Telecommunication and Regional Development in Sweden

1975-1977

The TERESE project was carried through practically in the north of Sweden in 1976-1977. The project concerned development and practical use of, at the time, new telecommunication services for social purposes, like education, health care, small scale industrial development, communication for the handicapped etc.

Responsible for financing and administrative planning was Tomas Ohlin. The project was defined and implemented by Tomas Ohlin and Bertil Thorngren.

The TERESE project was described and commented on by Yoneji Masuda in his pioneering book "Information Society".

The project results were analyzed in a report by Leif Lindmark et al: "Projekt TERESE", Umeå University 1979.

FYRKANTEN
LULEÅ·BODEN·PITEÅ·ÄLVSBYN

TELEKOMMUNIKATION
OCH
REGIONAL UTVECKLING

Informationsspridning spelar en central roll för det moderna samhällets utveckling. Redan idag fyller de teletekniska hjälpmedlen en viktig funktion i detta sammanhang. Fyrkantskommunerna, Styrelsen för teknisk utveckling och ERU — Expertgruppen för regional utvecklingsverksamhet — förbereder tillsammans ett projekt under titeln "Telekommunikation och regional utveckling".

Försöksverksamhet inom ett eller flera samhällsområden med nya tillämpningar av teleteknik kommer att startas. Konferensens syfte är att spegla deltagande myndigheters, företags mfl behov av förbättrad intern och extern kommunikation — information och att finna ut vilka av dessa behov som kan omsättas i praktiska försök inom tillgängliga tekniska ramar.

KONFERENSPROGRAM

MÅNDAG 29 NOVEMBER 1976

09.00	Kollektivtrafiken — resandeinformation och trafikledning.
11.00	Konsumentupplysning
11.00	Statistik och prognoser för kommunal planering via datorterminal.

LUNCH

13.30	Den centrala kommunala informationsverksamheten.
15.30	Bostadsförmedling med datorterminal.
15.30	Kommunernas kommunikation med konsulter.

TISDAG 30 NOVEMBER

09.00	Överföring av arbetsuppgifter, ritningar och annan information inom företagssektorn.

LUNCH

|	
13.00	Användning av datorer och teletekniska hjälpmedel i utbildning.
14.30	Medbestämmande med hjälp av teleteknik.
15.30	Regional arbetsförmedling.

ONSDAG 1 DECEMBER

09.00	Hälso- och sjukvårdens behov av intern och extern kommunikation.

LUNCH

13.00	Socialvårdens behov av kommunikation och informationsspridning.
15.30	Handikappades behov av teletekniska hjälpmedel.

TORSDAG 2 DECEMBER

09.00—09.05	Inledning	Sven-Olof Edström
09.05—09.35	Regionalpolitik och Telekommunikation	Ragnar Lassinanti
09.35—09.45	Telekommunikation och regional utveckling	Tomas Ohlin
09.45—10.00	Förtätning av arbetsmarknaden	Bertil Thorngren
10.00—10.15	KAFFE	
10.15—10.30	Kommunal information	Bertil Köhler
10.30—10.45	Behovet av information och kommunikation inom hälso- och sjukvården	Göran Westerberg
10.45—11.30	Systemtillämpningar (utbildning, arbetsförmedling, konsumentupplysning, och annan social information, samt spel och förströelser)	Anita Kollerbaur Marianne Janning Sture Hägglund
11.30—11.45	Energibesparing i samband med telekommunikation	Bengt Sahlberg
11.45—12.00	Teletekniska möjligheter och restriktioner	Åke Eriksson
12.00—13.00	LUNCH	
13.00—17.00	Praktiska tillämpningar av olika system.	

Lokaler: Måndag—Onsdag samt Torsdag e.m. Luleå Kommuns Informationscentral, Smedjegatan 15
Obs! Torsdag förmiddag Stadshusets sessionssal, Rådstugatan 11.

Telecommunications and Regional Development in Sweden
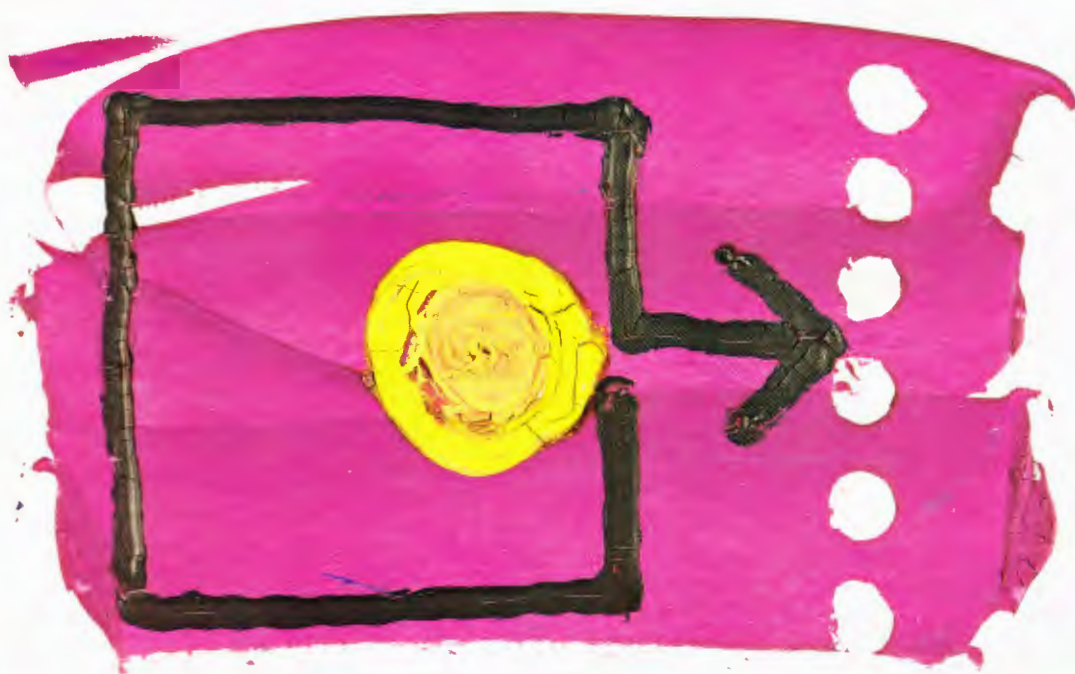
Telecommunications and Regional Development in Sweden

A Contact Report
January 1976

ERU   Expert Board for Regional Development
STU   National Swedish Board for Technical Development

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1 PREFACE

During 1975, a Working Group comprising the official representatives named below has analyzed questions relating to regional development with the aid of telecommunications. The work was initiated in consultation with the National Swedish Board for Technical Development (the STU) and the Expert Board for Regional Development, Ministry of Labour, (the ERU).

The resources for the work consisted of three parts. The Working Group has had numerous meetings, to attend which the members have sacrificed both working hours and their own spare time. Studies of reports, literature, etc., and preparation of the Group's own project material, have demanded time resources. In addition, a grant of 50 000 Sw.cr. from the STU has made possible a great number of international contacts.

Instead of presenting in this Report direct proposals for regional telecommunications development, the Working Group has chosen to formulate the Report with the aim of establishing *contact* with possible interested parties, particularly on the local government side. It is the opinion of the Group that the regional needs should control the technical development and not the other way round.

After further light has been shed on these needs on the basis of the present Report, it is the intention of the Group to revert with concrete proposals for development measures. The Group expects to be able to do this before the end of 1976.

The Working Group has had the following members: Katrin Hallman (the Secretariat for Future Studies), Laila Noord (the Swedish Association of Local Authorities), Tomas Ohlin (the National Swedish Board for Technical Development), Bertil Thorngren (University of Umeå), and Ingemar Wåhlström (the Swedish Telecommunications Administration). Tomas Ohlin has served as Coordinator for the study.

2 SUMMARY

An analysis has been conducted of the possibilities of promoting desirable regional development through the consistent use of telecommunication aids.

The analysis has been concentrated around the regional *needs*. Consequently, only limited studies of technical detail have been conducted, the reason being that technology in itself should not be allowed to control regional development. An object of this Report is to encourage local authorities, in particular, to specify their wishes in face of a possible more practical continuation of the project.

Regional development is considered here to be dependent on numerous components: employment, living conditions, transport, education, health service, other social services, social solidarity, culture and leisure activities, external environment, etc. After having analyzed how these can be promoted by telecommunication aids, it has been found that the greatest effects can be achieved in respect of *employment*, possibility of *exerting co-influence* (participatory employment democracy), *education*, *social information* and possibly reduced *transports*. The telecommunication aids available today are highly flexible and efficient. From the sheerly technological angle then, technology does not restrict development. It has therefore merely been intimated which forms of telecommunication aids can enter the picture. This has been done intentionally without going into specific details. In this context it has been considered technically satisfactory to stress two-way communication on the narrow band network, where computer aids are of special interest. This accentuation has taken the cost aspects of the development very much into account.

In the Report, some different feasible development lines are presented. This is done in the form of examples, in which different systems are briefly elucidated, both technically and in respect of their consequences.

This Report *invites* local authorities to submit their views on possible priorities for regional needs. The invitation also embraces interest in possibly participating in further development, the existing resource situation, etc.

After this Report has been circulated for consideration by the bodies concerned, it is intended to present final proposals for field trials in a suitable regional environment. It is proposed that these trials should be financed entirely by public funds. Responsibility for conduct of the trials should rest as far as possible on the local authority concerned and thus be near practical reality.

3 STARTING POINT

Development in the field of telecommunications is currently proceeding at a very rapid pace. Numerous new possibilities are being revealed. *Purely technically*, it will be possible to prepare, store and almost immediately transmit documents, drawings, moving pictures and other descriptive data between separate places with ever-increasing speed. Time and money can be saved. But how is the planning to be done? And how are distortive and non-desirable effects to be avoided?

A vital part of the concept of telecommunications concerns physical transports. This gives us reason to observe retrospectively, together with T. Hägerstrand (1973) that

> "a different kind of transport philosophy could have led from the beginning to the introduction of a technique that did not segregate and which presumably could have given higher total efficiency than the one we have now, particularly in urban districts. Mobility, for instance, is a good means of combating unemployment. There would have been no need for us to get into the present-day situation if the transport system had been regarded right from the beginning as a system, and not merely as the sum of the choices of individual households through private purchases".

Obviously, the new telecommunications techniques can be regarded as something more than merely a way of mechanizing and cheapening communication. Its consequences, for good and bad, spread throughout the entire organization of our society.

Traditionally, investments in a new technique have been decided on the basis of the *economic* prerequisites of that technique, often in a fairly short and limited perspective. Expansion has taken place piece by piece at the rate in which there has been interest in paying for utilization. One problem in this context is that the physical frame investments, for instance in railways or cables for telecommunication traffic, are considerably more long-lived than the market conditions which governed their emergence. Frequently, those concerned simply cannot afford to choose again. The technical solutions have been successively superimposed, thus amplifying each other and have finally restricted the space available for development. This leads to troublesome consequences, not only for joint planning, but also for individual households and companies.

Telecommunications belongs together only with one of these locked structures, but there are examples which show that this type of communication can constitute a "critical factor" in certain situations. In a country such as Sweden it can be difficult to trace the positive effects of the ordinary telephone – viewed internationally we are in the rather unique situation of having a telephone available to practically everybody. We only have to go, however, to other countries in Western Europe to find examples in which whole urban districts or rural areas are practically excluded from the possibility of participating in this form of telecommunications, for technical or economic reasons. Another example,

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from the USA, is the often disregarded key role played by the telephone – along with the car – in the creation of new suburbs, occasionally with slums in the city centre as a result. The telephone and the car have affected each other in these respects.

Hitherto, the use of telecommunications has amplified the tendencies towards centralization rather than contributed to regional spreading of employment, education, functions for distribution of information, etc. One reason is that telecommunication aids (telephones etc.) have been found by experience to be used in the first instance as a support and further development of already existing contact and communication patterns – in other words, established tracks are cut all the deeper.

It is this effect of the telecommunication aids – strengthening of contact and communication methods of other kinds – that makes it interesting to put the question:

> *Can we reverse the pattern, and get telecommunication aids to promote instead a desirable regional development, an improved regional balance?*

The Expert Board for Regional Development (the ERU) asked this question in its Report entitled "Communities in Regional Co-operation (SOU 1974:1)". The National Swedish Board for Technical Development (the STU) has paid attention to this problem. "Telecommunications and Regional Development" is also one of the subjects taken up by the OECD in order to test methods for technology assessment. Sweden is participating actively here.

An intentional caution in the efforts towards technical development should not be regarded as an expression of "animosity towards technology". New technology can scarcely be regarded as automatically equivalent to "profits" for regional development – even if it were "profitable" from a more narrow economic perspective. It is equally important to make allowance for the possibility of the reverse, i.e. that currently "unprofitable" technology can be socially important. The final result of a critical technology assessment can very well be to *expedite* the introduction of certain parts of a new technology, technology which otherwise would have been delayed or eliminated by market considerations of a more short-term nature.

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4   WORKING FORM AND AIMS

Early in 1975, a working group was formed in consultation with the STU and the ERU in order to study the prerequisites for practical trials with telecommunications in regional development work. The Working Group is composed of representatives from the STU, the ERU, the Swedish Telecommunications Administration, the Swedish Association of Local Authorities, and the Secretariat for Future Studies. A host of contacts has been established in course of the work.

Experience, much of it from other countries, shows that technology in itself is not the major problem, although such things as new cable systems are an expensive solution for areas with a less dense population structure. Already made investments in the existing telephone network can also be developed advantageously. The primary problem, however, is to obtain information as to which *needs* can be satisfied at reasonable cost with the aid of telecommunications, and how the priorities should be set between different possible services.

This Report has been drawn up in order to establish contact with interested local authorities, county authorities, county councils and other affected bodies, in order to obtain their views on the priority between these needs. The Report includes a description of possible connections between telecommunications and regional development and on which types of services that possibly can be tested practically.

In addition, the hope of the Working Group is that this Report will enable the Group to gain an initial idea of which local authorities are interested in participating in possible field trials. The Working Group has discussed in the first instance new utilization of tele-communications for a "primary centre" and its surroundings. It is essential in this context that improved telecommunications must not be an isolated step, but rather a support for other measures relating to regional politics, when it comes to changing the labour market as well as to increasing the facilities for social service, cultural activities, etc.

