The power of local information

Tomas Ohlin

The author argues that tele-communications efforts too often tend to stress distant connections. The local informative contacts are important, and should be given a chance in future systems. The argument presented to support this view includes the specific example of the TERESE project (Tele-communications and Rural Development in Sweden). This publically funded project uses narrowband communication, including computer conferencing, to stress economic and social identity in a region in the far north of Sweden. Details of continuing regional efforts are given.

Dr Ohlin is with the National Swedish Board for Technical Development, PO Box S-100 72, Stockholm, Sweden. As of August 1978, he is also Secretary of the new Swedish Viewdata Commission.

[1] M. Mayer, 'The telephone and the uses of time', in *Social Impact of the Telephone*, edited by Ithiel de Sola Pool, MIT Press, Cambridge, MA, 1976.

[2] I took a careful step in this direction in 1967, defining information as change in knowledge over time ($I = dK/dt$). Several continuations from this simple approach are possible.

[3] *Instant World*, Canadian Telecommission, 1971.

Several investigations of our so far most two-way telecommunications medium, the telephone, show a heavy emphasis on *local* communication. It turns out that the majority of normal telephone calls connect points within a surprisingly small area. For example, it has been demonstrated[1] that between 40 and 50% of telephone calls originating from a household are made within a two-mile radius. Two possible explanations for this are (a) that the usage tariffs are extremely efficient in reducing the number of long-distance calls, or (b) that the dominance of local telephone calls reflects a deeper human communications pattern. This pattern could have a simple organizational origin: communication follows and connects the structure of physical resources. But it could also be somewhat deeper, and reflect a wish for the closest human connections possible. The former of these possible explanations will not be discussed here: instead, I will try to illuminate the nature of certain informative contacts.

In what sense can information be regarded as local? When subjects of interest are connected in a geographical sense, then it would be natural to expect an emphasis on transfer of local information through available telecommunications media. But the connection certainly need not be geographical; any coordinated reference pattern between senders and receivers would suffice.

A dominant problem with local information lies in the lack of theory (and measuring units) as a base for reasonable conclusions. The concept of information seems to be too elusive to be easily formalized on a general level.

Many micro models exist for information structures, especially in connection with data-base design theory. From a macro perspective, however, generally accepted models are missing.[2] Consequently, intuition has to be applied when we search for explanatory backgrounds to the question of why local information is important. A few relevant intuitive comments are given in Table 1.

One thing is clear: local needs do exist. Furthermore, the more distributed communications access, the more this may influence conversations. So, as our communication media become increasingly efficient and flexible, it is only natural to expect them to be used more and more with 'local flavour'. We shall soon really feel the 'soul in the system', to quote from the classic Canadian report *Instant World*.[3]

It can be observed that several of the characteristics listed in Table

Table 1. Why is local information important?

1. Many biological resources are by nature local. Even if a resource such as raw energy can be easily transmitted over large distances, it has to be adjusted quite clearly to local needs before consumption. This adjustment is becoming more and more important. Higher forms of energy, eg in the form of food and clothing, quite evidently possess limitations in physical transferability. And information is perhaps the highest possible form of energy, where biological resemblances are beginning to be stressed.

2. Distortion increases with distance. No matter how technically efficient the communications links are said to be, all amplifiers introduce some distortion, whether they are human or computerized, or a mixture of the two.

3. The strong expansion of intelligent offline equipment has been called the 'microprocessor invasion'. Few areas of the human environment will be left outside this movement. The kinds of information that these small machines will handle will be primarily of local nature – which is the whole point in their expansion. (The fact that in certain instances connections to a central facility may be made, does not change this balance). These offline applications will probably be given more and more of a 'human touch', and the impact of this development will be considerable. Applied microprocessor technology does indeed represent a step towards a symbiosis between man and machine.

4. As centrally produced information concerning social services (education, health care, etc) and industry-oriented information services is increasingly provided over data networks, the more demand can be anticipated for local orientation of what is generally made available.

5. The communications media have started to deliver messages of increasingly 'soft' nature. Consider the mail services in a computer-conferencing environment. These are conceptually not far from telephone conversations. Thus, it is quite natural to expect a personal and local touch here, especially when we stress the expected deepened connection between mail and intelligent local data bases.

