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HEADLINE: CTO Nathan Myhrvold's High-Tech Formula

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BODY:
Redmond, Wash. -- Microsoft Corp.'s resident research guru, Nathan Myhrvold, likens his work to "Mission Impossible."

"In a narrow sense, all the things you do in research are impossible," said Myhrvold, who heads Microsoft Research (MSR), a $3-billion-a-year, 350- employee group nestled in shiny new buildings on Microsoft's corporate campus. "There's no precedent for them. If there was, it wouldn't be research, it'd be engineering. But research is daunting in a different way. You don't even know if it's possible. You don't even know if it's possible in theory."

Myhrvold oversees a corporate research unit that would make most academic computer scientists turn green with envy.

In Myhrvold's office, magazine racks hold technical journals, Scientific American and Science. They separate his book-filled, paper-strewn work space from a conversation area with a leather sofa and two chairs. Floor-to-ceiling windows overlook a landscaped forest. All the offices inside MSR are carpeted and quiet. Most research is done on state-of-the-art computers and on whiteboards in insurance-office-like conference rooms.

Myhrvold, chief technology officer, reports directly to Chairman and Chief Executive Bill Gates and once was described by The New Yorker as "Bill Gates' favorite geek." Myhrvold also serves on the board of trustees at the Institute for Advanced Study at Princeton University, where he earned a Ph.D. in theoretical mathematical physics. He co-authored "The Road Ahead" with Gates. He also worked with Cambridge University Professor Stephen Hawking on research in cosmology, quantum field theory and theories of gravitation.

Myhrvold oversees four main areas of research: advanced interactivity and intelligence, mathematical sciences and programming tools, methodologies and techniques, and systems and architecture. Technical groups within each research area specialize in particular themes. For example, the "Millennium Project," part of the systems and networking research group, wants to eliminate the distinction between local and

distributing computing.

Galen Hunt, a University of Rochester graduate who did his Ph.D. dissertation on converting existing COM-based applications into client/server applications, leads the project.

"We want to make it so that no matter how many computers you have, or how many devices are connected to those computers, you can write programs as easily as you could for one machine," Hunt said.

Then there is the intelligent interface technologies group, which concentrates on advanced speech recognition and text-to-speech engines for Microsoft's desktop applications, as well as server and handheld operating systems.

"People here spend a lot of time talking to their computers. In five years, I think everyone will be using a microphone," said David Jennings, product planner. "That microphone will be in a headset . . . or it will be in a field on top of your display or embedded in human sensor displays."

Microsoft already has speech recognition. "We just don't ship it yet," Jennings said. In fact, you can download a Microsoft Voice speech-recognition software development kit, he said.

Jennings asks his computer: "What can I say? What can I say?" It responds with a command and control list of all the commands it recognizes. "Page down, " he tells the computer. It then highlights the command. "Do it," he says. It follows his orders and does it.

Not long ago, attracting world-class computer science researchers to Microsoft was a challenge, but not anymore. As business boomed in the 1990s, the company allocated enormous resources to research and development. While not as old, or as legendary, as Bell Laboratories, Xerox Corp.'s Palo Alto Research Center (PARC) or IBM Corp.'s Thomas J. Watson Laboratories, MSR has grown. It has centers in Cambridge, England; Beijing; and San Francisco.

Critics often accuse the software powerhouse of being more of a marketeer than an innovator. But MSR officials insist the fruits of their labor are present throughout the company's lineup.

"Every major product has critical technology in it from Microsoft Research," Myhrvold said. "If you took that critical technology out, none of our major products would work."

For example, the grammar checker in Word came from the group, as did the intuitive information retrieval method in Encarta.

Simplicity is key. "The most annoying thing about software and computers more

generally is that they do exactly what you tell them to," Myhrvold said. "They are not very forgiving about how they listen to our input. They want commands given in their own arcane languages. They're not particularly intuitive. If computers were more forgiving, if they adapted more to us, if they dealt with us in the modes we are comfortable dealing in , rather than in their own modes, they'd be way easier to use. It's a simple vision to describe. It's very difficult to do."

Specific research areas include vision, speech recognition, user interface, and decision theory and adaptive systems. In general, all research is dedicated to the idea that computers should be able to talk, listen, see and learn.

"If we can get computers to meet us on our ground, rather than us have to meet them, it will be enormously valuable," Myhrvold said.

When these advances will be commercially viable is open to question. Five years ago, the Internet was just starting out, Myhrvold pointed out. It is difficult to forecast what will happen even five years from now, he said.

"My prediction for the future of computers in 20 years is that personal computers will be woven into the fabric of our lives in millions of ways," Myhrvold said. "The things you do with a PDA, or organizer, cellular phone or things in your wallet, all those things are ripe for exploitation by computing."

Critics countered that Myhrvold's crystal ball has been cloudy at best. After all, in 1990 Netscape Communications Corp. rode the Web to wealth and Microsoft was left high and dry, promoting its own non-Web vision.

Microsoft "didn't know the Internet existed" back then, said Jim Cannavino, a former IBM Corp. executive who competed with Microsoft and who is now chairman and chief executive of CyberSafe Corp., Issaquah, Wash. "I believe Bill's wake-up call was the market cap of Netscape. Here's a guy with a franchise, and he missed the Internet," he said.

But Cannavino and others also credit Microsoft management with turning on a dime and making up for lost time with its browser and Web server efforts.

Microsoft invests about the same percentage of its revenue in R&D as other software companies, analysts said.

"They are a real steady 17 percent of revenue, and that's typical," said Jeff Tarter, editor of SoftLetter, an industry newsletter. Of course, 17 percent of Microsoft revenue is a phenomenal amount of money.

"In absolute dollars, Microsoft spends more on research than the Honduras GNP," Tarter said.

Perhaps more to the point, Tarter added that Microsoft "is not terribly good at converting R&D into new product revenue." He added that some projects, such as the human interface and intelligent agent work, could pay off in five to 10 years.

Microsoft Research groups

Advanced Interactivity & Intelligence

- Collaboration & Education

- Decision Theory & Adaptive Systems

- Information Retrieval & Analysis

- Natural Language Processing

- Speech Technology

- Telepresence

- User Interfaces

- Virtual Worlds

- Vision Technology

Mathematical Sciences

- Cryptography

- Signal Processing

- Theory

Systems and Architecture

- Database

- Graphics

- Hardware Systems

- Networking

- Scalable Servers

- Systems & Networking

Programming Tools, Methodologies & Techniques

- Advanced Development Tools

- Advanced Programming Languages

- Component Applications

- Programming Language Systems

- Semantics-Based Tools

- Software

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