Before the end of 1976 the Working Group plans to initiate more complete project plans. *We therefore hope to receive views on the proposal presented in this Report at the earliest opportunity.*

The proposal report to be presented later in 1976 will include a discussion of effects justified by considerations of political, behaviour-orientated effects, etc. How much information do we need in a modern society and how much are we capable of receiving? Can efficient telecommunications help to make it possible for people with interesting jobs, who are now often forced to earn their livings in the big cities, to work in a region where they may rather prefer to live? Can telecommunications contribute towards improved working democracy? Can the collection and distribution of governmental social information be

made more efficient? Can (and should) telecommunications increase the possibilities for contacts between politicians – experts and politicians – electors? What control instruments may be needed in order to take advantage of telecommunications as an instrument in regional politics?

These are examples of questions that can be raised. A goal is to *improve and expand existing contact networks* and to establish to some extent new contact networks, and *not to replace currently existing direct contacts* between people by contacts with the aid of more or less advanced technologies.

If the Group reaches the conclusion that a practical field experiment can be carried out with the resources available, this will receive broad public participation and be followed by experts from different scientific areas, in order to arrive at a serious technology assessment.

In this Report, a study is presented of if and if so how improved access to information can promote regional development. The discussion is intended to shed light on inter alia how information can be explicitly used as a control instrument in this context.

To begin with, the Working Group has considered different regional and functional imbalances, which it has found reason to influence with or without telecommunications technology. It has not been part of our briefing, however, to set up any priorities between these motives — for this we have lacked both enough knowledge and authority.

Instead, we have chosen to study the demands and wishes already formulated, particularly in regional politics, by different groups of society. We have attempted to confine ourselves to those cases in which new telecommunications techniques can be expected to give particularly valuable contributions towards satisfaction of these demands or in which telecommunications — as it stands today — can risk coming into conflict with established political goals.

As already explained, this Report is concerned with a concentration on the provision of information with the aid of telecommunications techniques. A very brief description of the possibilities and limitations of this technology is given below in Section 10. The Group gives precedence, however, to the need pattern rather than to the actual transmission medium and form of treatment, which is why the technology itself is here intentionally dealt with secondarily.

To structure this discussion around telecommunications and regional development has not been entirely without problems. Should technical possibilities and limitations be taken into account in the analysis right from the very beginning, or should these be applied only when the information needs for regional development have been made clear? In this latter case — the situation for which the Group has the warmest feelings — we run the risk of overexpanding the information analysis. In the former case, the technology can come to take the upper hand in an excessively broad field.

In the analysis, the Group has studied the following simplified sketch of the civic flow of information:
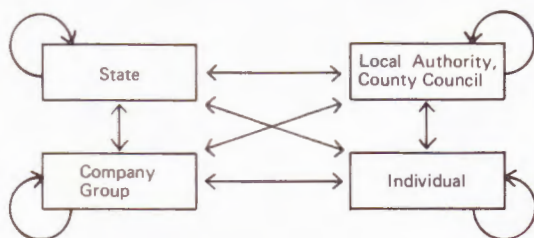
This implies ten specific relationships: information between state and state (i.e. within the state), between state and local authority — county council, between state and individual, between state and group-company, etc.

It can also be discussed the degree of dialogue between sender and receiver that is appropriate in these different contexts. We can distinguish between:

— unidirected access of information (one-way communication)

— limited participation in the flow of information

— fully worthy dialogue (full two-way communication)

It is thus the intention to raise immediately the questions relating to co-influence and division of responsibility.

To permit subsequent discussion in more detail of different aids for the communications forms concerned, it is necessary for the information needs to be classified. Without this it is difficult, if not impossible, to find out the extent to which, for instance, purely manual information service is satisfactory for certain local needs, and to what extent tele-communication aids are necessary. A classification of this kind for information can be based on the following characteristics:

— Access time (the time it takes to get the information concerned)

— Up-to-dateness (the time at which the information concerned is valid)

— Wanted geographical location (the place where the information is needed)

— Aggregate level [the amount of data required for the information concerned, e.g. 1 (high level): average income for women in the engineering industry, 2 (low level): the telephone number to a speaking clock]

— Publicity/secrecy of the information concerned

— Reliability, plausibility and utility for the information concerned

— Form of presentation (e.g. oral or written).

An introductory delimitation concerns the size and extent of the concept of "region" in the respect concerned. Does this concern a geographical area with perhaps several hundred thousands of inhabitants or an area with only a thousand or so? We have chosen to consider in the first instance so-called "primary localities". i.e. places which already have been given special regional priority by the Swedish Parliament. These are usually of fairly large size. The area size should thus be sufficient to allow effects on inter alia employment and physical communication, etc. to be noted, without the natural character of a connected region being lost.

The Group believes that practical measurements should be made if possible in reality, in explicit *field trials*. This is preferable to manual model studies or computer simulations. *In consultation with interested local representatives, it is our wish to arrive at common wants with regard to practical trials using telecommunication aids in the service of regional development*. By this means we can gain valuable experience in face of possible subsequent expansion on a larger scale.

Although the aim is joint financing – with the aid of research councils and other public bodies – the limited resources available will naturally speak in favour of a limitation of the practical trials to, in the first instance, one individual regional area. Consequently, it would be appropriate to choose a region which has already been selected for regional political measures.

In most of the arguments encountered by the Group in this context, it has been possible to notice a distinction between measures that are effective primarily *within* a region and measures which are effective primarily *between* regions. This difference is obvious if we discuss replacement of physical transport by telecommunications, e.g. through TV conferences between more or less remote places. On the other hand, local information centres, for instance, where access to social and other information can be promoted with telecommunication aids, are mainly active within one region.

Practical trials of different kinds have provided valuable experience concerning, in the first instance, inter-regional effects in recent times. It can now be said to be time to raise the level of ambitions and to tackle the inter-regional problems on a larger scale. In this context, telecommunications give particularly interesting *qualitative* possibilities.

The Group does not, however, see any state of variance between the inter-regional and intra-regional measures. On the contrary, the two types can supplement each other in a valuable way. By this means, both the individual character of one region (and its integrity) and its dependence on its surroundings can be studied, both with a view to regional development.

7   OVERCOMMUNICATION?

"Overcommunication" is a term which is often heard today. People say that they do not have time to use all information distributed via different media. People get answers to questions they have never asked instead of answers to the questions with which they are dealing at the moment. Certain technology can then be experienced as a method of distributing superfluous and frequently irrelevant information. This is something against which we must make every effort to defend ourselves.

At the same time, we should not forget that the "abundance problem" is often limited to certain groups in our society. There are other groups who do not have access to information of either one kind or another — and with little or no opportunity to put their questions forward. The surplus is unevenly distributed — both socially and regionally.

The following examples serve to illustrate regional imbalance:

— Firms in Stockholm have more contact with the world around them than with the rest of Sweden (14 % and 11 % respectively).

— Firms have far more international contacts than authorities (15 % and 3 % respectively). Many firms have more than 50 % of their contacts with other countries.

— Inter-contacts between, for instance, the Swedish cities Umeå and Skellefteå comprise a mere fraction of the contacts each of these places maintains with Stockholm. Similar examples (Norrköping/Linköping) can be found elsewhere in Sweden.

Examples of *regional imbalance* concerning communications can be regarded as an indication of deeper imbalances and of unutilized resources. Many places simply do not get the resistance against unemployment that a bigger and more coordinated labour market gives the biggest regions. Regional political investments, for instance in industrial or university expansion, often do not achieve the effect they would be able to give to places closer at hand, etc.

In a similar manner, *functional imbalances* can lead to incomplete utilization of existing possible courses of action, or to direct faulty investments.

— Local authorities and other planning bodies do not normally have access to such extensive international contact networks as those which have been built up by the companies and on which these often base their investments. The planning bodies then often have to work on the basis of second-hand information.

— Trade unions, and even more, individual citizens, seldom have access to institutional resources for information and communication.

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It is obviously not realistic to "rebuild", with or without telecommunications techniques, considerable parts of such a well developed country as Sweden. Taking the rough with the smooth, we must start on the basis of fundamental investments already made in roads, railways, sewage systems, telephone systems, etc.

In its work, the Group has taken for granted the desirability of trying to identify unutilized resources, particularly such cases where telecommunications techniques, *together* with other measures, can be expected to unravel important bottlenecks. The Group has then also attempted to call attention to "snowball effects" which can arise through better co-action and coordination between places which, for instance from the standpoint of the labour market, are currently isolated or between civic functions which are incompletely informed about each other' s prerequisites. The Group has also discussed the possibilities of making different kinds of valuable information available for as large groups of citizens as possible.

Such goals need not necessarily lead to "overcommunication". On the contrary, by re-distribution of the information work they can result in a *smaller* load.

Nor should telecommunications — as we see it — be regarded as a means of "mechanizing" or taking the place of direct personal conversations between people. Instead, telecommunications should be regarded as an aid in providing relief from the time-consuming tasks of updating and seeking. "It should not be necessary to remember everything"; what is necessary is to increase the opportunities for getting answers to questions when they are really needed.

Effects which, as we see it, are of great interest in continued discussions of expanded communications, include the following:

— What effect will this have on the basis for other forms of communication, e.g. letters, telegrams, etc.?

— What will the effect be on the balance between the public and private sector, between small and large organizations, between organizations and individuals?

— Can individuals, organizations or regions without access to more efficient communication resources risk getting in a worse situation than before?
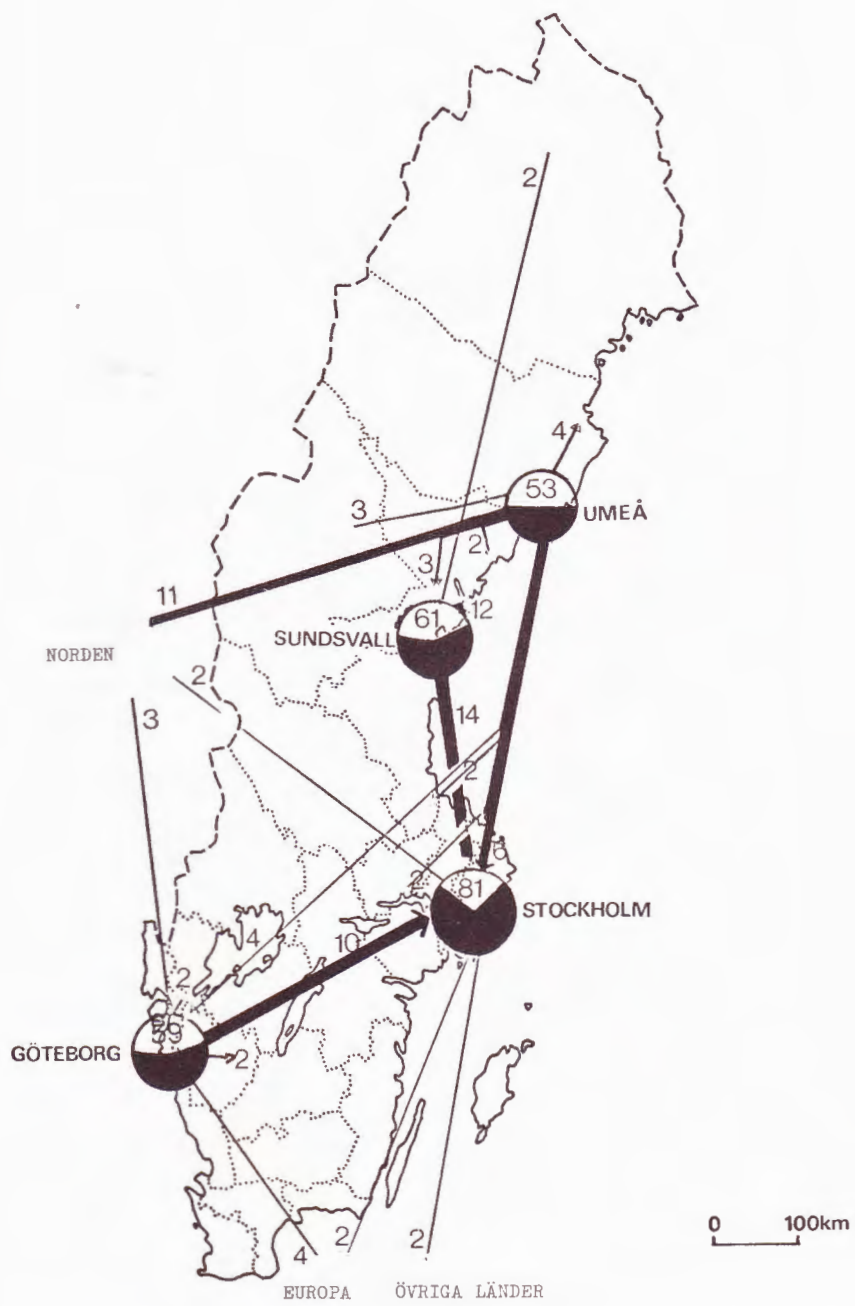
Imbalance for planning contacts according to the KOMM 68 investigation. (Percentage distribution, for instance 78 % of planning contacts generated in Stockholm concern only the city itself.)

8 REGIONAL COMPONENTS

The development in a region depends on access to good production and living conditions. These, in turn, depend on the strength of numerous *primary welfare components* (cf. SOU 1974:1, pp. 148 and 153):

— employment
— living
— transport
— education
— health service
— other social services
— social communion
— culture and leisure activity
— external environment
— etc.

It is only natural for priorities to be made between these components. Thus, for example, employment and living conditions can probably be regarded in many contexts as being of a more primary nature than social service and culture. What will be given precedence will naturally vary from case to case and from time to time (consider, for instance, the switch of priorities from house-building to the building of day nurseries during the 1960s and 1970s). For each individual welfare component, consideration can be given to both *fundamental access* and to *improvement above the fundamental* level.

Regional development is dependent upon the accumulative effect of measures for these components. The Working Group has considered the extent to which information via tele-communication can influence these components both directly and indirectly.

9   ANALYSIS OF EFFECTS

Discussed below are several possible effects as a consequence of the introduction of suit-
able telecommunications technology for the development of a selected region. The analysis
is brief and considers in the first instance the welfare components listed in Section 8 above.
We cannot stress too strongly that the analysis deals with assumptions rather than facts.
A future field trial should be able to either verify or reject these assumptions.