6. Active two-way communication often has a strong local element. ('Two-way' here meaning at least '1·5 way' user influence.) While the 'human reach' is correctly said to be expanded through telecommunication systems, its active origin is often local because of human physical limitations. Interaction in two-way systems reflects the human think-pattern, with its often local references and short-time memory.

7. Efficient telecommunications media are, as yet, not often used in the democratic process. However, as contacts between representatives and voters really need to be strengthened, these media are bound to come into focus, whether it be with access from everybody's home terminal, or primarily from the democratic gatekeepers. As

democracy clearly is, or should be, locally rooted, we are bound to find expanded local connections here.

8. No communications medium is in itself perfect. As Thorngren points out,[a] we need coordinated use of different media at different times. To observe the local touch here provides the opportunity for deeper human contacts, so much needed in this one-way TV-age.

9. Cultural information is often local. The correspondence between groups of people and their backgrounds often stresses the local identity. This can certainly be expected to continue, as such soft information attracts more and more interest.

10. Few computer/communications systems of today handle truly 'living' local data. New and increasingly flexible media, beginning with computer conferencing, are promising here, as they so easily treat soft information. The 'living' aspect is important. In more and more accessible communication systems, the demand for fresh data will dominate. Yesterday's facts will not be as important. And the fastest update will be local, once again because of close relationships to subjects of interest.

11. Generally, it could be added that in rapidly updated local systems, data security loses some of its importance. When an encryption has been broken by the non-authorized user, its data may well have lost their significance because of their short lifetime.

[a] B. Thorngren, 'Silent actors', *Social Impact of the Telephone*, MIT Press, Cambridge, MA, 1976.

are relevant generally, that is independent of the particular information environment. In many current applications, a distinction is drawn between 'business information' and 'personal information'. A good example here is the UK Viewdata system, now in market phase, where this distinction is stressed. Naturally, different kinds of data processing are relevant for different audiences. There seem to be, however, certain general aspects of information categories that are independent of this border. Such aspects should be of primary importance in the planning of future telecommunications.

It should perhaps be noted that several types of information which are currently regarded as 'personal' may well be used in business environments in the future. This applies, for example, to advice, travel information, certain types of education, etc. In spite of the difficulties of determining the value of such information services, they will definitely somehow be made available in the marketplace – and soft pricing will support competition.

Unfortunately, not many projects investigate computerized information needs for everyone. In the UK, the Citizens' Advice Bureaux are being considered from the angle of increasing computerized support for the advisers. In London, Canada, the same approach has been put into practice.[4] It is interesting to combine the experiences from these – and other – experiments on real information needs. One discussion that also must be noted here is that of Dervin.[5]

Concerning more formal types of data, the Swedish project on 'Information for small-scale industry', described below, illustrates another version of a fairly local advice centre, intended for another audience. The point here is to investigate how increased intraregional communication can support regional expansion for knowledge-intensive industrial employment.

Many reasons for local communications are natural. However, complete regional isolation must be avoided. Strong links of a general nature need to complement the local patterns. The isolated island will have difficulty in surviving. But intense internal communication supports identity, and thus has positive value.

Role of computer conferencing

Computer conferencing has an important role to play in local communications systems. First, it may be useful to note some aspects of such systems.

By promoting local contacts, computer conferencing will become the link between local and general communication spaces. More precisely, it may be looked on as an 'interface element' in larger, and only partly human, information systems.

This will be the contact area, where the user meets the system. The more flexible and efficient this meeting can be, the more satisfactory will be the contacts achieved: a friendly 'remote meeting table', so to speak.

Today's computerized information systems put many, and often unnecessary, constraints on the user. When s/he wants to establish contact, s/he has to behave in very specific, and often machine-dependent, ways. Widespread computer conferencing opens new doors, leading towards more human contacts, free from unnecessary machine dependence.

However, as yet, only in a few cases has computer conferencing been integrated with the larger system's functions. It is most often used primarily as a separate contact facility. Future systems will probably treat computer conferencing more as a system module. It will be considered as a 'building block' that can be coarranged with other systems' blocks. These blocks may then be put together with programming-like techniques, similar to current structured programming methods.

Also, and in the longer term, free-text conferencing will probably be interpreted in a partly automated way. Certain conference sentences, more or less freely intermixed with other sentences, may be 'understood' by the computer system, leading to specific formal actions. A mixture of syntactic and semantic grammer might be used. Integrated parts of the dialogues could be treated as 'comments', while other parts could be interpreted as instructions. It may also be that these two forms in certain cases could be mixed in a dynamic way: comments for action, so to speak, and instructions that could be

[4] J. Tague, C. Walters, and M. Shepherd, 'The distribution of community information: the role of the computer and computer-based networks', *ASLIB Proceedings*, September 1976.

