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Physicist Oversees Research for Software Giant

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An Interview with

Nathan Myhrvold

Physicist Oversees Research for Software Giant

What could lure a quantum field theorist away from a postdoctoral fellowship with Stephen Hawking at Cambridge University in England? In Nathan Myhrvold's case, it was the urge to write a symbolic mathematics program to help him in his work.

Myhrvold's detour, taking a leave of absence back to his native California to start up a software company with some friends, has extended much longer than he originally planned—into a position as one of five senior executives who help Bill Gates run software giant Microsoft Corp.

In May, Myhrvold, who as a senior vice president had headed Microsoft's advanced research laboratory, was named to co-lead the company's "applications and contents" group as part of the firm's executive office.

"It's a little bit hard to say with a straight face that I'm still a physicist," says Myhrvold, a 35-year-old who joined Microsoft in 1986, when his start-up software firm Dynamical Systems was purchased by Gates's company. He recently discovered, however, that his tax returns—passed from one set of accountants to another over the years—still list that as his occupation. Though he tries to keep track of his former field, he notes, "Mostly, what I'm involved in these days is some combination of computing technology and the management of it."

The group within Microsoft that Myhrvold now co-leads has several thousand employees and brings in revenues of $3.5 billion annually. He will continue to be responsible for overseeing the research effort, which initiated the company's development of interactive television and advanced multimedia, as well as sharing responsibility for the stable of Microsoft's applications programs. "It's a pretty big enterprise, but I still have to keep quite current on technology."

Graduating in 1979 from the University of California at Los Angeles at the age of 19 with a bachelor's degree in mathematics and a master's degree in geophysics and space physics, Myhrvold migrated east to Princeton University in New Jersey, where he earned a master's degree in mathematical economics and a doctorate in theoretical and mathematical physics.

Myhrvold's involvement with computers came almost by accident. As a quantum field theorist concerned with quantum gravity and cosmology, his work was not particularly computational. "The key question was what is the theory of quantum gravity, not in computing some aspect of it," he says. "The first big project I used [the then-new personal computer] for was typing my thesis."

Together with several friends from graduate school—also physicists—he decided to write software for scientists. "Specifically, we wanted to create a symbolic manipulation program," he says. "If you had described *Mathematica* to us back then, we would have said that it was very similar [in concept]." This was at the time that Stephen Wolfram was a postdoctoral fellow at the Institute for Advanced Study in Princeton and was continuing to work on his first symbolic mathematics program, SMP. Myhrvold recalls having a number of conversations with Wolfram about their common interest in symbolic computation software.

"At the time, symbolic manipulation programs were big, hairy things you would only use on a calculation if there was no other way to do it," Myhrvold notes. "Our idea was that, if you had something that was simple and convenient—even if all it could do would be to make sure you never had a minus sign or factor-of-two error in a calculation—that in itself would be valuable." The aim of Myhrvold and his friends was to create the equivalent of a numerical scratchpad to help researchers to do everyday calculations. Creating the software they envisioned required developing a real-time operating system and a windowing environment, something not available on the personal computers of that era.

"We didn't actually do much work on the symbolic manipulation program," he says. Instead, the group of friends focused on creating the operating system and windowed environment. "Completely naively, without any experience, this group of physicists began working on this." The group split up as its members went their separate ways to a variety of postdoctoral positions, but the desire to realize their idea remained.

After Myhrvold's first year at Cambridge University, he and the others decided to take leaves of absence for the summer to flesh out the software ideas, "to try to get it to the point where we could finish it." They did not want to abandon the project, yet they knew that nothing would happen if they continued to work on it only in their spare time.

"So I took a three-month leave of absence, and I never returned," Myhrvold says. By the end of the summer, he and his friends had incorporated a company around the software they were developing, and they named Myhrvold the CEO. "For the next two years we raised venture capital and tried to create a software product," he said.