9.1   Employment

The employment effects affect all application areas and are therefore particularly interest-
ing.

Effective telecommunications can influence the structure of employment by increasing
the possibilities of spreading jobs over a larger geographical area. Telecommunications can
also help to create a more differentiated labour market, which according to certain sources
is regarded as a prerequisite for a totally expanding labour market. As things stand today,
"qualified" (in the sense of contact demanding and well paid) jobs tend to be concentrated
to certain workplaces and regions, while other regions stagnate. According to an earlier
ERU Report, more than half of the 250 000 jobs regarded as "contact intensive" are to be
found in the three main city counties in Sweden. This, in turn, amplifies continued con-
centration of job opportunities.

Telecommunications can also possibly contribute to coordinating and "densifying" regions
which now have relatively isolated labour markets. Many places at fairly short distances
from each other (e.g. Umeå/Skellefteå, Borlänge/Falun and Norrköping/Linköping) have
a dissimilar but complementary occupational structure. At the present time, as already
mentioned, the contacts between Umeå and Skellefteå are a mere fraction of the contacts
each of these places on its own has with Stockholm.

Telecommunications can also influence the quality of employment. The job content can
be improved through automation of routine tasks, computer control of dangerous or dirty,
noisy or stress-giving jobs can improve the working environment, etc. One should not,
however, be blind to the fact that certain effects can be negative.

It is possible that certain working tasks will no longer be necessary. At the same time,
certain less qualified jobs can become more routine in their nature than before. There are
indications that telecommunications can free qualified employees from certain routine
tasks, while people with less qualified jobs will get more routine tasks than they formerly
had. Such effects on job satisfaction demand a thorough analysis.

It is particularly interesting to study the extent to which telecommunications can give the
employees more participation and influence in decision making, through spreading by tele-

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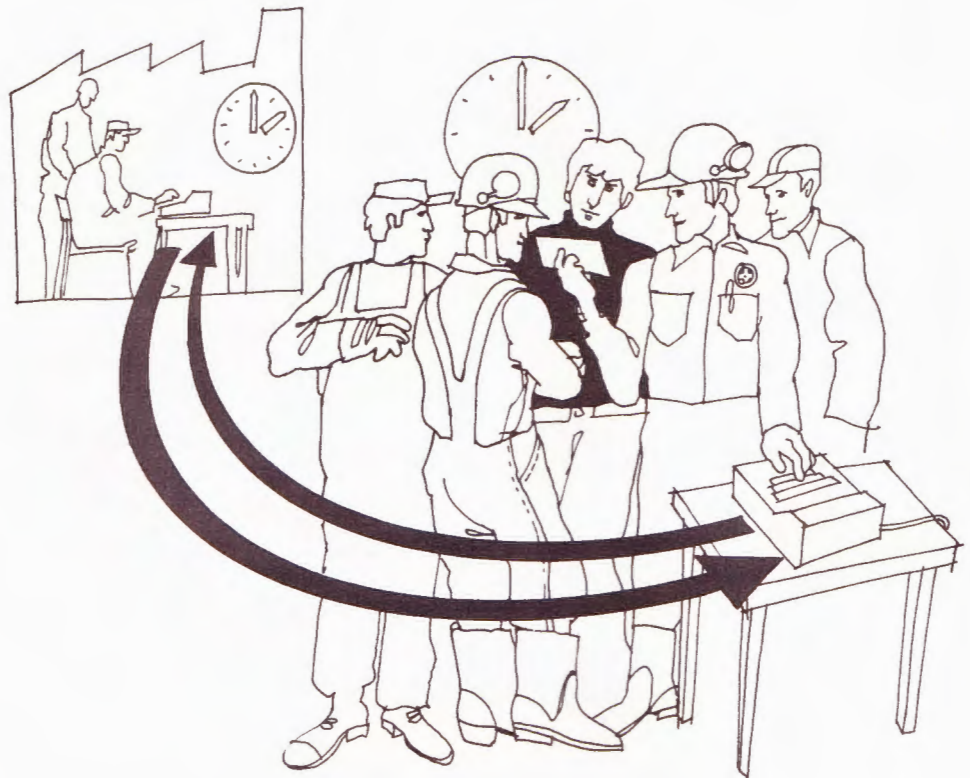
communication means information on such things as planning and economy in firms (authorities, organizations) in order to improve co-operation between employees and employers and between different local unions. Excessively closed telecommunication systems can, however, broaden the information gap between employees and employers unless every effort is made to directly counteract this, through education and other measures. (In Norway, there is an agreement between the Norwegian counterpart to the TUC and the Employers Confederation, which regulates the introduction of computer techniques at workplaces.)

It is also necessary to bear in mind that systems created for the need of working life can have both positive and negative effects on social life otherwise, e.g. for households or popular movements. There is a potential risk, for instance, that new telecommunication/ computer systems designed *only* in view of the needs of working life can reduce the basis for more conventional communications, such as letters, thus causing greater expense for households than they have today. This can be dealt with by different forms of equalization from those making the savings to those who possibly suffer from increased expense. Another solution, which in our opinion is a better one, implies that new technical systems should be designed right from the very beginning in view of *"co-utilization"* between working life/households/associations. *Some form of trial activity in the field at an early*

stage is necessary in order for the development of new systems to be influenced in the intended manner in time.

Telecommunications systems in themselves also have some *direct* influence on employment. Apart from the temporary increase in employment which arises while the system is being built up, permanent positions are needed for, in particular, the development of the application-oriented services provided on the telecommunications networks and for operation and maintenance of these networks. These employment contributions, especially those concerned with application development, are of particular interest, not least because they concern *new* types of working tasks.

9.2 Living

The possibilities for co-planning of the localization of residences and workplaces are currently being discussed with increasing intensity. Certain types of job functions can be moved closer to the dwelling environments with the aid of telecommunications. Local co-operation between official functions, companies, etc., for instance office hotels or the like connected to a telecommunications network, can contribute towards this. To some — but limited and part-time-oriented — extent, individual job functions can also be moved to the homes, e.g. counselling of different kinds, typing etc., tasks with results that can easily be communicated over the telecommunications network.

9.3 Transport

Purposeful investment in communication can link weak local labour markets together with each other and with larger units, so that accumulated offering of job functions within a region is increased. In all probability, telecommunications can make a very worthwhile contribution in this respect, by also reducing the need for personal transports. One possibility is the concentrated tele-conference service, another is local electronic post (exchange of rapidly written out messages).

Telecommunications can also function as a reserve system when other systems do not work (for instance, in the event of an air traffic strike or something similar).

This type of telecommunications can never completely supersede physical transports. We all need direct human contact, but the number of sometimes unnecessary personal meetings can be decreased with the aid of efficient telecommunications. If, however, such development is allowed to proceed too far, there is a risk that the basis for collective transports will decrease.

Another effect is that the replacement of physical transports by telecommunications can imply energy savings. By utilizing telecommunications to render goods transports more efficient, for instance, energy can be saved within this field also.

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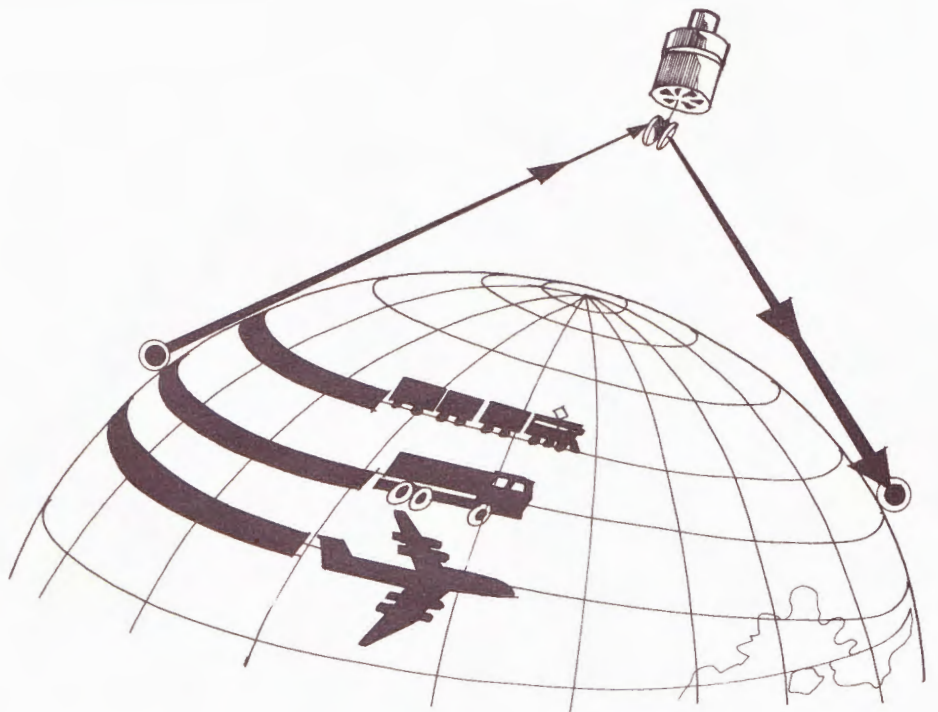
9.4 Education

The problems of regional balance are very closely related to questions on occupational
and educational labour markets. To the extent that telecommunications can contribute
towards geographically highly dispersed and flexible educational systems, training facilities
can be coordinated with labour market and living facilities in a regionally valuable way.

Several investigations have elucidated the possibilities of spreading different types of edu-
cation geographically with technical aids. Evaluations have also been made. Experience
has been gained from the work done by the Swedish TRU on scattered education by the
use of television and radio. In so-called *distance education*, there can be some communica-
tion between teacher and pupil via the telephone. Picture-transmitting equipment can also
be used. In the opinion of the Group, however, major progress can be made in this field
when a definite measure of two-way communication can be introduced. This is facilitated
for technical reasons by the incorporation of a computer system. Valuable knowledge in
this field has been obtained in this country as a result of efforts made by the STU over
several years. As yet, however, only limited empirical experiments have been carried out
in Sweden. Further development in this field is recommended at present by both the
National Swedish Board of Education and the Office of the Chancellor of the Swedish
Universities.

The difference between conventional education, even including television education as hitherto, and two-way *computer-assisted education,* can be regarded as considerable. The following characteristics of computer-assisted education make this difference obvious:

— the pupil is completely free to choose his study pace and study opportunity

— the pupil can generate education examples himself

— educational tasks which are difficult or dangerous to illustrate in a natural manner can be managed even if extensive data searches or computation are needed for exemplifying and execution

— the system can — better than a teacher — be made to definitely *forget* the pupils' s results afterwards

— international experience gained hitherto indicates that a high study motivation has been found, not least for impatient and otherwise difficultly motivated pupils.

Obviously, negative effects may also be encountered. If the contact with the computer terminal is extended for excessively long periods of time, if the computer support is allowed to *replace* instead of to complete the work of the teachers, if a standardization of the production of teaching programmes is permitted, etc., the development can be retarded. And if the teachers experience this form of education as a competitor which threatens their employment, the same effect may be reached.
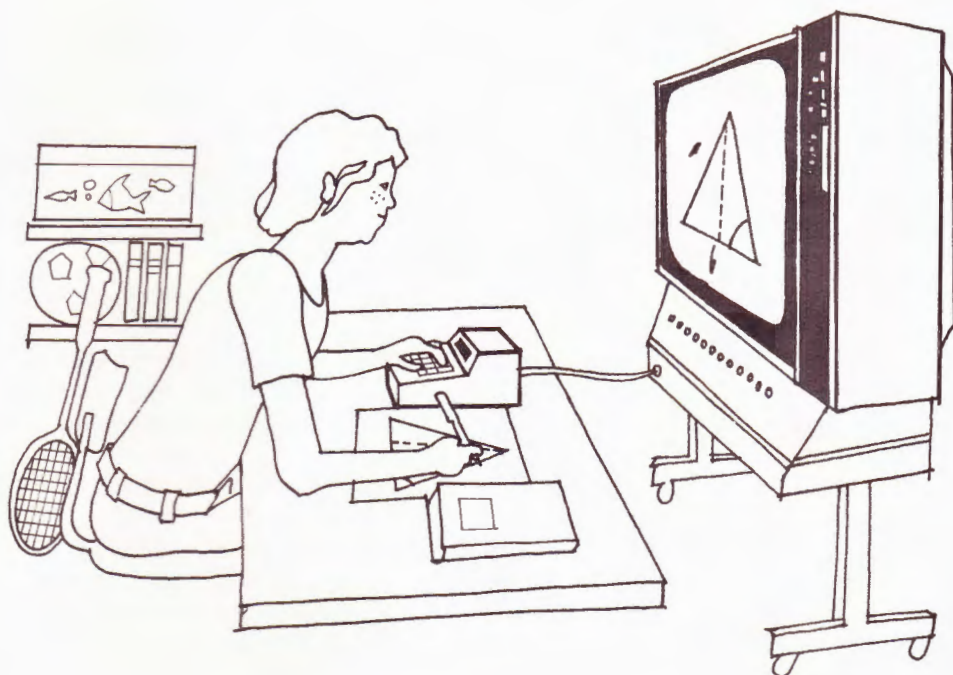
Interesting advantages can be gained in that the education can be brought out to working life. This is a matter of providing industrial workers, among others, with simple and effective access to education. With telecommunications, this can be provided *at the actual workplace.* One or more persons can, for instance, gather around a simple terminal in the workshop in order to study for half an hour a day subjects such as rationalization of their jobs, planning in consultation with the trade union, etc. etc.

Of particular interest are the possibilities of utilizing telecommunication aids to bring occupational education right out into the direct working environment. Activities in the home environment via the telephone network are also conceivable to some extent.

It can be observed that the limits between education and spreading of social information are frequently not clearly defined.

9.5 Health service

In the fields of health and medical services, several activities are in progress in order to utilize telecommunications partly to store and transmit information within hospital units and partly to transmit information between different units. The latter is the most interesting in the present context in view of the demands on regional development.

The STU and the Swedish Planning and Rationalization Institute of the Health and Social Services have commissioned the Association of Future Studies to study the prospects of using telecommunications in the health and medical service sector. This study has been presented at the beginning of 1976 and deals with inter alia transmission of speech, writing and pictures (including X-rays) between medical centres and regional hospitals. Both information transmission via the telephone network (narrow band) and two-day communication with moving pictures (broad band) are discussed in the study. Among the goals mentioned are a desire to reduce travelling time for the patients, to improve the quality of the medical and health services provided in the regions, thus giving increased security, and the possibilities of giving further education to all personnel.