[5] B. Dervin, 'The everyday information needs of the average citizen: a taxonomy for analysis', *Information for the Community*, Kochen and Donohue, ALA, 1976.

ignored. Such dynamics would then have to be controlled from higher system levels. Computer conferencing will become a fully integrated part in the larger systems perspective.

From the applications viewpoint, computer conferencing shows extremely interesting features. Several of these stress local contacts. A few points are listed below.

The easy definition of local-interest communities is of primary importance. Groups with common ideas and priorities can be born quickly, and can also die quickly, after completing the desired contacts. This organizational possibility will probably be of major social value.[6] The concept 'local' will easily be expanded to non-geographical areas in this context. We can be connected by common interests. In computer language, this means 'associative contacts', or addressing by contents.

The strength of argument in these local discussions will be stressed, in contrast to the current focus on 'who is talking' – and nobody can interrupt in the middle of a sentence. However, new imbalances may also follow: people with verbal and typing skills are given the chance to dominate. Behind the shelter of the terminal, we probably also dare to form communities on sensitive subjects, such as personal drug use, sex practices, unaccepted politics, etc.[7]

Despite its potential, however, the use of computer conferencing is spreading rather slowly: not many have yet discovered its true flexibility. A consideration of experiences in Sweden will serve as a useful illustration.

Experiences with system FORUM

We now have two years of practical experience using the FORUM conference system.[8] A large number of application projects exist around it and its programme successors. The systems are used for research, planning, administration, and much more, with an emphasis on the Stockholm environment.

A few data can reflect a sample of the FORUM usage pattern.[9] During January, February and March 1977, close to 10 000 activities were logged, forming 4220 FORUM sessions.[10] This means that in a session a little more than two conferences were visited, adding up to eleven minutes on average. Public or private messages were sent in 1443 sessions (ie close to every third session only). Such sessions lasted 19 minutes, and 2·5 conferences were visited. The typing took 7·3 minutes. Also, in these last sessions, reference to (request for) earlier messages was made in close to every second session. Seven times more public than private messages were sent.

The session distribution over time of day does not differ much from what might be expected, although the evening use perhaps reflects a certain communications efficiency (see Figure 1).

It is interesting that the old '80/20 rule' applies to a certain extent in these data. Close to 20% of the users answer for very close to 80% of all sessions. In addition, the conclusion can be reached that, as a whole, the system during these months was used primarily as an electronic blackboard, and that simultaneous conferences were not very common.

These experiences naturally reflect the particular environment, including the type of terminal user. The users in this case were mainly computer professionals. We used the system for planning and

[6] It is indeed a subject of interest, and perhaps headache, for existing strong and slow human organizations. They do not seem to have realized this yet.

[7] In Stockholm we have some interesting experiences in this area, including trials in the creation of collective art.

[8] Created by J. Vallee and R. Johansen, Institute for the Future, Menlo Park, CA, USA.

[9] G. Ahlqvist and Ö. Leringe, *The Use of FORUM Computer Conference System* (in Swedish), Stockholm Data Center, January 1978.

[10] An 'activity' is a visit by one user in one conference, and a 'session' comprises all user activities from entrance into the programme to his/her exit.

Figure 1. Time distribution of FORUM messages.

Source: G. Ahlqvist and Ö. Leringe, *Use of FORUM Computer Conference System* (in Swedish), Stockholm Data Center, January 1978.
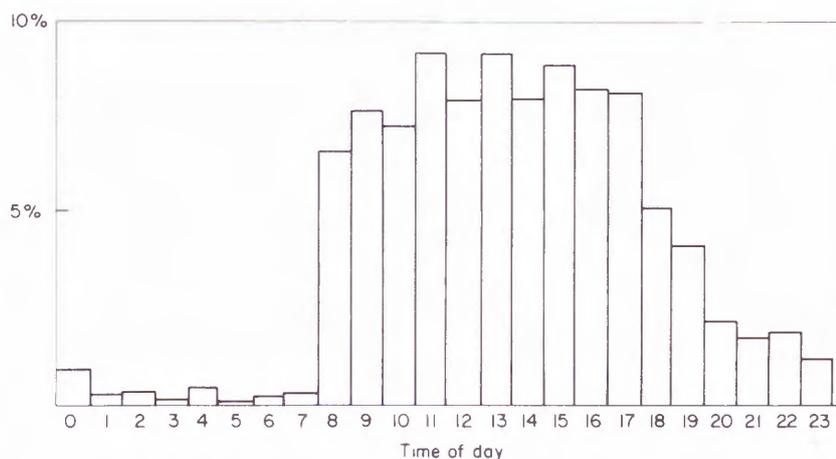
administration of daily work, including coffee and lunch break discussions. Nobody had any typing difficulty worth mentioning, and terminal access was generally very satisfactory.

