to deal with the peculiar nature of nanotechnology as well as the traditional aspects of venture capital.

One way to think about what we're doing is that we really have got the economic characteristics of a venture capital firm, it's just that nanotechnology has this transcendent potential because of the fact that every substance at the nanoscale has totally different characteristics than it does at the macro scale and radically new things are possible with nanotechnology that are literally impossible in the macro scale. The mere fact that physics is different at the nanoscale than at the macroscale is of course profound enough to drive home that point because at the nanoscale, quantum mechanics start to dominate over classic Newtonian physics and it's hard to imagine anything in technology more potentially profound than that.

We're looking for something really special that's enabled by the tiny technology, something that couldn't be done, or couldn't be done as well at the macroscale so there is a tremendous advantage, by virtue of intellectual property rights and sustainable advantage that's conferred by the technology. Beyond that, we're looking for a company that has large, addressable markets for its products, and which has the potential to earn high and sustainable profit margins. We're looking for a great management team and we're looking for favorable financial characteristics in terms of the capital intensity and the competitive advantages. Once you get beyond understanding the science and technology and understanding intellectual property rights, then we believe that investing in nanotechnology is the same as all early stage venture capital investing based on companies with proprietary technology.

We recently sold our interest in a company called Neurometrix which is something that we had spun out of Harvard and MIT 9 years ago, it's a medical devices company. When we found it, we knew that we had terrific intellectual property with a large addressable markets and high profit margins, and we had a terrific CEO. We were doing something in that case, which is, for a venture capitalist, particularly risky, which is taking market risk. In other words, this company was seeking to create a market which had never existed before, point of care devices for identifying and monitoring neuromuscular disorders, point of care meaning physician point of care. In that case, we knew we had a big winner when we finally figured out the marketing piece, which took a few years because we had no direct competition by definition. Gross margins were around 73-74% and we had a razor blade economic model, so we're selling sensors and the sensing device, and both of them command about a 75% gross profit margin. Once we saw that we were growing in a sustainable fashion at about 100% a year compounded in sales growth and that we were enjoying those kinds of gross profit margins, and that we were conferring a terrific benefit to patients and to physicians and saving the healthcare system a lot of money, we knew we had a big winner. Oddly enough, we still had a difficult time getting it through its final private rounds of financing because of the so-called nuclear winter that set in after the stock market crash in 2002. Ironically, even though it was at the point that we knew we had a big winner, it wasn't always possible to convince other people of that. In the course of finishing up the private rounds of financing at one point, we actually had to take a big down round, and finance it totally from people already sitting around the table. We took a big write-down on our investment at a time when we were convinced that the prospects for the company had never looked better. We invested \$4.4 million in cash and we took out \$34 million in cash." [end box]