In the USA, several trials have been carried out with cable television and picturephone in order to enable small hospital units to utilize the knowledge of experts at central hospitals.

In Sweden, experimentation is proceeding on transmission of electrocardiograms via the telephone network both between different hospital units and directly between patients and hospitals for heart cases with a pacemaker. The Federation of Swedish County Councils is producing several training programmes for internal television, but as yet there is no broad hand link-up between different medical establishments. In co-operation with the Federation of the Swedish County Councils and the Office of the Chancellor of the Swedish Universities, the TRU has produced video programmes for hospital information.
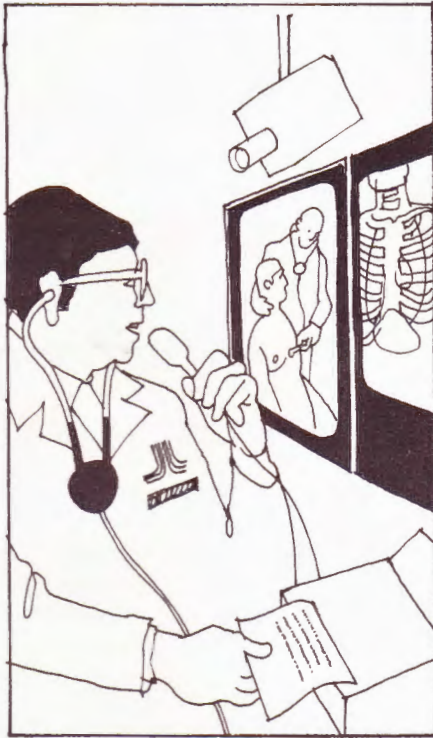
The use of telecommunications in the health and medical care sector can be divided up into:

a) making hospital work more efficient (clinical processing, hospital administration, e.g. information storage, transmission of X-ray pictures from a data base to an operating theatre, etc.)

b) decentralization of medical services (e.g. transmission of electrocardiograms on the telephone network, picture transmission to specialists, etc.)

c) training of nursing staff

d) medical and nursing information (e.g. the type of telephone service currently available at the Poison Information Centre at the Royal Caroline Hospital)

e) preventive health and medical care (e.g. information on exercise, dieting habits, etc.)

This field obviously embraces numerous interesting applications, the regional effects of which, however, vary.

9.6 Other social service

An ever-increasing amount of civic information currently concerns all citizens both as receivers and as senders. It is becoming increasingly difficult for the individual citizen to

keep herself informed about even the main features of a rapidly expanding social service and about the division of roles between different social bodies. Considerable difficulties are frequently noticeable when an individual is trying to obtain adequate civic information. Society, however, insists upon the citizens being familiar with many rules of society (laws, traffic regulations, taxation, etc.). In addition, it is also desirable, from the standpoint of the society, to cover and reach a very broad field with information on social benefits, particularly to groups with weak resources.

There is a seeming paradox between the enormous offering of different types of information and the desire to have the right information at the right time.

An interaction can be seen between the desire of society to reach out and the desire of the citizens to get answers to social questions, etc. A two-way approach is natural here. Experience gained hitherto has indicated difficulties in reaching out with social information, e.g. consumer information, to those who can be regarded as being primarily interested, one reason being that these are difficult to reach through existing channels. The suitable approach for coping with these difficulties is currently being studied by the National Board for Civic Information (the NSI). The Working Group believes that NSI's activities can also have regionally promoting effects, and is therefore in contact with the NSI in these respects.

An increasing exchange of information between society and individuals can pave the way for a wider democracy. Telecommunications can contribute towards this partly by facilitating an interchange of information between politicians, experts and citizens, and partly
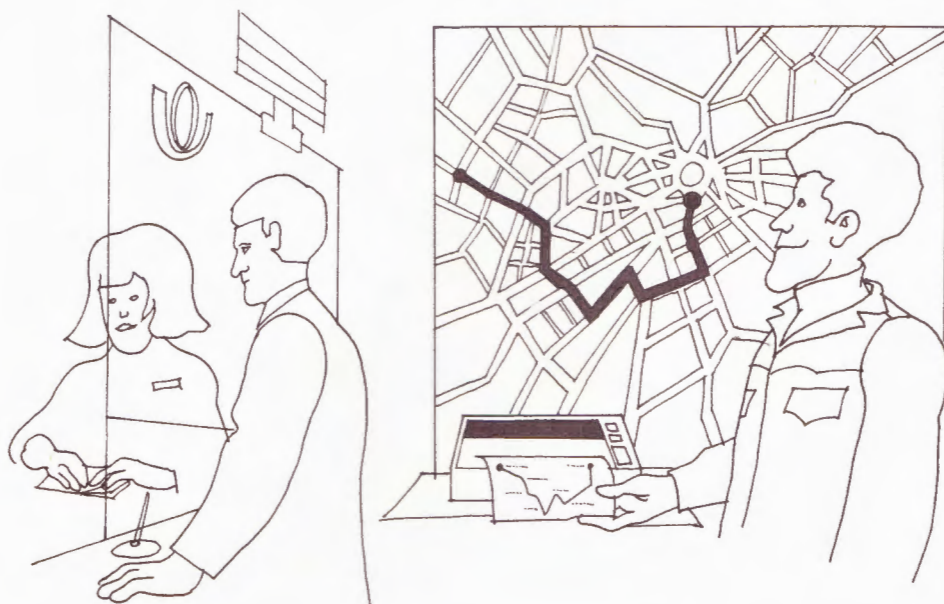
by enabling more groups to participate in civic planning when they get more effective access to the background material on which the proposals presented by experts and politicians are based. This will enable them to present their own views and proposals at an earlier stage in the planning process.

Among types of social information discussed by the Working Group are dwelling information, labour market information, consumer information, etc., for instance made available through libraries and so on.

9.7 Social communion

Telecommunications can make it easier for people to maintain contact with one another, even if the physical distances are large. Moreover, personal satisfaction can be stimulated in several ways by access to adequate information concerning possible working, dwelling and educational conditions, etc.

Of particular interest are the possibilities for employees to exert influence on their workplaces. As already mentioned, amplifying effects can probably be noticed here in connection with the introduction of telecommunications information channels.
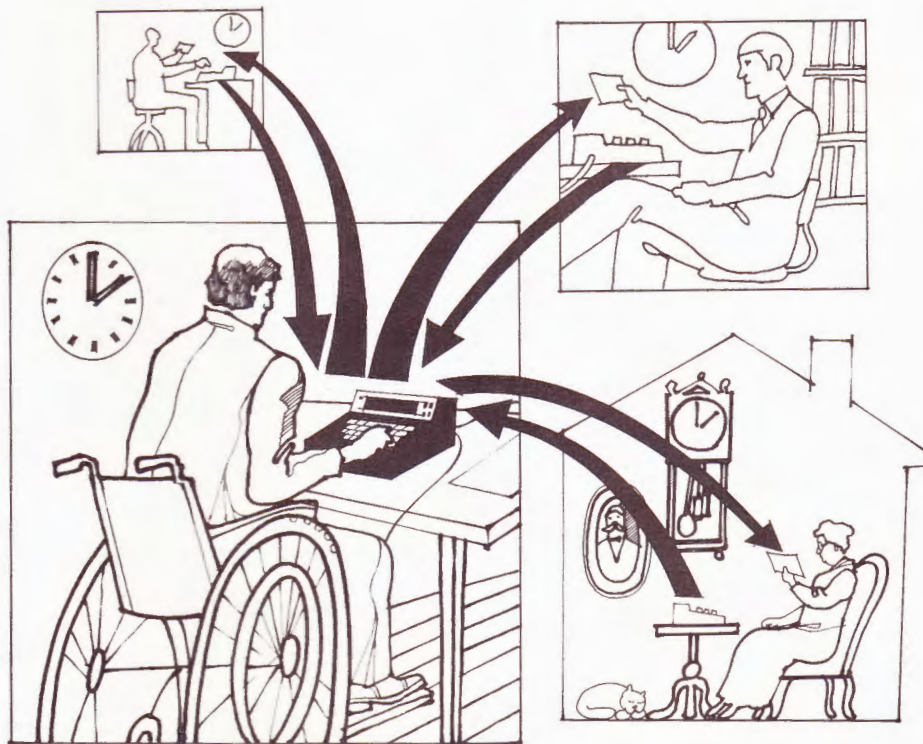
At the same time, there are certain risks which should be observed. Telecommunications can be used so that direct human contacts decrease in numbers. In addition, fragmentation may occur between groups who can handle the technology and groups who cannot. This places both demands and responsibility on those who design the technical applications.

New media for, among other things, social communion carry in their train new risks for mis-use. This circumstance, which is of importance to all kinds of technology, must be particularly observed in connection with systems for treatment of something as general as information. For example, it is a fact that the person responsible for the selection of information exerts considerable influence on the receiver.

9.8 Culture and leisure activity

Increased access to information concerning cultural events of various kinds can possibly also be regarded as social service. Recreation facilities can also in all probability be so regarded. Creative participation in culture can probably take place via telecommunications networks only with a wider technology.

In certain foreign CATV-systems it has successfully been tried so called public channels, where ordinary people can have their say, with usually technically rather modest but nevertheless very interesting programmes. The TRU tried a similar idea in the cable TV trials
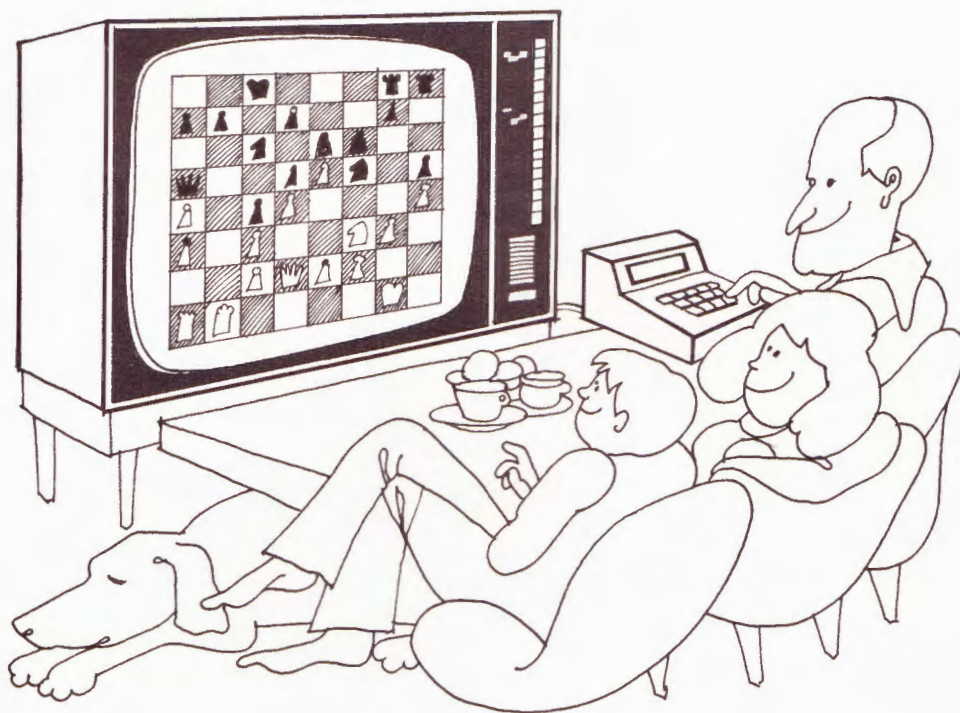
held in Kiruna in 1974. There, a considerable measure of local character was given to the programme production, and the studio building, the "cable villa", proved to be attractive to many individuals and social groups.

9.9 External environment

As a consequence of several of the above-mentioned effects, a positive influence on the environment can also be noted. Telecommunications instead of transport can contribute to limitations of external pollution.

At the present time, no directly negative effects of telecommunications on the external environment are known to the Working Group.

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10 PREREQUISITES

10.1 Development work and new services

The building up of telecommunications systems should be coordinated in good time with other regional political measures. Telecommunications systems can, in the same way as for instance roads, schools and shops, be an obvious factor to be considered in regional planning. Particular attention should — as mentioned — be devoted to cases in which telecommunications can be expected to be a critical link in the development process, i.e. where even minor modifications in technology and economy can exert great influence on the result of other measures.

Apart from the fact that the economic, social and organizational effects of the telecommunications systems need to be studied before a *major* expansion can take place, the prospects of developing the telecommunications services must be considered at an early stage. For instance, a new input of certain key categories can be a bottleneck which must be overcome in order to create a basis for the establishment of new types of qualified industry. A limited example: experience from the regional computer centres (e.g. UMDAC in Umeå) indicates that system programmers, among others, can play a vital role in the further development of knowledge and new types of education/jobs. If an adequate number of system programmers should no longer be needed, then the possibility of training certain research students, who in turn can train other students for the regular needs of the labour market, deteriorate. In Umeå, it is considered that the close contact between UMDAC-university-planning bodies-companies is considered to be of great importance for the long-term development of the labour market in Northern Sweden.

In addition to building up competence within this sphere, administrative and legal aspects on new forms of telecommunications need to be studied.

10.2 Telecommunication technology — present situation and development prospects

(This section is particularly briefly summarized.)