These data, then, are specific, and perhaps unsuitable for general conclusions, but they do provide a useful picture of the early stages of local use of computer conferencing in a research environment. As such, our experience may be of more than local interest.

Access to what?

For types of information that are of a formal nature, current computer/communication systems are running quite efficiently. But 'soft' and local data are not often treated in these systems. Why is this? The superstition of having to use hardware parts to maximum efficiency is still around, even though this suboptimization is beginning to be exposed. It is quite simple: we need efficient communication, not maximum use of available hardware. Such balanced understanding is coming, but sometimes astonishingly slowly. The old-time planners and equipment suppliers also – naturally – tend not to support this line of development very strongly.

Furthermore, methods and experiences are lacking concerning the formal treatment of soft data. How do you deal with feelings? Should they be put in boxes just like conventional numeric data, and be measured and packed as usual? What about controversial opinions? And local secrets? – Not so important, yet? Where, then, is the experience and evaluation to support such a statement?

It is often said that treatment of soft and local data can wait, because of high processing cost and formalization difficulties. Fortunately, the price fall for hardware is stronger than the applications conservatism – and some attractive software pieces are available. So there is room for some optimism.

In many scientific fields researchers complain about the difficulties in educating people to understand the practical application possibilities of their work. Not so for applied telecommunications: everybody is an expert here. This is often troublesome, since so much coordination is needed for new projects: everybody wants to take part in, for example, studies about the electronic newspaper of 1990. Because of this, it is wise to support development projects that work within narrow information borders, and/or projects that use telecommunication only as a peripheral service. Business-oriented areas

often fit quite well here – and, of course, positive employment effects following active use of telecommunications are extremely important, especially in a regional perspective.

What we need to develop are systems primarily handling important types of information. Therefore, we should spend much effort in trying to ascertain peoples' priorities. What do you want to know? What do you want to discuss? It is doubtful that this concerns payroll or large quantities of business letters only. On the contrary, both at work and at home, we often want fresh opinions about activities that are close to us: a 'soft society', rather than only an 'instant society' of the McLuhan type. In this new society, access to information must be widespread, and not a service primarily for the information-rich. This balance will perhaps be difficult to achieve, since resource concentration is often attractive, but strongly centralized information services must be avoided.

How strong should the interaction be between system and user? We should remember that the computer/communications system is concerned with quantities of data, while the human participator primarily works with qualities. To perhaps overstate the case, two-way broadband sessions seem to be too much, too massive, for many human-oriented applications. We cannot swallow all this dynamic information. Where is the time to think about reactions and answers? (The broadband systems are seldom buffered.) If broadband primarily is quantity and narrowband is quality, then limited broadband out and narrowband back sounds like an interesting combination, independent of cost. Now, we know that the cost for broadband is very high. Is it worth its cost? How much can narrowband do, with adequate data-base back-up? These questions need to be considered in depth in the near future. Are there general conclusions to be drawn about bandwidth, from a human applications point of view?

As an example of available data to underline such a question, it is useful to refer to a study by Reid.[11] Comparing the efficiency of ordinary audio telephone with or without the addition of a facial display, Reid concludes that little positive effect follows the addition of a picture in the message stream, when emphasizing environments of information transmission and problem-solving (but perhaps excluding conflict conversations). This may well be a conclusion of wide applicability.

Information as regional support

The question of telecommunications support for regional development has recently been analyzed in some depth in Sweden in an activity named TERESE (Telecommunications and Regional Development in Sweden.[12]

The development began in mid 1975, when a steering body was formed with members from the National Swedish Board for Technical Development, the National Telecommunications Administration, the Expert Board for Regional Development (Ministry of Labour), the Secretariat for Future Studies (Cabinet Office), and the Swedish Association of Local Authorities.

