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COMPUTERS AND COMMUNICATIONS: AN OVERVIEW OF TRENDS

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The paper suggests that the information technology has its foundation in the communication and computer sciences. It examines the trends in information technology revolution and throws light on the sociological impact of the integration of computers and communications.

The Convergence of Computers and Communications

One of the outstanding developments of the twentieth century has been the way in which two separate technologies – communications and computers – have combined to form the foundation of a third, which is more than a technology and even more pervasive than an industry. And that is information technology.

The first linkage of computing and communications occurred in 1940 when telegraph lines were used to send data from a college in New Hampshire to a laboratory in New York City. But it wasn't until the end of 1950s that the computing communication linkage began in earnest.

In 1977, the concept of an information technology based on the complete integration of computer and communication technologies was first presented. A year later was coined the phrase for the phenomenon, namely C & C, standing for the Integration of Computers and Communications.

Information technology has its technological foundation in the communication and computer sciences. But it is having an impact on all other industries, our economies, societies, cultures and the future so much so that it could be termed a revolution: the Information Technology Revolution.

The Information Technology Revolution

The Information technology revolution is a new Industrial Revolution. The principal hallmarks of the first Industrial Revolution were the replacement of muscle power by machine, the discovery and exploitation of new raw materials, accompanied by vastly improved transport services.

The new Industrial Revolution is primarily about information in all its forms: its processing, storage and dissemination. We have shifted from an industrial to an information society. There has been a tremendous rise in information occupations. More and more of us spend our time creating, processing or distributing information. We now mass produce information the way we used to mass produce goods.

Whilst we have very definitely stepped into the threshold of this new technology, its full and widespread impact is yet to come. The first strings are al-

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ready discernible. But it is almost certain that in the times to come, mankind will be increasingly affected by the progress of this new technology.

An Overview of Trends

Crystal gazing is always a hazardous process. More so when it pertains to the information technology sector, where technology leaps during the last 20 years, have been immense and entirely unforeseen.

What follows therefore, is only a description of some important trends, all of which are the result of C & C integration.

(a) Robots

The new buzzword in industrial productivity is robotics. Robots today are not only limited to replacing muscle power. Some can even "see" by means of imbedded cameras and "feel" with sensors that permit them to assess the hardness, temperature and other qualities of objects.

Robots are used for handling dangerous, boring and dirty jobs. They are used in manufacturing units for welding, painting & assembling, and by bomb squads to investigate suspicious articles. Also they handle radio active substance and even help to mine coal. In fact, a well known sushi chef in Japan is not a human at all but a robot.

(b) Electronic Cottage

With distributed information systems and the availability of personal computers it is possible to perform many office functions at home ushering in the age of the electronic cottage. Working for a distant employer at a home terminal or computer has come to be known as telecommuting. A microcomputer or terminal attached to a telephone line can communicate with the office computer. Electronic mail/message systems can be used to communicate between the home work station and the office. Most tasks can be done at home – writing memos, analyzing data, preparing reports, updating database, information, and other operations – and the results or data can be transmitted to co-workers or to other computers.

Although the number of employees telecommuting is small today, it is growing especially in the United States, where every home is potentially the "electronic cottage" envisioned by Alvin Toffler not very long ago.

(c) New Electronic Heartland

Linked by computer and communication technologies, a new breed of information worker is re-organising the landscape of the world today. Free to live almost anywhere, more and more individuals are deciding to live in small cities, towns and rural areas. A new electronics heartland is spreading throughout countries around the globe, especially in the United States. Quality of life in

rural areas which are technologically linked to urban centres and other cities is proving to be far superior. This factor, coupled with the emergence of the electronic cottages, is gradually laying the groundwork for the decline of cities.

(d) *Smart Cars, Smart Streets*

Under a project known as Autoguide in Germany, a company has wired a few hundred kilometres in city roads with infrared beacons mounted on key traffic lights. The sensors monitor the flow and relay information about delays or hazards to a computerized control centre, which in turn beams the data to computers on board the test vehicles.

As a result, voices from the dashboard are guiding thousands of cars on Germany's clogged streets, directing them to their destinations over the safest, fastest routes. "You are approaching a traffic circle in 100 metres", says the voice from deep inside your dashboard. "Stay in this lane and prepare to take your second right". "The last stoplight was out of order, but you're going in the right direction". An arrow on your dashboard points the way as well. Should you fail to follow instructions, the car politely warns, "You are leaving the correct route. At the next intersection, turn left."

That was not an extract from a title by Asimov. It's the way Autoguide works. For the future, planners envision caravans of automatically controlled cars and trucks, travelling between cities at 90 miles per hour.

(e) *Smart Cities*

By the year 2000, the truly global cities will not be the largest, they will be the 'smartest'. Computers are turning buildings into 'smart' buildings that monitor and run themselves – and connect occupants with the rest of the world.

The next logical step is to create networks of smart buildings, and create smart cities. In Tokyo recently, we connected thirty-two buildings with a network of optic fibres. If you connect enough smart buildings, you have a 'Smart City' which will eventually be connected to others. These will be the global cities of the future.

(f) *Neural Networks and Silicon Intelligence*

Interest in artificial intelligence (AI) of computers which refers to efforts to capture the way humans think has been with us for over 3 decades now. The distinguishing feature of AI is its ability to learn from mistakes.

But now researchers are taking the first steps toward building neural network computers: machines with circuits patterned after the complex interconnections existing among the brain's neurons, or nerve cells. Neural network computers have processing elements, or simulated "neurons", that number in thousands, and there are millions of interconnections between these elements. Neural networks are capable of making decisions even on fuzzy and contradictory data. This is a major break-through from the earlier scenario where com-

puters could merely operate in the yes/no environment. Are we heading towards some form of silicon intelligence?

(g) *Overcoming the Energy Crisis*

We may well be on our way to beating the energy crisis. Quite simply, the world is using less energy while producing more. Instead of physically transporting messages in envelopes and delivering them through letter-boxes, we are increasingly sending messages in the form of electrical impulses along wires. The fax, e-mail, home-office movement (the electronic cottage), and videoconferencing are all working towards this. Compare the energy savings through replacing the energy equivalent of couple of gallons of petrol with the few thimblefuls needed to transmit the information required. The implications in an increasing energy-conscious age are obvious.

Conclusion

Much can be said about the sociological impact of the integration of computers and communication. Some forecast a Utopia, others an Armageddon, arising from the process of technological change. Technology however, is ethically neutral. Properly applied, it provides greater creativity for individuals, reduces drudgery, and leads to more leisure. Thoughtlessly applied, it eases warfare and annihilation. Ultimately the choice rests with society.

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