Throughout the entire period during which our society has been built up, telecommunications — the transport of information by electrical means — has been developed towards an increasingly sophisticated and deversified part of the infrastructure of our country, and the Swedish society is now highly dependent upon properly functioning telecommunications. In historical sequence, the telegraph, the television and computer communications have been added to the supply of generally available and utilized branches of telecommunications technology. Among these, radio and television, along with the telephone, are nowadays available in practically every Swedish permanent residence. A fundamental difference between these services is that the radio and television services are unidirected by nature,
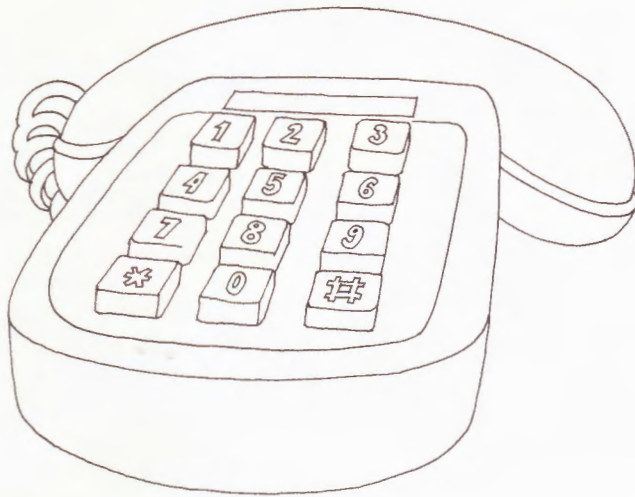
whereas the telephone is duo-directed, whereby two-way communication becomes possible. From every telephone connected to the public telephone network, every other telephone in the world's telephone network (close on 400 million telephones) can, in principle, be reached with automatic or manual connection. A constantly increasing proportion of the connection processes take place automatically: all telephony in Sweden, for instance, has been fully automated since 1972.

Another development process of interest in this context is taking place in electronics. A constant endeavour in computerization to be able to store and process increasing volumes of data within increasingly small computers has interacted, via large-scale production, with a trend that rapidly cuts costs. An implication has been that the terminals in a communication system can successively be provided at reasonable cost with their own memories and own logic circuits, thus paving the way for new and interesting communications applications.

The telephone network — a so-called narrow band network — which is now connected to practically every place where people stay in order to work or during their leisure time, is built up for transmission of human speech — telephony. Its information capacity also suffices for written messages, for transmitted data up to certain speed limits, and for transmission of documents and slides. With present-day technique, however, moving pictures cannot be transmitted via the telephone network except over very short distances — up to a few hundred yards. In order to transmit moving pictures, special cables (so-called broad band networks) of the type used in central aerials and elsewhere are necessary at this time. Technology, however, is making rapid strides in this field too.)

A further development of the central aerial is to be found in cable TV, which is used to a relatively large extent in several countries (including the USA and Canada). Cable TV is basically comparable with normal wireless television, the difference being that the information is transported via a system of cables. The systems in use today are unidirectional, as

is wireless television: the difference is that it is technically possible to transmit a considerably great number of independent television channels in the cable than "in the air". In the cable system, we also know directly which households are connected to the system.

Cable TV is a local medium by nature; it is technically fully possible to interconnect a number of such networks to provide increasing geographical coverage, but this is not normally done in practice. A great deal has been said about the possibilities of developing the cable TV technology to allow a two-way communication and to enable provision of a connected broad band network, which, among other things, would make possible a general picturephone. The costs involved, however, would be high and the technical problems have not yet been entirely mastered.

Certain cost estimates can be found in the Report published by the Swedish Telecommunications Administration on Expansion of Cable Television in Sweden (dated February 1975). The investment cost for an all-embracing expansion of a cable TV network with two-way communication in a large Swedish city is roughly 1 400 Sw.cr. per household excluding the terminal; the corresponding cost for a sparsely populated area is about 10 000 Sw.cr.
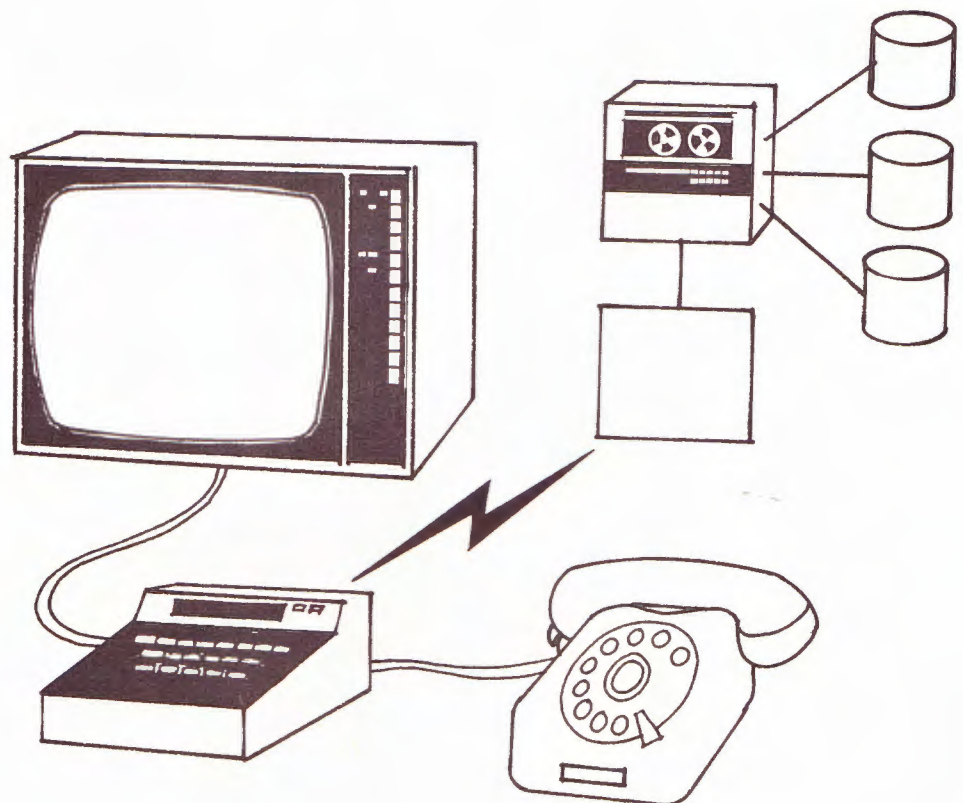
In densely populated areas, the cost is reported to be between 3 300 and 4 600 Sw.cr. With the aid of suitable terminals, a system of this kind would allow two-way communication between the individual subscriber and the main centre of the system (no real connection equipment for communication between terminals is included in these calculations). Additional costs are for computers, terminals, software, etc., and these would be high.

To sum up, then, it can be said that:

— the telephone network is generally available "everywhere"

— the cost for logical intelligence and memory capacity (hardware) is rapidly decreasing

— television sets as presentation screens are available in practically every Swedish home [with relatively simple attachments, these can be used as terminals for presentation of alphanumerical information (with letters and digits), slides, etc., transmitted via the public telephone network]

Technically, a narrow band network which could be used for a possible pilot test would comprise data bases, terminals, computers for communications control, etc., telecommunications connections and software. A narrow band system is far less expensive than if broad band technology were to be applied.

In the above, consideration has primarily been given to the case of communication from man to computer and back. Obviously, applications involving communication from man to man (or a group of people to a group of people) are also interesting. The building stones will then be the same, but without telecommunication links and information storing computers. Combinations of the different cases are also conceivable.

11   ACCUMULATIVE REGIONAL EFFECT

From the analysis in Section 9 it is desirable to be able to extract those activities which have the most obvious regional effect. This should be done with a view to actual technical and economic limitations. In particular, the restricted resource availability favours the use of telecommunications technology requiring a minimum of resources.

Before we can decide how a regional trial activity should be carried out, there are two questions which must be answered, viz.:

1. What services and activities should be given priority on the basis of regional development effect?

2. What technical or economic restrictions are imposed?

The Working Group has here discussed different proposals. We have found it desirable to give priority to:

– measures which promote a positive regional *employment development*, and development of *co-influence processes* on both the social and the company level

– measures which enable *educational and social information* to be transmitted broadly out within the region, with particular attention to groups weak in resources (information poverty)

– measures which limit less well justified *transports*

In order to be able to specify more closely the needed telecommunications equipment, including affected computer auxiliary systems, the desired technical performance must also be studied. In this context, we can discuss such properties as characterize the value of information as were dealt with at the end of Section 5 above, i.e. access times, up-to-dateness, geographical presentation locations, etc.

With regard to Question 2, after certain technical deliberations the Group has reached the conclusion that *broad band telecommunications should not be considered* in the first place. Even when used to a limited extent, such communication – still mostly cable-tied – is extremely expensive, far too expensive also to allow reasonable studies in this context to take place within the time available.

We have also chosen to stress that *two-way communication* should be considered when it is at all possible. We have also assumed that the information system should include memory functions to store the quantities of facts which may be needed and to enable the information to be buffered, i.e. to be reached at different points of time.

These technical assumptions are, as indicated above, directly justifiable in terms of need in

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respect of the priorities listed above to only a limited extent. Instead, they comprise restrictions which, in the Group's opinion, should be considered in the light of experience and resources.

The motives for the activities proposed below are mainly regionally social. It is a question of making regional investments, which only in a later stage of development can give a return. This will then normally be in entirely different currencies.

12   DISCUSSION OF PROPOSALS

A number of different forms can be given to telecommunications systems intended to promote a regional development. The Working Group nevertheless wishes to stress that in the first instance the desires of the local authorities should govern the more precise nature of the system. At this juncture, we have therefore chosen, not to formulate any precise statements concerning the technology that may be used. Instead, we have preferred to exemplify different forms and ambition levels by means of a few short and descriptive environmental sketches.

These sketches have purposely been given a simple character. The limited space available has necessitated simplifications and perhaps exaggerations as well. They can serve as kick-off points for considering how telecommunication systems of one kind or another could be tested for the regional needs.
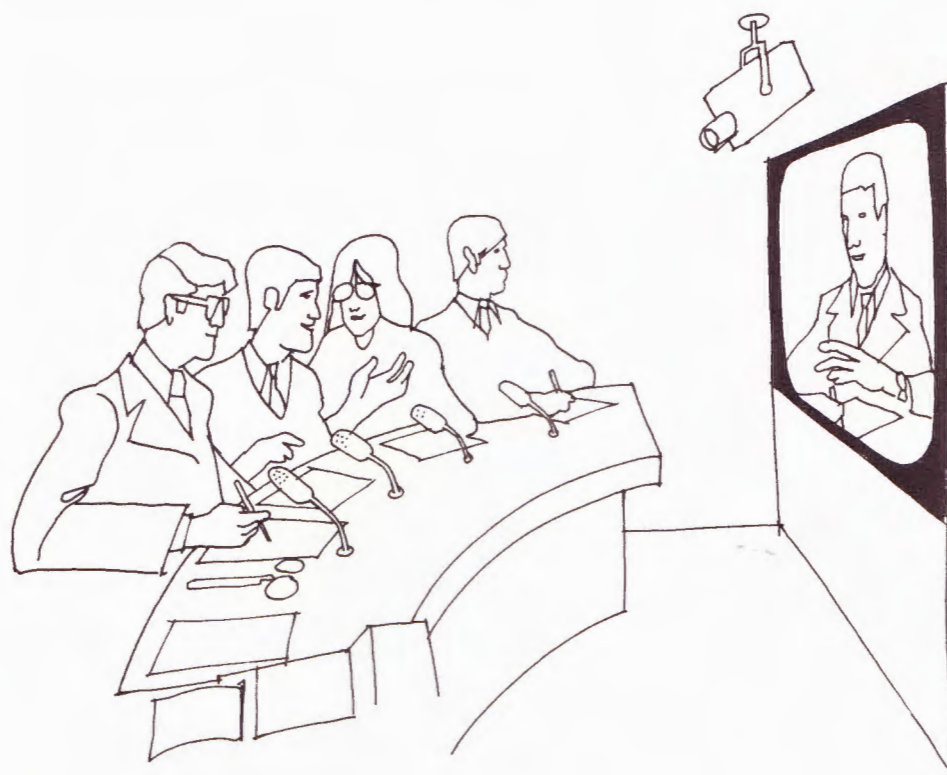
Also included below are things which we for different reasons considered to be less suitable for a practical pilot project. This is intentional. It is part of the nature of technology assessment not to allow the technology itself to take the upper hand and to restrict subsequent freedom of action, and to pay particular attention to analysis of needs and consequences.

The sketches below then hopefully can give impulses for ideas in the reader's reality.

Example 1

» It could be like this:

MULTI, a multi-activity company, has production facilities at many different places in the country. Extensive product changes are now being planned between the different production units and with a few other companies in the trade, since this is reported by the Management to "improve the market prospects and safeguard employment for all concerned in the long-term view". An application has also been submitted for a government grant to "create more jobs in the forest counties".

The Management Group has proceeded with great thoroughness. Meetings have been held day after day, trips have been made abroad to "study the latest technology", and experts and consultants have been employed. All the findings are now available in a well-documented report.

The Joint Industrial Councils at the places concerned have naturally been kept informed, but this has been just one of numerous plans to be borne in mind. The Management now needs a quick answer from all concerned . "Are you with us?"

The local trade unions, which previously have only had sporadic contacts with each other, must now make a decision. Who stands to gain, who stands to lose? Is it really true that X technology is declining internationally? The union members are becoming increasingly anxious, and the local unions ask for a respite in order to have time to contact central investigatory resources, to familiarize themselves with the technology, the market conditions in the development country "FORGE AHEAD", with what the reaction is at the other workplaces . . .

The Management Group thought it had some lead on account of its good and well documented knowledge of the demands of the surrounding world for action. But did this really give them any advantage in the negotiations? The local unions are doubtful, the process is tending to take time, the almost certain localization grant is becoming less certain. The "golden opportunity" disappears.

Many deep sighs are drawn about overcommunication, exaggerated democracy, meeting sickness (or undercommunication).

Or it could be like this:

At an early stage, the Management had a feeling, based on its years of experience and its well-developed finger tips, that something was in the offing in the fundamental technology. The Management Group quickly became aware of its responsibility and also realized that such extensive changes were about to take place that the old approach of "It is now a matter of getting the men to go along with our idea" would not suffice here. Because of

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this, the Management did two things which in point of fact can appear as fairly modest. An audio conference room was set up at each subsidiary, and in widely spread information leaflets it was explained that the audio conference room was open to all and sundry. Not in the sense that each and every person was welcome to come and talk about anything at all, but not in the sense either that each and everyone had to display a licence that an approved meeting was being held in order to gain admittance. What they did, quite simply, was to arrange half-day training for all employees on how to use the room and the technology. Of the four hours, most of the time was used for practical exercises. Training was given in how to convene and conduct remote meetings. It was found that not one single person in MULTI had realized that it is so simple to arrange a meeting of this kind and that it can be so worthwhile. And in combination with the Management's generous interpretation of the law on trade union positions of trust, the remote meeting quickly became a success. The local unions at the different places began to speak to one another increasingly often; they had had every ambition to do this before as well, but as a rule contacts had taken place during a tea break, at a congress or at courses. After all, there was never anyone who interfered with who one talked to or indeed what one did or said at all when in the conference room.