The object was primarily to try to define social development needs, and to ask whether these needs called for some kind of expanded communications technology, and, if so, if telecommunications could be of interest.

[11] A.A.L. Reid, 'Comparing telephone with face-to-face contact', *The Social Impact of the Telephone, op cit*, Ref 1.
[12] See T. Ohlin and B. Thorngren, *Telecommunications and Regional Development in Sweden*, National Swedish Board for Technical Development, Expert Board for Regional Development, Contact Report, January 1976 and Progress Report, April 1977.

It was quite rapidly noted that in technology application environments, the explicit choice of technology is in itself not the primary problem. The main interest instead turns out to be the difficulties in defining the *information needs* in various regions. Furthermore, these needs have to be considered locally; they cannot be defined by central authorities without close practical contacts within the region concerned.

Thus, the working group completed a contact report to be considered by potentially concerned local authorities and interested parties before any definite suggestions about enlarged telecommunications systems were to be put forward. Possible measures discussed in the report included the development of telecommunications applications in transport, education, health and other social services, and culture and leisure activities. The report was sent for consideration to representative authorities for selected regions, and interesting replies were received.

How should we continue? It was evident that theoretical discussions on the basis of only written documentation about possible project directions would be insufficient. Local responses would be too limited. On the other hand, fairly complete practical system tests in full-scale environments would be very resource-consuming and at the same time enable only limited applications flexibility.

A compromise was reached. A priority discussion period was arranged in the selected region – the town of Luleå, in the very north of Sweden – at the beginning of December 1976. The seminar lasted for one week, and the participants were able to see a wide range of demonstration systems.

Normally, a seminar session would last for half a day, and would be followed by practical aquaintance with application systems. In some cases, an 'interactive' structure was adopted between these two parts. The sessions included discussion of local communication needs in the following fields:

● Collective traffic.
● Consumer information distribution.
● Planning by local authorities.
● Local citizen information.
● Planning of physical living conditions.
● Efficient use of consultants.
● Factual business contacts between firms, markets and university expertise.
● Computer-aided and distributed education.
● Cooperative decision making.
● Planning of local employment.
● Health systems communication.
● Communication between the handicapped.

The seminar participant had the chance to use, among others, the following systems:

● Computer conferencing.
● Computer-aided education.
● Social question/answer computer applications: health information and planning; psychiatric care; consumer information; planning of employment.
● Telephone conferencing.

- Telefacsimile services.
- Picture telephone.

The discussions at Luleå gave rise to various interesting project possibilities. Some, however, had to be abandoned because of lack of organizational and human support. A firm organizational structure is a necessity for project success in this kind of environment. Such a structure naturally includes, as an important part, a solid assessment resource – something that, as it turned out, is not easily defined.

As a matter of fact, the definition of *organization* for the particularly interesting projects was found to be a dominant problem. The importance of stability and local support here can hardly be overemphasized.

It is interesting to note that the Luleå week created several project ideas outside the original application framework. Local representatives tended to ask 'Couldn't our need for communication in this (other) field be helped in a similar way?' Consequently, a number of ideas developed which had not been considered beforehand.

During the months following the seminar, the suggested projects were examined in detail: some turned out to be lacking in stability; some were considered to be too resource-consuming, etc. The projects finally selected for development, in March 1977, are listed below.

Early regional projects

Promotion of local small-scale business

The project deals with increased interaction between small-firm conglomerates, with the aim of giving small-scale businesses in peripheral locations some of the advantages of resource-sharing normally confined to larger, more dense, urban centres. Examples include joint sharing of resources for qualified consultancy, new product testing equipment, documentation files, and files of potential customers and suppliers within the region.

The project is also concerned to promote the sharing of experience by direct interaction between firms and university researchers.[13]

Joint planning for northern Nordic regions

This project will tie together planning resources for the very northern regions of Sweden, Norway and Finland (the so-called 'Nordkalottern' districts). By way of using efficient telecommunications systems, it should be possible to obtain increased efficiency in connection with joint use of resources of different kinds.

Health care

Considerable experience in this area already exists, concerning different levels of computerized information services. In the project, aspects of information distribution in rural environments are stressed.

Two approaches are taken. First, the local planning of 'mobile nurses', so-called 'home first-aiders' is to be made efficient with the use of portable terminal access to advanced computing resources.

