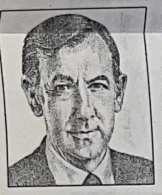
APPLIED INTELLIGENCE

Full Automation Will Create Jobs, Not Unemployment



JAMES MARTIN

This is the last of a three-part series on new computer technologies that will have great strategic importance in the future.

Artificial-intelligence technology is growing at a furious rate and promises to have some important strategic implications for business and society.

Actually, I prefer not to say "artificial intelligence." A better phrase is "automated reasoning," suggesting that a computer reaches conclusions by reasoning in an automated fashion.

There are a great many applications and implications for artificial intelligence in the future. The combination of artificial intelligence and robotics will automate many simple, routine, reproducible tasks.

What Can Be Automated

We can automate tasks requiring very complex calculations and logic, the expertise for which can be reduced to rules. It's possible today to automate many clerical and financial support jobs, although we haven't automated the jobs of many professionals. However, in the future, any task in which expertise can be reduced to rules or tasks that require a vast amount of knowledge can be automated.

What tasks won't be automated? Artistic efforts or tasks performed by highly creative people—those, for instance, requiring human empathy and understanding: the job of the salesman, leader, film director, orchestra conductor, musician.

A large proportion of today's jobs may become automated. But how fast will this happen? And what effect will it have on society?

Obviously, the effects will be dramatic and will happen pretty rapidly within the next 20 years.

Look at manufacturing in the 1950s—about 40 percent of all Americans were employed in the manufacturing sector of the economy. But according to some projections, it's likely that by about the year 2015 only 1.5 percent of Americans will be in the manufacturing sector.

Will this cause massive unemployment? If most factories are automated, and if we have an enormous amount of competition from countries where labor is cheap, isn't this going to cause major problems?

Not necessarily. We've already seen such a transition in agriculture. One statistic which is rather surprising to us today is that in 1900 about 50 percent of Americans worked on farms.

That proportion steadily declined to about 20 percent after World War II, dropping much lower in the 1960s, until today only about 1.5 percent of Americans work on farms. So, the percentage of the labor force in the manufacturing sector is likely to drop to about 1.5 percent by the year 2015.

In spite of this historical precedent, it's important for society to maintain something reasonably close to full employment.

It's likely that we can maintain close to full employment because the number of jobs in the service sector today (such as the information and entertainment industries) is steadily climbing.

For example, as we get high-definition television, Ka-band satellites and fiber-optic communication links to the home, we can pick up hundreds of television channels. A lot of work will be required to create television programs for this future society.

Television is very people-intensive, and it's the type of work that can't be automated. We're likely to see the television, entertainment and information businesses converge, creating many new jobs in these sectors.

And we'll be moving into a world of electronic books, where you can select any subject and branch into related material in video, speech or other media. The preparation of material in electronic form will require a high level of effort and human creativity.

In an era of rapidly changing technology, what should universities be teaching now?

Unfortunately, universities don't seem to have caught up with computing in the 1970s, let alone a vision of what computing and jobs are going to look like by the year 2000. It's important for universities to understand the effect of technology on the changing mix of jobs in the future.

With the introduction of wideband packet switching, broadband Integrated Services Digital Network (ISDN) chip sets, multifiber optical trunks, optical switching, intelligent networks and so on, telecommunications is undergoing a wholesale transformation.

We need to understand what telecommunications will look like in 2000 or 2010, given the technology we're developing now.

What telecommunications regulations need to be established?

Maryellen Zawatski

Unfortunately, universities don't seem to have caught up with computing in the 1970s, let alone a vision of what computing and jobs are going to look like by the year 2000.

What impact will those regulations have on the operators of public and private telephone and telecommunications networks?

In 1992, our communications will be governed by the Brooks Act, which mandates an evolution to open architectures to be implemented with the Open Systems Interconnect (OSI) Reference Model and ISDN.

But to move to open architectures, we must have standards, and those standards must be controlled.

Standards will lead to the manufacture of products that are certified by the National Institute of Standards and Technology.

The Brooks Act states that it will be illegal for any government department to build a telecommunications network using equipment that has not been certified to support an open architecture. This will lead to vast networks in which millions of computers can be connected together in an open environment.

From our current perspective, future technological advances seem limitless. However, as these advances occur, we need to ask: What could go wrong? What are the worst things that could happen?

One of the worst scenarios is our accidentally drifting into another Cuban missile crisis or some other type of crisis in the Middle East.

Perhaps a breaking away of peripheral parts of the Soviet Union might cause great unrest in Poland or behind the Iron Curtain.

The danger is that we might drift into a situation in which events fly out of control, and we could find ourselves at risk of nuclear war.

Where the Danger Really Lies

Much more important than nuclear weapons themselves are the command-and-control computer systems, which set the pattern for events that could lead to an inadvertent nuclear war.

Today's command-and-control systems are referred to as "meta-stable," which means that, initially, the systems are extremely safe and well-locked.

However, if we move toward a serious crisis, we have to start taking the locks off. We then move from a fail-safe situation to a "fail-deadly" situation.

Our technology is dangerous not because of the missiles themselves but because of the command-and-control systems we've built. Therefore, as technical professionals, we should be looking at the changes we can make in technology to prevent the worst scenarios from happening.

We're at one of the most extraordinary moments in history. Rather than drift into nuclear catastrophe, we have the opportunity to use rapidly developing technology to make an entirely different and better society.

The computer field is going to be the most exciting industry in which you could possibly work during the next 20 years. If we look at the model of future technology I mentioned earlier, we're now moving into a period of time in which the rate of change is going to be phenomenal, and we'd better be prepared for it.

Next week I'll begin a series of four articles on ISDN—an information network of the future that integrates voice, text, data and video in an open-communications architecture. ■

The James Martin Productivity Series, an information service updated quarterly, is available through High Productivity Software Inc., of Marblehead, Mass. (800) 242-1240. For information on seminars, please contact (in the United States and Canada) Technology Transfer Institute, 741 10th St., Santa Monica, Calif. 90402 (213) 394-8305. In Europe, contact Savant, 2 New St., Carnforth, Lancs., LA5 9BX United Kingdom (0524) 734 505.