An audio conference is a further development of the telephone, enabling several people to talk to several others. In one of numerous conceivable forms, the participants sit in a semi-circle at a round table, where the other semicircle sits at a similar table in a different place. The seats of the remote participants are marked with name tabs and lamps which light up when the person concerned is talking. An audio conference can also be regarded as a further development of the loudspeaker telephone.

The MULTI Management also arranged training courses for members of the Management, for employees and for experts in the Company. The participants were given a fairly rough time, with sensitivity training playing a dominant role, but the major stress was on group dynamics in its wider sense. To go through this training proved to be a rather interesting experience   many of those involved were affected in a manner previously inconceivable. The fact that some people had difficulty in finding their own role in the Company as clearly as an exercise of this kind intends was probably positive too. Seen in a more long-term perspective, it may be said that practically everyone benefited. The intention behind the whole thing was partly to create ground for MULTI-INFO. After this, MULTI-INFO occupied a central place in everybody's awareness. It was quickly realized that the system gave a great deal for employees at all levels if one contributed openly and honestly oneself. After a couple of fairly severe arguments between the Management and the employees concerning the plausibility of certain pronouncements, people quickly learned to interpret INFO in the right way and realized that there was a new openness in all contributors to make an effort and really try to present formulations which corresponded in the best way to reality. To put it briefly, they learnt to distinguish between "It is rumoured that", I think that", "The time is right for" and "I am fully convinced that". The INFO terminals became widely utilized, especially when it became generally known that the unintelligible language previously used by the Management had completely disappeared, this too as a conscious result of the INFO course. And after a new rule had been laid down, prescribing that a report of ten lines should be submitted on all foreign journeys, people began to realize that things were actually happening in other countries.

INFO is a system of terminals, telephone lines and a data base controlled by a small computer. The terminals are used to feed information to and to obtain information from the data base. These terminals are available to everybody and are very easy to operate, so that anybody, with a minimum of training, can pick out an item of information at any time. And there is no difference in the possibilities for the Gotland subsidiary and the Stockholm Office. Everybody has the same chance. It was, in fact, the question of confidence that made INFO so interesting. In accordance with the Joint Industrial Councils Act of the 1940s, everything related to information and joint consultation had been so enormously legally tied up that the personnel had always felt themselves to be rather on the outside. Now things were completely different — even confidential information could be obtained in INFO. Everybody experienced that there gradually emerged, at the right pace, a number of all-embracing and generally accepted truths, which created an understanding for the necessary changes.

Example 2

It could be like this:

The BANTAM Organization has completed a far-reaching reorganization into divisions, the individual regional offices being given "independent goals and action space of their own". The Head Office has been cut down to a focal point around a "Long Range Planning and Scanning Task-force".

Very soon, however, the Head Office finds itself suffering from some "overcommunication" in the vertical direction. The "independent" units are constantly in vertical touch, and more and more business trips are taken in order to "check the general position". There is no time over for any long-term work. Finally, a central "regional policy unit" is established to deal with the growing need of help. The Divisions take great pains to avoid this return alley and quickly set up their own "headquarter policy units" manned by top forces, who with the support of computers can enter into discussions with their counterparts at the Head Office. (With time and ability for sufficient interaction. Anyway, there is so much else on in Stockholm, when one has to pass through anyway . . .)

More and more long-term trained employees are taken on, both at the Regional Offices and at the Head Office, mostly at the Head Office which has regained its former size. Air and data communication routes between the Head Office and the Regional Head Offices (as they have now come to be called) are constantly growing. Everyone complains about tiring journeys and ununderstandable computer messages, but . . .

Example 3

It could be like this:

X-son, a large company, has production units at different places in Sweden. They manu-facture components for products whose "recipes" are based on central research, develop-ment and marketing. Only when new products have begun to "settle" are they passed on to the different component factories. "The local labour market is too small and sluggish; we can't cope with all the change risks that the new technology implies with such a small operating area. Moreover, we haven't got time to spend a whole day in order to check for five minutes with the research people if we haven't got them here at the Head Office".

The local trade unions have started to make a noise and have pointed out that although their working environment has become cleaner and quieter in the newly-erected factory, many calculating jobs and other tasks formerly coped with "on the spot" are now handled via a terminal by the central computer at the Head Office. The office staff, mostly women, and young people with excellent reports from the local red brick universities, cannot get local jobs.

"Are industrial jobs going the same way as agricultural jobs", people are beginning to wonder.

Or it could be like this:

BANTAM and X-son had similar views about the development trend. For BANTAM, it soon became clear that it was essential in the short-term view to expend some resources on development of the regional subsidiaries in order to obtain the wanted long-term effects. They were wise enough to realize what is demanded of a progressive company, and it was in fact their foresightedness that had given the companies their position. The Management and union leaders took time for a week-long seminar, where they received help from the foremost international consultants available in order to define the problems and indicate solutions. On the very first day, they arrived at the conclusion that the matter of achieving better balance between the Head Office and the regions was, just like everything else, a matter of direction of will on the part of everybody working in the Company, regardless of function and level. The consultants then explained how a three-dimensional communi-cation pattern needs to be understood, mapped out and influenced in order to achieve the

wanted results. Those attending the seminar began to realize that they had been staring their eyes out at communication between the Head Office and the subsidiaries, whereas in point of fact the real solution cannot be reached until the flow is considered in total in all three dimensions, i.e. within each region, between regions outside the Head Office and between each region and the Head Office. The consultants pointed out that strengthening of the first two of these dimensions was at least as important as the traditional. To begin with, some doubts were entertained: it was pointed out that the Regional Managers were active Rotarians and that they had good relationships within the region; all the local authorities were good to deal with. But when a consultant started to show how these relations could be further developed, everyone became convinced. And no-one had even thought of the fact that the subsidiaries in Malmö and Skellefteå could need direct communication outside the Head Office. And after the last day (and night) which was devoted to group exercises on the big computer system which could be used both to support discussion and to collect both central and local current information from the Company and civic bodies . . . They found it difficult to call a halt and to realize that one really has to go to bed sometime. The possibilities now opened up were enormously exciting, everybody realized that. It was universally agreed that this week would give its reward. They all had a feeling that they were on the right track, and that it was now time to put one's shoulder to the plough.

A (computer-controlled) conference system makes it possible to carry on discussion between several parties regardless of both time and place. Access to the system is gained via a simple computer terminal of recording type. The information in the direction from the system to the individual conference participant consists of a write-out of contributions to discussions held since the last write-out was called for (who has said what since last time). The information in the direction from the participant to the system consists of the contribution to the discussion that participant wants to make (what do I want to say after I have heard what other people have said). The system also enables selective messages to be sent, which can be read only by the people one wants to reach: the others will not even know that a private message has been sent (what I want to whisper to my neighbour or who I want to get together with for a quick consultation in the corridor or during the coffee break). Geographically, the system need have no limitations, and requires only computer terminals connected to normal telephone lines and central computing power. The updating for each individual discussion is taken care of automatically while the discussion is being held through the actions of the participants. – The same terminals can also be used for other purposes, for instance to get other information contained in central or local systems. A local system can combine in the same local computer local information both within the company locally a and to and from local civic bodies. In principle, the terminals can be used to update, add or delete information in the system. All terminals do not necessarily have to be usable for all of these functions. Things can very well be arranged, for instance, so that certain terminals can be used only to read out information and not to change the information content in the system in any way.

Example 4

The A-region UTOPIAN IDYLL was really thriving since it had gained access to the LOCAL COMPUTER with interaction facilities for picture processing.

Until then, there had in fact been quite a lot of quarrelling. A-town had its central hospital, B-town the university, C-town some relocalized governmental department and D-town had

long had a "good industrial environment" which, however, gradually needed more and more support in order to maintain its employment level. There had not been much in the way of contact between the different towns: C-town had to be on a good footing with the National Board of Health and Welfare, B-town with the Office of the Chancellor of the Swedish Universities. and so on. Every now and then, of course, they ran into one another at the Stockholm airport.

With the LOCAL COMPUTER, drawings and documents could be quickly transmitted, access could be gained to the data base jointly established, tele conferences could be arranged, prototypes could be shown on picturephone and, most important of all: the local data enabled the regional towns to reach out jointly in the international field so that they were sometimes even better informed than Stockholm "about the situation" in their particular areas. It sometimes happened that people came from Stockholm in order to "brief themselves". The region was no longer so dependent on Stockholm, a quick check with other regions often gave more. In Stockholm, people were relieved (at any rate to begin with); they no longer had to receive all these delegations and group visits and could devote their time to thinking ahead on projects which hopefully might gain anchorage out in the country.

Local travelling had not decreased and, in fact, it was rather the opposite. The growing co-operation had to be continuously supported by talks and meetings, and obviously the situation had to be checked on. Utilization of the LOCAL COMPUTER was not completely common either. The trade unions had, true enough, reached an agreement with the firms and the local authorities to produce certain joint broad environment data, but they also wanted to have their own secrecy protected channel for talks between themselves. By this time, the trade unions had caught up on the Management's lead when it came to "facts about the case", and it became easier to keep members informed of the trends in both technology and on the market — and to produce alternatives themselves.

Commuting and relocation between towns increased, but on the other hand there was no longer the same call for moves to Stockholm which until then had been the only alternative. Now, several alternatives were available at closer range. Sometimes, it was also possible to work in one of the "local work centres" which had been established in the residential areas. Here, people from the hospital rubbed shoulders with others from the university, from industry and from many other places. Via the LOCAL COMPUTER, the nurse could quickly get direct contact with a discussion taking place about "telecommunication assisted medicine" at the university. And in a similar manner. the teacher could find out that a colleague on the other side of the town had just finished a new computer programme for training in road traffic knowledge. The kids in Class 5 loved running that programme.

In due course. it had been found that the information accumulated in the LOCAL COM-PUTER could be useful for everybody — even for those who were not involved in the rush of production life. Advice and assistance were available on matters such as dieting, exercising. filing tax returns. etc. And another thing was that everybody could benefit from participating in the growing programme of cultural activities. Formerly, the local music society had hardly even been able to afford to advertise that they had succeeded in booking a well-known soloist. despite the fact that he had been content with a modest fee.

In the end. region A had really become a REGION, an alternative which had something of city robustness about it when the winds of trade blew cold. but still had a certain local profile in the different "city districts", which far from being suburbs out in the wilds had a history of their own.
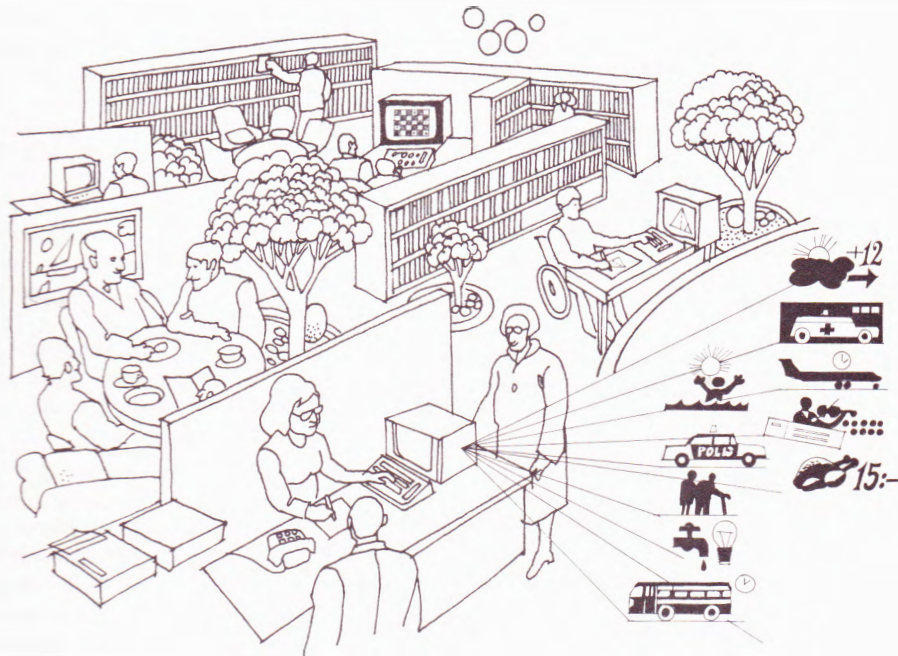
That there had been quite a few problems during the running-in period cannot be denied, despite the fact that every effort had been made to benefit from experience in other countries. They had, for instance, made a gentle start with the information centres, and used perfectly ordinary telephones and manual routines until a good impression had been gained about what people really were asking for. Only after this had they gone in for a more sophisticated telecommunications technology, primarily in order to get faster up-dating and more up-to-date information on such things as local events, time-tables and other basic facts. In due course, a very good balance had been achieved between what the technology could give and what actually required human direct contact. It had also been found that quite a lot of information was common to both households, businesses and authorities, enabling economy, technology and openness in the exchange of information to walk hand in hand.

This, however, was where certain problems were encountered. Business firms were not particularly enthusiastic about supplying certain data that planning authorities and trade unions would very much like to have continuous access to, for instance the development on different product markets. In their arguments, the firms referred to what they called the "tough international competition". The trade unions also wanted certain guarantees that "sensitive" negotiation data really did stay within the closed circuit, and so on. For a while, it seemed as if this confidence crisis was about to ruin the entire project. Finally, however, the specialists were able to convince all those concerned that the secrecy functions really did work, and a compromise was found which regulated what information could be regarded as

"common", what could be released "upon application" and what should remain internal. And in addition, agreement was reached that every advantage should be taken of the ability of the LOCAL COMPUTER to *erase* data from its memories with great efficiency.

Looking at it in retrospect, most people probably, despite everything, agreed that the development in the region had been rather favourable. The previously separate towns had begun to co-operate in a manner beneficial to them all and had become less sensitive to changes in the business climate, and had also got a firm base for new and qualified industry and service that promised well for the future.