Second, resource-pooling of specialist knowledge between different regional hospitals is being studied. The distant hospitals often lack specialist knowledge in important fields. Highly efficient telecommunications nodes, to be used to reach a limited number of

[13] For project details, see M. Glader, 'Computer-aided information systems for small business', University of Umeå, Sweden, February 1978.

specialists, will enable distant hospitals to be close to knowledge centres in several fields.

Distributed education

Different levels of ambition have been discussed concerning distributed education with the help of telecommunications. It is thought that complex systems of the computer-aided-instruction (CAI) type at the moment involve a too heavy systems investment.[14] Rather, telecommunications aids of simpler, but interactive, nature are used. In this way, education is distributed to an interested population over large geographical distances, with direct terminal access.

Increased communication for the handicapped

A project is underway with the aim of increasing the communication possibilities for groups with impaired hearing. With the help of portable typewriter terminals it is expected that new and valuable communication patterns will be made available. A particularly interesting aspect of the project will be the possibility for people from 'outside' to join the groups temporarily, supply information such as news, cultural events, possibilities for expanding contacts, etc. Thus, dynamic windows to the outside are created.

Telecommunications and energy consumption

A special study has been undertaken of the potential for energy reduction through the use of telecommunications as a substitute and/or complement for travel. In particular, the interplay is studied between actual travel parameters, and the possibility of replacing certain journeys with qualified use of telecommunications. Also, indirect regional effects are examined. One subject of discussion in this area concerns the 'paperless office', and the possibility of being able to work from home. There is still relatively little documentation of knowledge in this field.

The next phase

It is clear to the TERESE administration that these projects constitute only a beginning. To be able to strengthen the evaluation of this first critical phase, a decision has recently been taken to expand the evaluation resources. Discussion of technical and economic effects has to be complemented by deepened observation of social and psychological consequences. The projects will be evaluated at the end of 1978.

The TERESE project family is certainly not complete. The projects in this first phase do not constitute a whole unit. Therefore, the development will have to be expanded to enable the formulation of more widely applicable conclusions about regional effects. A new project phase has to be defined, with long-term possibilities.

It is often difficult to reach further than a first approximation in early forms of social experiments of this kind. In an international perspective, it is quite evident that practical telecommunications applications in economic and social environments are required in larger quantities, but organizational perfection is hardly to be expected in the early stages.

Social experiments are difficult, in that they are necessarily broad

[14] Despite the fact that interesting CAI research results are currently being practically tested in Sweden.

in application, and touch many evaluation parameters. Therefore, one must be prepared for organizational difficulties from the beginning. Besides, many unexpected bumps appear on the road. The lack of theory for this kind of experimentation is also troublesome; one often has to measure ill defined object parameters. But the achievement of results – once they appear – is extremely encouraging.

Concerning the continued Swedish actions in the field, we have been lucky to note a supporting statement by the Swedish Parliament in late 1977. Also other types of broad support have been registered. Consequently, further practical initiatives are anticipated, taking account of available project experiences. So far, the funding has been completely public. It is planned that industry will be invited to take part.

It is probable that the next project phases will concentrate on regional employment effects, as well as experiments with distribution of education, with the help of qualified two-way communications systems.

The continuation will doubtless shed further light on the importance of telecommunications services and the desirable balance between local and central information, used as support for economic and social development in rural areas.

Conclusions

Very briefly, the main points of the above discussion may be summarized as follows:

- Local communication and/or communication with local information support will probably be stressed in many telecommunications systems of the near future.
- The impact of applied microprocessor technology in offline local systems will be great.
- Two-way communication means a drastic systems change, emphasizing the user influence and responsibility. Is the user ready for this?
- The rapidly updated 'instant society' may disguise the character of a 'soft society' when easy access to local information complements the one-dimensional communications forms of today.
- Computer conferencing may be seen as a flexible man/machine interface in the communication systems of the future.
- Telecommunications services may be of great importance for a region's economic and social development. The internal regional identity is to be stressed here, rather than the support for efficient links to central resources in society.
- The Swedish regionally oriented narrowband experiments are being evaluated during 1978. Continuations may stress employment effects and educational possibilities.
- Socially oriented experiments with low-cost and available telecommunications systems should be supported in many countries.

Experiences from efforts in this field should form an important contribution to the qualitative development of future distributed information systems. Specifically, increased interest may be expected in the systems balance between the use of centrally referenced data, and data that are both produced and consumed locally.