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## Working Together, Wherever They Are

By [STEVE LOHR](#)

TO glimpse the real effect of today's computer networks, it helps to travel far beyond the high-tech hothouse of Silicon Valley, away from the venture capitalists, inventors and billionaire-wannabe entrepreneurs. To go where [Google](#) is just a search engine, not an obsession.

Try Elkhart, Ind., home to Nibco Inc., a century-old maker and distributor of plumbing supplies. A private company, Nibco employs 3,000 workers and generates \$500 million a year in sales. It faces stiff competition from Chinese producers.

Since the late 1990's, Nibco has pushed hard to increase productivity and improve customer service by using computer networks. The company first focused on its own operations, then established network links to its customers and suppliers. Now, Nibco's inventory, labor and administrative costs are down sharply, and 70 percent of all orders are digitally automated, twice the level of a few years ago.

The second round of Internet innovation appears to be here. Companies large and small experienced soaring productivity in the 90's as the Web made worlds of information available at the click of a mouse, and the Internet drastically reduced the cost of communicating and doing business with someone on the next floor or the next continent. That cost-cutting payoff continues to spread. But in the next wave, companies are embracing the potential of networked computing to let workers share their knowledge more efficiently as they nurture new ideas, new products and new ways to digitally automate all sorts of tasks.

Companies are drawing on collaborative models that first blossomed in nonbusiness settings, from online games to open-source software projects to the so-called wiki encyclopedias and blogs to speed up innovation. This

networked collaboration is creating new opportunities and disrupting industries. New styles of work and, in business schools, new theories of innovation are rising.

"The big payoff for the future will be in helping knowledge workers to be more inventive and creative, and to get those innovations into the marketplace," said Erik Brynjolfsson, a professor of managerial economics at the Sloan School of Management at the Massachusetts Institute of Technology. "That's where a wealthy nation like the United States is ultimately going to have to seek its competitive advantage."

Open-source software is a pioneering example of the kind of collaborative work made possible by the Internet. Networks of far-flung programmers share code and ideas to constantly improve and debug their software. So the open-source Linux operating system is challenging [Microsoft's](#) Windows, a product backed by one of the world's richest corporations.

The open-source formula is being applied in one field after another. Projects range from Wikipedia, an open-source encyclopedia, to Biological Innovation for Open Society, or BIOS, an open-source initiative in biotechnology. Corporations are rapidly adopting software tools intended to nurture collaborative work, including wikis, blogs, instant messaging, Web-based conferencing and peer-to-peer programs.

So far, economists say that only a fraction of the cost-cutting opportunity from networked computing has been captured. Looking ahead, they say, the United States must master how to use networked collaboration to accelerate innovation.

Pursuing that competitive edge will rely partly on the spread and steady advances in high-speed networks and software, but mostly on smart people figuring out how to exploit this protean technology. That is certainly the lesson of history. The electric motor, for example, was introduced in the 19th century, but the big economic benefits came decades later with innovations like assembly lines and mass production.

"Whether the current information technology-enabled productivity surge will continue into the future is and should be controversial, for it depends on the inventive capacity of businesses using the technology," said Timothy F. Bresnahan, an economist at Stanford University.

Personally, Mr. Bresnahan said he would bet on it. And businesses everywhere have been betting on the potential payoff from networked computing projects of all sizes. In Williamsville, N.Y., the Buffalo Brew Pub, which offers food and 34 draft beers, took the usual touch-screen ordering system further. It installed six I.B.M. touch-screen terminals linked to a Web-based network. Waiters punch in the orders, which are electronically shuttled to the kitchen and the bar, instead of walking them over.

Now, said Keith Morgan, the general manager, there are no mistakes from messy handwriting or bad math. From his laptop at the restaurant or home, Mr. Morgan can tap into a Web site and get hourly reports on inventory and sales by drink or food items. Slow-moving items are quickly eliminated from the menu. The payroll is automated, saving him hours a week.

Mr. Morgan estimated that the productivity of his staff, which serves more than 2,500 customers a week, has increased 15 to 20 percent, from time saved not calculating checks and running to the kitchen and bar with orders. "It keeps them out on the floor, so the customers see them so they order that extra drink," he said.

In the health care arena, government and industry are striving to move from paper and ink to digital patient records and prescriptions as a big step in the development of a national health information network. Such a network, experts say, is essential for reducing medical mistakes, curbing costs and independently evaluating the effectiveness of treatments and drugs. Building up a health information network will take several years and billions of dollars. It will be a challenge, but a national network has become a practical goal because of the falling costs and open standards of modern networked computing. "It's the Internet that makes it possible technically," said Dr. David J. Brailer, the Bush administration's coordinator for health information technology.

Others are working on small-scale health networks. A unit of Bang & Olufsen, the Danish producer of stereo gear, is developing a "smart pill box" with I.B.M. It is linked by short-range Bluetooth technology to cellphones or notebook PC's, tracking when people take pills - and reminding them when they forget - to improve treatment and assist in diagnosis and clinical trials.

For Mark Dickinson, a technical manager at the XRT Group, a software

company, the payoff from using Web collaboration software is self-evident. With Microsoft's Live Meeting program, Mr. Dickinson can provide technical support to the large corporations that use XRT's cash management software without traveling from his office in King of Prussia, Pa. He can see what is on the computer screen in customers' data centers, tell them what setting may be wrong, walk them through software upgrades - even, with permission, take control of their computers and make changes himself.

In his job, Mr. Dickinson uses the Web collaboration tool three or four times a day. "I can spend a few hours on a Web conference instead of spending three days, including the travel time, for an on-site visit to a client," he said. "The productivity benefit is just obvious. Besides, I hate flying."

Dresdner Kleinwort Wasserstein, an investment bank, has been using wiki software, which lets users collaborate on Web pages, to encourage teamwork among its traders and bankers around the world. The wiki software, from Socialtext, a start-up, has replaced e-mail and conference calls for tasks like pricing international bond offerings. "It's a virtual work space for tapping the expertise and knowledge of more people," said P. J. Rangaswami, chief information officer of Dresdner Kleinwort. "Conference calls and e-mail just aren't suited for collaborative work."

This is the year when more American households will be connected to the Internet with high-speed connections, or broadband, than with slower dial-up connections. According to research by S. G. Cowan & Company, broadband households will jump by 8 million this year to nearly 39 million.

Seeing the spread of broadband, media companies are investing in the Internet again, despite being burned badly in the bubble years. They recognize the inevitable, that broadband is bringing a shift in their world as faster network connections mean more video, music and advertising migrating to the Internet. So major media companies must try to capture Internet revenues as growth in their traditional broadcast, cable and publishing businesses slows.

One striking sign of how far the pendulum of industry sentiment has swung came last month when Richard D. Parsons, chairman of Time Warner, called AOL - its long-disparaged partner in a disastrous merger of the mania years - his company's big growth opportunity today.

For his part, Rupert Murdoch predicts that the [News Corporation's](#) Internet revenues may jump fivefold or tenfold over the next five years, to \$500 million or \$1 billion. "The timing is right," Mr. Murdoch told an industry conference last month. "Growth has really come in the last year or so with the growth of broadband."

The media moguls, it seems, agree with the Indiana plumbing supply company, Nibco. Jumping on the Internet is unavoidable, a competitive necessity.

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