Some people, of course, asserted that all this could have been achieved in any case, without the new technology. There were indeed so many things that led to the development which, after all, "was in the air". Others were of the opinion that the new technical facilities for co-operation beyond local boundaries had been a decisive push in the right direction, which would have been difficult to achieve in any other way. Everybody, however, was agreed that the investment was "worthwhile". Previously unutilized resources had been put to work, unemployment figures had become lower, etc. — things considered to be far more worthwhile both economically and socially than what the investment had cost. »

The above examples are obviously not by any means clearly defined as regards technology or shape. It should be noted that the telecommunications technology that *can* enter the picture can be chosen from: telephone lines, terminals, data bases, computer power, control programmes and application programmes.

Thus, several different technical levels of ambition for the systems are conceivable. As the Working Group sees it, it is natural for a pilot study to be started up on a *low* level, and to be given the opportunity to expand after introductory experience has been gained. It is conceivable that an introductory part of a pilot study can be concentrated primarily on an application-controlled conference system with printing terminals only. It can also be possible to use CRT terminals (TV screens with keyboards) in a similar system, which also improves the facilities for education. Or else, push-button telephones could mainly be used. In all cases, however, heavy investments are needed to produce the necessary software in order to get started, as a basis for further development.

It would obviously be natural for such a system to be so constructed via the telephone network that social institutions (e.g. medical, planning, informative) trade unions, companies with subsidiaries and so on can find natural connections.

After an introductory analysis, it has been found that only a very limited investment asset for an initial work phase can enable a regional pilot study to be initiated. Obviously, however, this depends on the chosen level of ambition for the applications. The start-up would mean activity on a low level, with a possibility for expansion after introductory experience has been gained. Affected in the first instance is basic hardware; computer power, terminals, etc. plus the basic software. Telecommunication lines are to be provided by the Swedish

Telecommunications Administration at low cost. An important part of available personnel resources will be concerned with development of application software in the proposed regional system.

It is evident from the above that worthwhile development studies can be made here with a relatively modest input of resources, compared for instance with the situation for cable TV. Here, however, the discussion of resources must be imprecise. Priorities made by local authorities on the basis of social motivation constitute a prerequisite in order to be able to define the resource side more precisely, information which is not yet available at the time of writing.

13   SHAPE AND FINANCING

To sum up, the Working Group has found reason to call attention to endeavours to promote regional development with telecommunication aids through:

— measures to promote employment

— educational measures and measures to spread social information, and co-influence measures

— transport-limiting measures

The object of this contact Report is, as already mentioned, to find out the views of those concerned of a development which takes into account these interests. These priorities are obviously, however, not absolute. Well-founded wishes for displacements of them can stimulate an alternative and interesting development.

The financing of a pilot study should, in addition to local resources, be based on *public* funds. The Working Group has found no reason for commercial engagement in this activity.

Among *possible* interested bodies, mention may be made of the Expert Board for Regional Development (the ERU), the National Swedish Board for Technical Development (the STU) the National Board for Civic Information (the NSI), the Banks of Sweden Tercentenary Foundation, the Committee for Future Oriented Research, the Swedish Council for Social Science Research, the National Swedish Telecommunications Administration, the Social Research Delegation, the Transport Research Delegation, the Swedish Council for Building Research, the Swedish Work Environment Fund, and others. It has been natural for the Working Group to assume that *inputs of resources on the part of local authorities* will primarily be in the form of *manpower* for building up and carrying on the pilot study.

For a pilot study of the kind proposed, the project management should include in large measure persons with knowledge of local affairs. For discussions these can be completed by experts from a range of different scientific and application fields, to the extent such needs can be concretized. It can be noted that result evaluation — paying particular attention to social scientific interests — is regarded as a fundamental part of the work.

The Group would welcome views on:

— interest in this field

— allotment of priorities to needs

— possibility of participating organizationally in a pilot study

— resources that can be contributed

— development wishes

The Working Group looks forward to further discussions as a basis for direct project proposals to be presented shortly.

Telecommunications and Regional Development in Sweden

A Progress Report
April 1977

ERU Expert Board for Regional Development

STU National Swedish Board for Technical Development

Telecommunications and Regional Development in Sweden

A Progress Report
April 1977

CONTENTS

PREFACE

This is a second report from the project Telecommuni-
cations and Regional Development in Sweden, project
TERESE. It discusses the project activities that can
be observed since the beginning of 1976. It follows
the first project report, the Contact Report of
January 1976, where the project is defined, and the
primary plans for action are outlined.

This report discusses the project activities up to
April 1977, and gives indications about further deve-
lopment plans.

It has been found natural to give the project back-
ground in a manner resembling the text in the primary
report. Therefore, initially, there can be found some
text overlapping between the two reports.

Responsible for this second phase of the project
activities are primarily Bertil Thorngren and Tomas
Ohlin.

The drawings to this report were made by Stina Eidem.

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SUMMARY

An analysis has been conducted of the possibilities of
promoting desirable regional development through the
consistent use of telecommunication aids.

The analysis has been concentrated around the regional
needs. Consequently, only limited studies of technical
detail have been conducted, the reason being that
technology in itself should not be allowed to control
regional development.

Regional development is considered here to be dependent
on numerous components: employment, living conditions,
transport, education, health service, other social
services, social solidarity, culture and leisure acti-
vities, external environment, etc. After having
analyzed how these can be promoted by telecommunica-
tion aids, certain application priorities have been
discussed. The telecommunication aids available today
are highly flexible and efficient. From the sheerly
technological angle then, technology does not restrict
development. It has therefore primarily merely been
intimated which forms of telecommunication aids can
enter the picture. This has been done intentionally
without going into specific details. In this context
it has been considered technically satisfactory to
stress two-way communication on the narrow band net-
work, where computer aids are of special interest.
This accentuation has taken the cost aspects of the
development very much into account.

The primary project report has invited local authori-
ties to submit their views on possible priorities for
regional needs. The invitation also embraced interest
in possibly participating in further development, the
existing resource situation, etc.

The primary project report thus has been circulated
for consideration by a number of local bodies concerned.
As a result, several indications of interest was
registered. Thereafter, a region of primary regional
importance in the very northern part of Sweden was
selected as area of continued concern for the project.

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It was conducted a comprehensive local seminar for
further priority discussions in December 1976 in the
selected area, around the town of Luleå. The seminar
took the time of a whole week, and shed further light
on technical telecommunications possibilities with the
help of certain application demonstrations, a number
of which had been developed for the occasion.

The seminar showed several continuation possibilities.
These have been further discussed, and a number of
application projects are at the present moment (April
1977) taking form. These socially oriented pilot
studies are considered to open up possibilities for
greatly expanded telecommunication assessment opportu-
nities.

During 1975, a Working Group comprising the official
representatives named below has analyzed questions
relating to regional development with the aid of
telecommunications. The work was initiated in consul-
tation with the National Swedish Board for Technical
Development (the STU) and the Expert Board for Regional
Development, Ministry of Labour, (the ERU).

The resources for the primary part of the work consisted
    of three parts. The Working Group has had numerous
meetings, to attend which the members have sacrificed
both working hours and their own spare time. Studies
of reports, literature, etc., and preparation of the
Group's own project material, have demanded time
resources. In addition, grants from the STU has made
possible a great number of international contacts.

The Working Group has chosen to formulate its primary
Report with the aim of establishing *contact* with
possible interested parties, particularly on the local
government side. It is the opinion of the Group that
the regional needs should control the technical
development and not the other way round.

The Working Group has had the following members for
the primary parts of its work: Katrin Hallman (the
Secretariat for Future Studies), Laila Noord and Jan
Åhman (the Swedish Association of Local Authorities),
Tomas Ohlin (the National Swedish Board for Technical
Development), Bertil Thorngren (University of Umeå)
and Ingemar Wåhlström (the Swedish Telecommunications
Administration). Tomas Ohlin has served as Coordinator
for the primary part of the study.

STARTING POINT

Development in the field of telecommunications is currently proceeding at a very rapid pace. Numerous new possibilities are being revealed. *Purely technically,* it will be possible to prepare, store and almost immediately transmit documents, drawings, moving pictures and other descriptive data between separate places with ever-increasing speed. Time and money can be saved. But how is the planning to be done? And how are distortive and non-desirable effects to be avoided?

A vital part of the concept of telecommunications concerns physical transports. This gives us reason to observe retrospectively, together with T. Hägerstrand (1973) that

> "a different kind of transport philosophy could have led from the beginning to the introduction of a technique that did not segregate and which presumably could have given higher total efficiency than the one we have now, particularly in urban districts. Mobility, for instance, is a good means of combating unemployment. There would have been no need for us to get into the present-day situation if the transport system had been regarded right from the beginning as a system, and not merely as the sum of the choices of individual households through private purchases".

Obviously, the new telecommunications techniques can be regarded as something more than merely a way of mechanizing and cheapening communication. Its consequences, for good and bad, spread throughout the entire organization of our society.

Traditionally, investments in a new technique have been decided on the basis of the *economic* prerequisites of that technique, often in a fairly short and limited perspective. Expansion has taken place piece by piece at the rate in which there has been interest in paying for utilization. One problem in this context is that the physical frame investments, for instance in rail-

ways or cables for telecommunication traffic, are
considerably more long-lived than the market conditions
which governed their emergence. Frequently, those
concerned simply cannot afford to choose again. The
technical solutions have been successively superimposed,
thus amplifying each other and have finally restricted
the space available for development. This leads to
troublesome consequences, not only for joint planning,
but also for individual households and companies.

Telecommunications belong together only with one of
these locked structures, but there are examples which
show that this type of communication can constitute a
"critical factor" in certain situations. In a country
such as Sweden it can be difficult to trace the posi-
tive effects of the ordinary telephone - viewed inter-
nationally we are in the rather unique situation of
having a telephone available to practically everybody.
We only have to go, however, to other countries in
Western Europe to find examples in which whole urban
districts or rural areas are practically excluded from
the possibility of participating in this form of tele-
communications, for technical or economic reasons.
Another example, from the USA, is the often disregarded
key role played by the telephone - along with the car -
in the creation of new suburbs, occasionally with slums
in the city centre as a result. The telephone and the
car have affected each other in these respects.

Hitherto, the use of telecommunications has amplified
the tendencies towards centralization rather than
contributed to regional spreading of employment,
education, functions for distribution of information,
etc. One reason is that primary telecommunication aids
(telephones etc) have been found by experience to be
used in the first instance as a support and further
development of already existing contact and communica-
tion patterns - in other words, established tracks are
cut all the deeper.

It is this effect of the telecommunication aids -
strengthening of contact and communication methods of
other kinds - that makes it interesting to put the
question:

> *Can we reverse the pattern, and get telecommunication
> aids to promote instead a desirable regional develop-
> ment, an improved regional balance?*

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The Expert Board for Regional Development (the ERU) asked this question in its Report entitled "Communities in Regional Co-operation (SOU 1974:1)". The National Swedish Board for Technical Development (the STU) is paying increased attention to this problem. "Telecommunications and Regional Development" is also a subject of considerable international interest.

An intentional caution in the efforts towards technical development should not be regarded as an expression of "animosity towards technology". New technology can scarcely be regarded as automatically equivalent to "profits" for regional development - even if it were "profitable" from a more narrow economic perspective. It is equally important to make allowance for the possibility of the reverse, i.e. that currently "unprofitable" technology can be socially important. The final result of a critical technology assessment can very well be to *expedite* the introduction of certain parts of a new technology, technology which otherwise would have been delayed or eliminated by market considerations of a more short-term nature.

Early in 1975, a working group was formed in consulta-
tion with the STU and the ERU in order to study the
prerequisites for practical trials with telecommunica-
tions in regional development work. The Working Group
was composed of representatives from the STU, the ERU,
the Swedish Telecommunications Administration, the
Swedish Association of Local Authorities, and the
Secretariat for Future Studies.

Experience, much of it from other countries, shows that
technology in itself is not the major problem, although
such things as new cable systems are an expensive solu-
tion for areas with a less dense population structure.
Already made investments in the existing telephone
network can also be developed advantageously. The
primary problem, however, is to obtain information as
to which *needs* can be satisfied at reasonable cost with
the aid of telecommunications, and how the priorities
should be set between different possible services.

A primary task for the Working Group has been to
establish contact with interested local authorities,
county authorities, county councils and other affected
bodies, in order to obtain their views on the priority
between these needs. This discussion comprises view-
points on possible connections between telecommunica-
tions and regional development and on which types of
services that possibly can be tested practically.

The Working Group has considered it essential in this
context that improved telecommunications must not be
an isolated step, but rather a support for other mea-
sures relating to regional politics, when it comes to
changing the labour market as well as to increasing
the facilities for social service, cultural activities,
etc.

Questions to be asked include the following: How much
information do we need in a modern society and how much
are we capable of receiving? Can efficient telecommuni-
cations help to make it possible for people with
interesting jobs, who are now often forced to earn
their livings in the big cities, to work in a region

where they may rather prefer to live? Can telecommunications contribute towards improved working democracy? Can the collection and distribution of governmental social information be made more efficient? Can (and should) telecommunications increase the possibilities for contacts between politicians - experts and politicians - electors? What control instruments may be needed in order to take advantage of telecommunications as an instrument in regional politics?

These are examples of questions that can be raised. A goal is to *improve and expand existing contact networks* and to establish to some extent new contact networks, and *not to replace currently existing direct contacts* between people by contacts with the aid of more or less advanced technologies.

The development in a region depends on access to good
production and living conditions. These, in turn,
depend on the strength of numerous *primary welfare compo-
nents:*

- employment
- living
- transport
- education
- health service
- other social services
- social communion
- culture and leisure activity
- external environment
- etc.

It is only natural for priorities to be made between
these components. Thus, for example, employment and
living conditions can probably be regarded in many
contexts as being of a more primary nature than social
service and culture. What will be given precedence will
naturally vary from case to case and from time to time
(consider, for instance, the switch of priorities from
house-building to the building of day nurseries during
the 1960s and 1970s). For each individual welfare
component, consideration can be given to both *fundamen-
tal access* and to *improvement above the fundamental* level.

Regional development is dependent upon the accumula-
tive effect of measures for these components.

For each of the above mentioned components it has been
discussed the possible effects that would, or could,
follow the consistent use of telecommunication aids.
Preliminary conclusions are drawn from these activi-
ties.

RESTRICTIONS

It is desirable to be able to extract those activities
which have the most obvious regional effect. This should
be done with a view to actual technical and economic
limitations. In particular, the restricted resource
availability favours the use of telecommunications
technology requiring a minimum of resources.

