

Technology is changing the nature of work

National Geographic Society feature

"And what do you do?" may still be the favorite question at 21st-century cocktail parties, but the answers will add up to something new.

Most Americans will be working in information-related fields, futurists say. Hardly anyone will work in factories, and even fewer on farms.

There will be more biologists than there are today, and because of the older population, more paramedics and geriatric social workers. The number of restaurateurs and travel agents will increase to help us fill our expanding leisure time.

The cocktail party may include a genetic-engineering specialist or a robot technician. And sometime next century, we may travel in social circles with a space-flight attendant or a space pharmacist.

But telephone operators, postal clerks, meter readers and aircraft structure assemblers may be hard to find. New technologies could make many of their jobs unnecessary.

THE VIEW of the 21st century remains a bit murky in 1984, but technological breakthroughs occurring today — especially the development of industrial robots, telecommunications, and biotechnology — guarantee that the worker of 2000 and beyond will face a

choice of occupations different from today's.

There will still be doctors, lawyers and merchants, but automation will send the bank teller, the supermarket checkout clerk, the metal worker and the machinist the way of the elevator operator, the milkman and the bowling pinsetter.

A bulletin board of job openings might contain these descriptions:

- Biomedical engineer — Makes bionic arms, legs, hands and feet, as well as instruments to let the blind see and the deaf hear.
- Laser inspection technician — Installs and maintains laser devices used everywhere from grocery checkouts to factories.
- Hazardous waste technician — Monitors, collects, transports and disposes of hazardous wastes.
- High-skilled paramedic — Under the eye of a portable TV camera, performs emergency procedures on accident victims, supervised by doctors watching monitors at a hospital.

The century will see more women and older people on the job, futurists say. More people will work at home, especially the handicapped, who will be able to "telecommute" to an all-electronic office by computer.

WHATEVER we do, we'll probably do less of it. "In the last 100 years, we cut our number of working hours in

half, and I think we'll do that again in half the time," said John Naisbitt, author of the book "Megatrends." But few workers will hold one job for life; changing technologies will force a series of career changes and mid-career training sabbaticals.

W. Clyde Helms of Occupational Forecasting Inc. in Fairfax, Va., is convinced that Americans are not ready for the jobs of the future. "The future doesn't begin at 12:01 a.m. Jan. 1, 2000; it's happening today," he asserts. "The youths entering school today are the work force of the 21st century."

Technology has led in the evolution of the typical American worker, from farmer to factory laborer to information specialist. Today more than half of all Americans work in creating, processing, and dissemination of information — programmers, teachers, secretaries, accountants, insurance people, engineers, librarians, television and newspaper reporters — and the percentage is increasing.

When Ronald Reagan was born in 1911, almost a third of Americans worked on farms. Now barely one in 30 works the land, and most analysts expect even fewer farmers in the 21st century.

only 3 percent by 2030, says S. Norman Feingold, president of National Career and Counseling Services in Washington.

Increasing numbers of blue-collar workers are in service jobs rather than manufacturing. Already, far more people work for McDonald's, for example, than for U.S. Steel.

The computer is the heart and brain of our information-based society. Of the five fastest-growing occupations listed by the U.S. Department of Labor, four are in the computer field. More computers undoubtedly will mean more computer security experts, people who try to protect computer systems from outside modellers.

Computers will continue to evolve, changing people's jobs as they go. The all-electronic office will rewrite some job descriptions. Alvin Toffler points out in his book "The Third Wave": "Typing, the central function of today's secretary, will become obsolete, he says, with the advent of dictation equipment that will convert spoken words into writing."

THE ROLE of lawyers may shift, says Charles Craver, a law professor at

the University of Illinois. "With a home computer, you'll write a will without help from a lawyer — you'll just fill out a questionnaire and send it to your lawyer electronically," he says.

Craver, whose specialty is labor law, says the drain of industry to foreign sites will continue as long as U.S. wages remain so much higher than those of developing countries. Mending fences with China, he says, could sap American jobs. "If China allows outside companies unlimited access to its one billion people, I shudder to think how many manufacturing jobs we could lose."

The American assembly-line worker in 2000 may be a robot, and eventually the traditional assembly line may disappear completely. Robots and related forms of automation are already here; most analysts believe there will be several hundred thousand robots at work by 2000.

THESE "steel-collar" workers inevitably will displace many blue collar — especially autoworkers, metal workers, and machinists — but they also will eliminate some drudgery and dan-

gerous work. This type of automation will create future jobs such as robot technicians, who will program, install or maintain industrial robots.

Automation also may open doors for women. Few factory jobs will require brawn; instead, the worker will sit at a keyboard punching out programs that control robots.

The technology might even boost overall industry employment. During the Industrial Revolution, for example, the introduction of the Hargreaves Jenny allowed one worker to produce as much as 200 spinners had. Yet employment in the British textile industry tripled, because productivity meant large price reductions and increased demand.

IBM Corporation, which has been making robots for three years, is planning for the day when computers, robots and other automation merge to guide a product from design through manufacture. But the idea depends on highly skilled technicians, who are in short supply. To prepare for the future, IBM is financing a \$50-million automation training program at engineering colleges.

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