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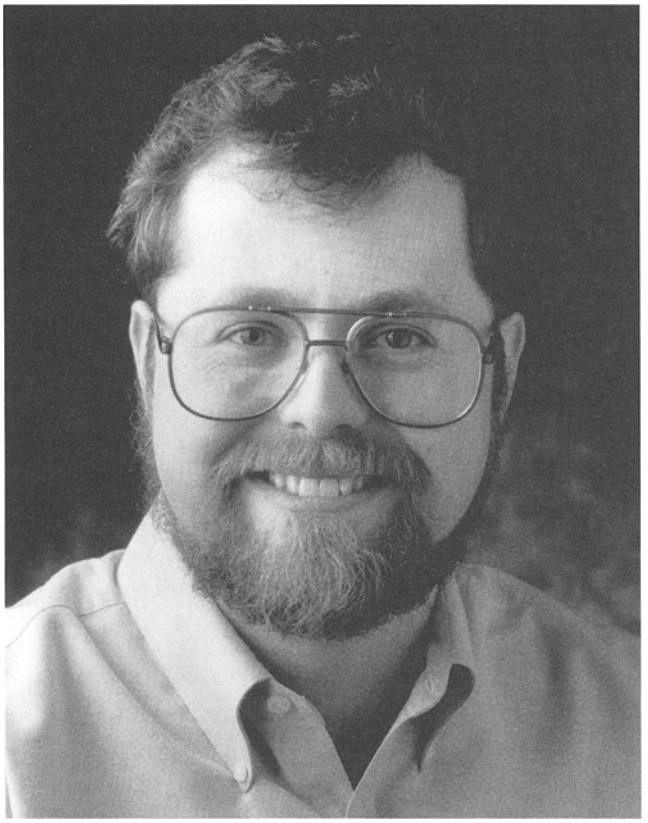

In the end, they did create a product. Their real-time operating system and operating environment ended up in use, not in the sciences, but on Wall Street. "It ended up being used by big stock brokerage firms that were creating large information systems for their stockbrokers," he says. Merrill Lynch & Co. still has 18,000 computers deployed with this software—which Myhrvold and his friends wrote a decade ago.

"After being in business for two years, we were approached by Microsoft, and Microsoft ended up acquiring us," he says. The group moved *en masse* to Microsoft, where most of the cofounders who were physicists remain today—though some have retired in the past several years. All the Dynamical Systems alumni hold senior positions at Microsoft, Myhrvold notes.

"David Weise, the technical lead for Windows 95, is another physicist and one of the cofounders of this company," he says. "The technical lead for graphics for Windows NT, until he retired recently, was Chuck Whitmer, who also got a Ph.D. at Princeton and did a postdoc at Fermilab [in Batavia, Ill.]. David Anderson, who is the test lead for Windows NT, is from my company and was a physicist at Princeton also."

Myhrvold never consciously planned to leave physics. "Quite the opposite—if I had been asked to make that decision, I probably wouldn't have done it," he says. "Computing was interesting enough that I said I'd try a three-month fix just to get it out of my system." Instead, it became his career, each incremental decision moving him farther from a return to his postdoctoral position.

"I see Stephen Hawking every year," Myhrvold says. "Eventually, I think, he's forgiven me for not coming back—in fact, his son is a software engineer here at Microsoft now."

Many of Myhrvold's other graduate-school classmates now work in the computing field. "Physics is actually a very good field to go into computing from for two reasons," he says. First, physics is about understanding abstractions, and second, physicists are practical and empirical. "We have at least 30 physics Ph.D.s here at Microsoft," says Myhrvold, "enough to stock a reasonably sized department."

Applying the worldview of physics to business is not always easy, he acknowledges. "Physicists try to explain the complexities and intricacies of natural phenomena with a small set of physical laws," he says. "There is a method to Nature's madness, and physics is dedicated to figuring that out." The dynamics of business and finance are also driven by a set of abstract laws, but economists are much less far along in elucidating these laws.

"Ultimately, economics would like to be an engineering discipline," he says. "That is, it would both like to understand the fundamental phenomena and to practically apply them. It isn't there yet." Despite this, Myhrvold believes many of the phenomena of business can be understood qualitatively in terms of dynamical processes. "Certainly I use that vocabulary as I try to understand [these processes] here at Microsoft."

Microsoft has always focused on software products with broad applications, rather than the niche market of scientific computing, but Myhrvold believes it has made a contribution to the conduct of science by enabling the growth of the whole personal-computer industry. "There is an indirect effect on science—the whole PC revolution has enormously benefited science," he says. "Moore's Law, the fact that computing power doubles in price-performance every year, has been great for science."

Still, there are large differences between working in academia and working in industry, he says. Both groups harbor grossly exaggerated stereotypes of the other. "Inside a company like Microsoft we work on problems that are very intellectually stimulating, as interesting in their own way as anything in academia," he says. "Often you find that there's less [baloney] associated with it. If you consider all the things that come with an academic career—faculty meetings, other kinds of committee meetings, getting tenure, and raising funds for your research—there really is a very high overhead in academia."

On the other side of the coin, academic researchers have a potentially broader scope. "If you want to be a cosmologist, you aren't going to be a corporate cosmologist."

Physics and computing are not Myhrvold's only interests. Myhrvold has also learned to race Formula 1 cars, and even applied to study at a professional chef's school in France.

"I love to cook, and even cook from time to time at a restaurant in Seattle," he says. This came about when the chef's school asked Myhrvold to gain some experience as an apprentice in a professional kitchen. He approached the chef at his favorite French restaurant, and an arrangement was made. "I think that, this fall, I'll finally be able to go."

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