Before one can decide how a regional trial activity
should be carried out, there are two questions which
must be answered, viz.:

1. What services and activities should be given
    priority on the basis of regional development
    effect?
2. What technical or economic restrictions are
    imposed?

It has here primarily been discussed different propo-
sals. The main discussion, however, has followed the
user seminar (mentioned later) that took place in
December 1976.

With regard to Question 2, after certain technical
deliberations the project has reached the conclusion
that *broad band telecommunications should not be considered* in
the first place. Even when used to a limited extent,
such communication - still mostly cable-tied - is
extremely expensive, far too expensive to allow reason-
able studies in this context to take place within the
time available.

It has also been chosen to stress that *two-way communica-
tion* should be considered when it is at all possible.
It is also assumed that the information system should
include memory functions to store the quantities of
facts which may be needed and to enable the informa-
tion to be buffered, i.e. to be reached at different
points of time.

These technical assumptions are directly justifiable
in terms of need in respect to applications only to a
limited extent. Instead, they comprise restrictions
which should be considered in the light of generally
available experience and resources.

From a purely technical viewpoint, it should be noted that the telecommunications technology that *can* enter the picture can be chosen from telefaximile and tele-phone type equipment, telephone lines, terminals, data bases, computer power, control programmes and applica-tion programmes.

Thus, several different technical levels of ambition for the systems are conceivable. It is natural for a pilot study to be started up on a *low* level, and to be given the opportunity to expand after introductory experience has been gained. It is conceivable that an introductory part of a pilot study can be concentrated primarily on an application-controlled tele-conference system with printing terminals only. It can also be possible to use CRT terminals (TV screens with key-boards) in a similar system. Or else, push-button telephones could mainly be used. In all cases, however, investments are needed to produce the necessary compu-ter software in order to get started, as a basis for further development.

It would obviously be natural for such a system to be so constructed via the telephone net-work that social institutions (e.g. medical, planning, informative), trade unions, companies with subsidiaries and so on can find natural connections.

The motives for the activities proposed below are mainly regionally social. It is a question of making regional investments, which only in a later stage of development can give a return. This will then normally be in entirely different currencies.

LOCAL CONTACTS

The main part of the discussions mentioned above were documented in the first project report, the Contact Report of January 1976. This was done in order to make possible local responses for further priority discussions.

In a joint action with the central regional authorities in Sweden it was selected a number of regions that could be possible geographical areas for further concern. This list concentrated on regions that already were considered as important from regional policy viewpoints.

The Contact Report was sent for consideration to representative authorities for these selected regions, and they were given two months time to respond. This fairly short time period was chosen since it was clear to the project administration that mainly indicative operational responses were to be expected in this project phase. Because of limited factual resources, it was thought that the regions would probably reply in the form of interest indications, and not in very exact and measurable terms.

This assumption proved to be correct, with a few positively important exceptions. Concluding from the replies the following pattern emerged:

| Region | Interest in further activities | | |
	Low	Medium	High
Fyrkanten (Luleå, Piteå, Boden, Älvsbyn)			x
Umeå			x
Sundsvall		x	
Östersund		x	
Härjedalen		x	
Uppsala			x
Norrtälje			x
Norrköping			x
Linköping		x	
Karlstad			x

This no doubt indicates a high interest pattern
concerning the possibility of taking part in further
project activities. Several additional comments were
given in the replies, some of which in surprising
details. The overall response impression was clearly
positive, especially when considering the fairly
technical nature of the matter.

After thorough consideration, out of this list it was
selected the region of Fyrkanten, in the north of
Sweden, comprising the four geographically close cities
of Luleå, Piteå, Boden and Älvsbyn (number of
inhabitants ranging from 10 000 to 65 000 each). It
was made clear that only one region would be a contact
partner for the further activities, a case motivated
by resource limitations.

METHOD FOR FURTHER PRIORITIES

A considerable amount of penetration was given to the
method to be used in order to define further project
concentration.

It was evident that more or less theoretical discussions
on the basis of only written documentation about
possible project development directions, would be
insufficient. There would be too limited local
responses.

On the other hand, fairly complete practical system
tests in full scale environments would surely be very
resource consuming, and at the same time make possible
an only limited applications flexibility.

A compromise was chosen on the way towards full scale
assessments. It was arranged a solid priority
discussion period in the selected region, a priority
seminar in the beginning of December 1976, in the town
of Luleå in the very north of Sweden. The seminar was
given the time of one week.

The seminar contained a number of discussion possibili-
ties, with broad local representation in various fields
of application interest.

Normally a seminar session would last for half a day,
followed by practical aquaintance with certain appli-
cation systems. In some cases an "interactive" form
between these two seminar parts was chosen.

The seminar sessions comprised 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
- efficent use of consultants
- factual business contacts between firms
  and markets
- computer aided and distributed education

- co-operative decision-making
- planning of local employment
- health systems communication
- communication for and between handicapped

At the end of the seminar week, space was included for a public presentation of the project work. Here outside interests were given the chance for discussion, mass media were invited etc.

TECHNOLOGICAL POSSIBILITIES

The partly practical approach was considered important.
For several months before the seminar, it was carried
through development work with certain telecommunica-
tions applications that were looked on as indicative
of what the available technology can make possible.

The technological availability is stressed. On the
hardware as well as on the software side, the tele-
communications possibilities that are available to-
day make great social development possible. The project
TERESE considers itself as primarily application
oriented, and leaves possibly affected technological
research to be carried out by other bodies of interest.
Naturally, the actual definition of local communication
needs may define needs for i.e. new hardware products.
This, however, is considered to be exception rather
than rule. The main question concerns what social
progress that can be made possible with existing
technology. This dates from the opinion that so much
communication is available to-day, and so little is
used.

As was noted above, certain typical applications were
developed, using the latest software methods. This
includes highly interactive computer software, as well
as relationally oriented data base methods. The project
is fortunate enough to be able to use the latest soft-
ware and hardware knowledge, as a consequence of its
research organization affiliation.

As a complement, the Swedish PTT was kind enough to
make available for the seminar several types of tele-
communication equipment. As a consequence, the seminar
participator had the chance to practically use and
experience systems from the following list:

- teleconferencing
- computer aided education systems
- social question/answering computer
  application systems:
  · health information and planning
  · psychiatric care
  · consumer information
  · planning of employment

- co-operative decision-making
- planning of local employment
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  · psychiatric care
  · consumer information
  · planning of employment

PROJECTS

During the early months after the Luleå discussions,
it was investigated the more precise nature of the
suggested projects. Some of these then turned out to
lack sufficient stability, some were considered to be
too heavily resource consuming etc. Some new project
ideas along the same lines of interest also turned up.
People got in touch with the project, local people
who for different reasons missed the original
discussion occasion and they brought new thoughts.

A number of projects have been decided to be con-
centrated on for the near future. The main part of
these are commented below. It should, however, be
noted that these projects are looked on as only one
of many possible steps forward. The true and more
longtime concentration may well be on some communica-
tion application outside this list, although we
definetly do not neccessarily need to predict such a
development.

The projects listed below are being organized at the
very moment this text is written. Therefore, their
form and quantitative structure is not given below.
However, it is clear that there exists quantitative
minimum levels over which one simply must reach for
project meaningfullness. One such level concerns the
need for sufficient project quantity of hardware, i.e.
terminals and processing equipment. Another of these
levels is dealing with availability of experienced
evaluation personell. Naturally, there are several
others.

The projects are the following:

Information for small scale industry

Promotion of local small-scale business

The project deals with increased interaction within small firm conglomerats, aiming at giving small scale business firms in perhaps periferal locations some of the advantages of resource-sharing (external economies) normally confined only to larger, and more dense, urban centres. Examples are joint sharing of resources for qualified consultancy, new product testing equipment, documentation files, files of potential customers and suppliers within the own region etc.

Also concerned is sharing of experience by direct interaction between the firms and by interaction with university researchers.

Cruical parts of the potential network exist already as a result of earlier industrial policies in Sweden. Thus, industrial centres are built up, sponsored by government, to provide joint expertise, testing equipment etc. Also, there has been a natural growth of interaction between universities and small firms as well as growth of private service-bureaux supplying small firms with traditional as well as more refined services.

The project is geared to upgrade the interaction possibilities, making regional effects more precise. Specifically, the project concerns a number of pilot firms, who will be connected to fairly sophisticated distributed computer services for qualitative analysis of on-going operations. The experiment will study the effects of added capacity for exchange of qualitative interaction, over and above what is available to other and comparable firms.

Telecommunication over large distances

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 Nordkalotten districts). By way of using efficient telecommunications means, it is expected to be able to note increased efficiency in connection with joint use of resources of different kinds.

A natural start will be to connect responsible planning officers with each other and also - as a side effect - with a more central planning node. Traditionally, these officers have noted considerable formal difficulties in reaching joint planning decisions efficiently. People have been difficult to reach on telephone, travelling to joint meetings have consumed much time and energy, considering the very large physical distances in the area (several thousands of kilometers), the low density transportation possibilities etc.

The project is expected to be built out with quantitative as well as qualitative services after the initial period. These services may concern one or many of the following: culture, tourism, schooling, activities for elderly people etc.

Health service planning for the elderly

Health care
=========

Here, considerable experience already exists, con-
cerning different levels of computerized information
services. In the present project, it is stressed
certain information distribution aspects in rural
environments.

Two different approaches are taken. Firstly, the
local planning of "mobile nurses", so called "home
first-aiders" is to be made efficient with the use of
terminal access to advanced computing resources. The
problem of matching (too high) demand and (too low)
supply with highly time-dependent and numerous
parameters is a difficult combinatory and optimizing
activity. Here advanced computer data base methods are
to be used. These methods make use of fresh research
results, which have proven to be of great importance.
Hereby, it is calculated to be able to make the
regional first-aid system highly efficient.

Secondly, it is planned resource-pooling of specialist
knowledge between different regional hospitals. The
distant hospitals often lack specialist knowledge in
sometimes important fields. It has happened that
desired knowledge on difficult time-critical medical
problems has not been available at the right moment,
but rather only a day or so later. Highly efficient
telecommunications nodes, to be used to reach a limited
number of specialists, will give far-away hospitals the
feeling of being close to knowledge centres in many
fields.

Also, it is discussed whether portable teleconference
terminals can be of help to psychiatric first-aiders,
in their work far out in the field. These terminals
only need an ordinary telephone for access to, in this
case, qualified psychiatric experience.

Distributed education

Distributed education

Different levels of ambition have been discussed con-
cerning distributed education with the help of tele-
communications. It is thought that complex systems of
the type usually called computer-aided-instruction (CAI),
at the moment define a too heavy systems investment.
(This is although interesting CAI research results at
the moment are being practically tested in Sweden.)

Rather, telecommunications aids of simpler, but still
interactive, nature will be used. In this way, educa-
tion (i.e. about the English language) will be distri-
buted to an interested population over large
geographical distances.

It is planned to compare individual access with group-
wise contact with the pedagogical material. Results
from such a comparison no doubt will be of expandable
interest.

An adapted university course is being developed at the
moment for the occation.

Communication aids for the handicapped

Increased communication for handicapped

A project has been defined with the aim of increasing
the communication possibilities for groups with
impaired hearing (the deafs). With the help of computer
supported typewriter terminals it is expected that
valuable and new communication patterns will be made
possible.

Two subgroups are to be active in the project, one
group of persons responsible for planning and organiza-
tion, and one group of ordinary members of the deaf
community. Also the members of the first group belong
to this community.

It is supposed that the telecommunication aids here
will enrich the contacts inside and outside the two
groups considerably. Especially interesting will
probably be the possibility for one or many persons
from "outside" to join the groups temporarily, at
adequate intervals, supplying active information from
the outside, news, cultural events, possibilities for
expanded contacts etc. Thus, dynamic windows to the
outside are created.

Telecommunications and energy consumtion

A special study is being undertaken with the aim to
throw light on the area of possible energy reduction
through the use of telecommunications as a substitute
for travel. Especially it is studied the interplay
between actual travel parameters, and the possibility
to replace certain physical person travels with
qualified use of telecommunications. Also, indirect
regional effects are studied.

One type of discussion that has been had here concerns
the so called "paperless office" and the possibility
to be able to execute working functions at home. It is
a fact, however, that only limited knowledge still has
been documented in this field.

It has thus become evident that so far very little,
if any, empirical and quantitative evidence exists in
this interesting field, a momentum for the future. The
difficulties in defining the problems, however, should
not be underestimated.

The Swedish study in this field is at the moment
primarily a qualified litterature penetration, out of
which it will be suggested possible routes for expan-
sion. Thus, the level of ambition here has not been
defined at the time this text is written.

RELEVANT TECHNOLOGY

As has been stated earlier in this report, the project
TERESE concentrates on <u>two-way narrowband systems</u>. It
is considered important to be able to get pilot studies
going as soon as possible, something which is supported
by this choice of technology. The hypothesis is that
much communication can use text and still picture
transmission, and that rapidly moving pictures - calling
for broadband technology - is needed in special cases
only. The practical studies will show if this is true.

For the number of pilot projects that have been defined,
the following technical application means will be used:

- computer teleconferencing
- dedicated computer application programs
- local computer power
- telephone services
- (possibly) telefaximile

A concentration lies here on computer teleconferencing,
a communication medium of considerable importance in
many application areas. A new teleconferencing system
has been developed for the occasion, as well as several
other application programs. These are to be run in a
local computer center in the town of Umeå, in the north
of Sweden.

CONCLUSION

The analysis of telecommunications as a means to promote regional development in Sweden can be said to have the following basic characteristics:

1. The promotion of regional development is held as the dominant factor, to which technical solutions are to be identified and implemented.

2. Information access and availability are given high priority, which leads to concentration on two-way narrowband technology.

3. An incremental project nature is stressed, where early start in limited projects quantities is given priority. This flexible approach stresses user influence and local initiatives.

4. An initially somewhat scattered pilot project family is planned to be concentrated in a further phase, where emphasis is to be put on two to three especially important project areas.

5. As the work continues, concentration makes it possible to apply more and more rigorous methods for social assessment of the development. All kinds of measurable side-effects will be taken care of.

6. The projects are in the initial phases totally governmentally funded. Later on, it will be investigated if joint private/public funding possibilities may exist, while ensuring the important social communication characteristics of the whole activity.