Computers and communications

An article in the Department of Communications quarterly, *In Search,* states that "the awesome power of the computer has been extended through communications" and that "within a decade, the use of the computer and computer communications will multiply by ten".

A United States company, Data Transmission, has estimated that the annual volume of computer communication calls in the U.S. will increase from 3.7 billion in 1970 to 32 billion in 1980, while the number of terminals in use will leap from 84,000 to one million. Canadian requirements will probably be one-tenth of these figures.

Canada is already constructing networks to satisfy its needs in the area of computer communications. Two systems, Infodat and Dataroute, are making it possible to transmit vast quantities of information. These systems use private lines. Public switched data services such as Datapac and Infoswitch are now being planned for this year and beyond.

Commercial uses

Applications of computer communications are countless. Banks and trust companies are already using computer communications to centralize their accounting operations. Airlines and hotel chains use them to assure quick reservation service to clients. And companies with branches scattered across the country rely on computer communications to manage their inventories more efficiently. At any given time, these companies can determine the location, condition and quantity of the thousands of parts used in their equipment, how many of these parts need to be replaced and when.

Architects, city planners, and engineers are now able to simulate the conditions that will affect their projects before constructing them. They can observe on a cathode ray tube (CRT) screen the schematic flow of traffic on a planned highway or traffic exchange, or watch a jumbo jet landing on airport runways still on the drawing boards.

Doctors can be kept up-to-date on the condition of patients in intensive care units. They can transmit data from cardiograms, encephalograms, tissue samples, and biochemical or bacteriological specimens to be analysed by a remote computer.

Students can receive individual instruction by a computer that adapts itself to their learning speed.

Police organizations can fight crime more effectively by searching data banks. For several years, the police have been able to identify fingerprints by computerized comparison. Even tax inspectors can now discover forms showing income which taxpayers may wittingly or unwittingly have omitted in their annual tax returns.

Computers and human rights

These are only some of the areas in which computer communications have begun to be used. While accepting the benefits of this technology, there are however, inherent dangers.

Governments and large companies have extensive files on many aspects of the individual's life: school records, income, debts, credit ratings, medical associates, group memberships, and past offences, whether serious or not.

Vast data banks containing this type of private information have the potential to threaten individual rights. Safeguards are essential to prevent the abuse of computer power.

Engineers, data processing experts, lawyers, sociologists, and politicians will have to work together in search of the delicate balance between legitimate needs for protecting public safety, and preservation of the fundamental freedoms of citizens in a liberal and democratic society.

Machine analyses air we breathe

Viking, the unmanned space laboratory now hurtling through space on its way to a rendezvous with Mars next July – in time for the U.S. Bicentennial celebrations –, is carrying a highly-sophisticated trace gas analyser developed at the University of Toronto's Institute for Aerospace Studies, in collaboration with the University of Minnesota. The analyser is designed to measure the Martian upper atmosphere.

Meanwhile, here on earth, U of T aerospace scientists have modified the Mars-bound instrument for use on earth, and called it TAGA – Trace Atmosphere Gas Analyser. It will be used for environmental studies, geochemistry, medical research and paramilitary purposes.

TAGA, for which the University of Toronto holds the patents, can detect carcinogens (cancer-producing substances), mutagens, which can cause changes in human genes, and other matter in the atmosphere at concentration of one part in one billion.

Professor Barry French, aerospace engineer and physicist at the Institute of Aerospace Studies, collaborated in the design with Dr. Neil Reid, a chemist who has worked with the National Aeronautical and Space Administration, and U of T's Dr. Adele Buckley, the first woman to complete a doctorate of philosophy at the Institute. "We have demonstrated that we should soon be able to incorporate changes that will make TAGA sensitive to one part in a trillion," says Professor French.

Variety of applications

Professor French hopes that TAGA will be used to assess potential hazards before new industrial processes are installed and that it will also be used for detecting disease in its early stages, determining what drug has been taken in an over-dose, monitoring medical conditions in infants, assessing conditions in premature infants (who cannot afford to part with blood for testing) and detecting caches of drugs and explosives.

He says TAGA could facilitate the screening of a large number of people in a short time without specialists in attendance. "Its services should also be low in costs," he says. "Since readings are instant, neither doctor nor patient will have to wait long for results. It's 'non-invasive' – that is, no needles or tubes are required."

TAGA, its inventors believe, could be useful to the police, who have expressed interest in it as a device for detecting hidden caches of drugs. It might one day be possible for TAGA to "smell print" around furniture or objects and detect similar traces that will relate to those discernible on a person or clothing.

A model of TAGA that can be mounted on a survey aircraft may one day make possible the detection of ore or oil deposits in the earth or even under water.