that they are waiting to be read. It can be selective, sending a message to the entire network, to a specific group, or to one individual. It does all this, and more, at high speed, thus reducing the transmission time, and therefore the cost, and it can do this for many groups simultaneously.

Another advantage of the CBCS is its flexibility. Messages can be transmitted by phone lines, where these are available and reliable. Where they are not, the system may use VHF radio for short-to-medium distances — say up to 600 kilometres. For longer distances satellites may be used to "bounce" the messages across the country or around the world.

Time zones present no problem. The computer simply stores messages from other zones until the recipient next "signs on" to the system. Because it is independent of time, the system also overcomes language barriers to a large extent. And it enables every participant in a conference to have a say, regardless of rank or oratorical skills.

Such systems are not without their drawbacks, however. Each user must have access to a terminal — a viewing screen and keyboard — and must be able to use the keyboard to send and receive messages. Simple terminals are already cheap, and getting cheaper, as is most computer "hardware". But more sophisticated terminals offer considerable advantages — at considerably higher prices.

There are more basic, human problems in communicating through a computer terminal. Many people find the telephone an alienating instrument; they would find the computer terminal much worse. According to Dr. Richard Miller, of Infomedia, a California-based company that operates a commercial CBCS, conversing via computer can be "incredibly misleading", especially in the case where different languages are used.

"There is a real limitation," says Miller. "It is a means of exchanging information, or of obtaining access to expertise. But it can be disastrous without the body language, the tone of voice, and the facial expressions that go with normal, face-to-face communication."

Miller's Infomedia Corporation has a number of large multinational corporations as clients, operating as far afield as Hong Kong, the Persian Gulf, and Australia. They use CBCS to coordiante their international activities — from construction projects to petroleum exploration — using their own computers. The limiting factor in the use of such systems, says Miller, is not the technology, or the cost, it is limited access.

In most countries communications media are controlled by postal, telegraph and telephone agencies (PTTs), usually government-owned monopolies. Most PTTs see this new communications medium as a threat to their revenues, to lucrative international telex and telephone revenues in particular, so they try to prevent it by making it illegal. To overcome this resistance, says Miller, entails a long, painful process of explaining that the new medium is really an information storage and retrieval system that is complementary to existing systems, not competitive with them.

The PTTs are increasingly under pressure to relax their regulations. The International Federation for Information Processing (IFIP), a Unesco-chartered organization, has a special group looking into the problems facing CBCS. In 1980 it drew up a series of recommendations aimed directly at the PTTs. These include allowing organi-

zations to operate their own CBCS through the public networks, fewer restrictions on transborder communications, and the dropping of "discriminatory" high tariffs.

IFIP has recently formed a second working group on SBCS, to look specifically at the needs of developing countries, for there is a very real fear that the new technology is developing so fast that the Third World may be left behind if something is not done quickly.

Dr. Ramani, of the Tata Institute, is a member of this group. He sees the problems in developing countries from a different perspective. Computer-mediated conferencing is uncommon in the developing world, he says, not just because it is expensive or impractical, but because it is a new idea, not marketed commercially in the developing world, and requiring difficult design and implementation efforts at this stage. He believes the use of CBCS could do a lot more than simply improve communications among the scientists who use it.

"It is capable of allowing several teams of researchers, each sub-critical in size, to develop a high degree of interaction, provide mutual support, and sustain one another. Such facilities increase the visibility of a researcher's work, and offer him membership in a close-knit community. They make his work more stimulating and meaningful." What is needed now, adds Dr. Ramani, is a demonstration project at the local level to prove to the research community and the policymakers that CBCS is an effective tool.

The need for action is urgent according to Dr. Gordon Thompson, who is manager of communications studies for Canada's Bell Northern Research. If the developing countries simply duplicate the present communications infrastructure of the developed world, they will be "missing the boat", he says.

"The old structures simply can't do the required job. They aren't big enough, smart enough, or flexible enough. By tying themselves to conventional developed countries' communications infrastructure architectures, the developing countries may be incurring a major opportunity cost that will haunt them within the next two decades."

But Thompson warns, too, against the dangers of "prescribing" technology fixes for developing countries without careful preliminary study. "Considerable care and caution must be exercised," he says. "Very little is really known about the impacts of communications technology." And he adds bluntly: "Not every mindless installation of the latest technology will produce the desired results."

In other words the question is not simply whether the developing countries are going to miss the boat, but whether they should even be considering getting aboard.

In October a panel of 14 experts on computer conferencing from eight countries met in Ottawa for a five-day workshop sponsored by the International Development Research Centre (IDRC). (Computer-Based Conferencing Systems for Developing Countries, Ottawa, October 26-30, 1981. A summary report of the workshop will be published by IDRC.) The purpose of the workshop was to attempt to find the answer to that question; also to determine whether any formal structures are necessary to ensure that the developing countries are involved in the design and implementation of worldwide CBCS programs; and to suggest ways in which IDRC might be able to assist developing countries in this field.

Like Drs. Thompson and Miller, many participants expressed reservations about some aspects of CBCS ap-