

Teklok **Report 43**

November 1988

Large users' experience of advanced telecommunications technology

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Holst Vedin Information AB

English version by Gull-May Holst

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Thanks for all help!

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THANKS FOR ALL HELP!

The author and the editors of this report have many to thank for a lot of information, knowledge, and experience, generously shared with us.

First of all, we want to say thank you to TELDOK, the organization which made this report possible by supporting us financially. But, even more important, we owe a lot to the people of the TELDOK Editorial Board. These knowledgeable persons have, as always, provided information as well as contacts.

During a period of time, a group of specialists in Holst Vedin Information have had the privilege to collaborate with TELDOK on a number of different projects. This has started a very fruitful and stimulating dialogue. Thus, the readers of this report should remember, that the three names appearing as authors and editors, represent a superficial editorial board. The contents represent, in reality, the thoughts and influences of many more individuals.

Thirdly, we owe sincere thanks to all those, representing corporations and organizations, making their considerable experiences and knowledge available to us. Our very special thanks to everybody, submitting to our interviews! We are convinced that a report based upon real life experience rather than an avid reading, is by far more useful to its readers.

Moreover, we believe there are possibilities to continue a dialogue with all these experts involved. Our report clearly shows, that we are right at the beginning of a process that maybe one day will become an integrated and very important part of the strategies of large organizations - that of developing, measuring, and pricing the effects of new information technologies.

Thanks for all your help!

Stockholm, Sweden, April 1988

Thomas Müller

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SUMMARY

This report is based on a number of interviews with representatives of some twenty corporations and organizations in Europe, all of them large users of telematics, i.e. systems for communication based on the marriage of telecommunications technology to computer technology.

Corporations tend to invest in telematics for defensive reasons rather than for offensive ones, in order not to lag behind their competitors. Organizations selling information or based upon flows of information are, naturally, exceptions.

The combination of transmission and transmission related services, software, terminals, and practical solutions is so complex that general overviews tend to be missing. Investments are made in bits and pieces, often assumed to be profitable, but without real knowledge and a total overview.

Old technology is not scrapped when new technologies are introduced - the new is simply added to the old. Reliability is the most important feature, and problems are related to the software available, in particular. Moreover, it is difficult to monitor how any communications network is used.

Resistance and resentment against new technologies are almost non-existing. Training is important but not very frequent. The structure of the organization does not change, to the contrary, one of the advantages of telematics is its flexibility and adaptability to existing structures. The exception to this is the service and maintenance organization.

Plans for the introduction of telematics can be kept, generally speaking. Or rather, they cannot be adhered to as drawn, since the users keep finding new solutions and possibilities and in order to realize these, new plans have to be made.

International standards and better services from the different suppliers are basic problems. Without detailed knowledge of ISDN distributed outside specialists' groups, ISDN is still seen as the solution to more or less all problems, whatever their nature.

Surprises

We assumed that telematics should have started to influence the strategic directions as well as the organizational structures of organizations. So many experts talk about the strategic effects, however, without being able to demonstrate concrete results. The fact that telematics do not require changes in

the organizational structure is seen as an advantage - but the new freedom to develop the organizational structures offered has not been discovered.

These are no apparent trade-offs other than costs related to the introduction of new telematics systems, with the exception of the choice of terminals - fully integrated all-purpose terminals usually expensive and complicated to use, or specialized ones for specialized tasks?

The great importance of standards is often stressed, also from the point of view that Europe can be seen as gaining a general economic advantage over a fragmented USA. But stressing standards adherence as a general policy, does not stop anyone from deviating from this, should it turn out profitable enough!

Video conferences are becoming more and more important. All persons interviewed also state that there is a large need to transmit electronic files.

We as well as the persons we interviewed had expected resistance against the new telematics systems as well as problems related to the introduction of the new technology. We were surprised by the generally positive and easy acceptance. Training further facilitates problem free introduction.

Instructions to the Reader

The introduction of this report is a description of the starting points, the objectives, and the work methods. The corporations are described in general terms. Readers content with the knowledge that we have interviewed European large users of telecommunications technology are invited to skip this chapter.

Appendix 1 contains general comments related to the development of the project. Appendix 2 contains a summary of the interviews, visit by visit.

After the introductory description of the objective, the first subject-related chapter describes the investments. Internal effects as well as influence factors - strategies and tactics - follow next, and then external ones, such as the competitor situation.

The competitor situation is influencing as well as being influenced by the investments. The organization is, after all, changed, but only partially, while individual work situations undergo considerable change. The need for training must not be overlooked.

The introduction of new telematics has a chapter of its own. It also contains a rudimentary checklist for the introduction of new systems and services. Naturally, the introduction itself is influenced by exactly what is introduced - thus different services are described.

At last follows a chapter on general views on international collaboration, standards, and, logically, lobbying. One of the many specific areas of problems lends itself to a detailed description, the one on how to plan for the future, a subject often ascribed particular importance.

INTRODUCTION: ON THE STUDY

Starting Points

"Large Users' Experience of Advanced Telecommunications Technology" is a tempting title for any project. The contents of the project, its objective and target groups are obvious. But second thoughts start generating a number of questions:

- Who are the large users?
- What should be included in "practical experience"?
- What is a proper definition of "advanced telecommunications technology"?

In order to make life easier for our readers, we want to share our definitions and our starting points.

A Large User

is an organization, a corporation or an association with many operating units with large international and geographical distribution, using telecommunications in their daily operation and depending thereupon. The need for communication, and the volumes of it, is directly related to sales, number of employees, and field of activity.

Practical Experience is related to the knowledge - and lack thereof - a user encounters during the installation of new equipment, new services, and/to the development of new suppliers of advanced telecommunications technology.

Advanced Telecommunications Technology In this we have included all kinds of equipment - hardware and software - and services possible to connect to or obtain through public as well as private networks in addition to traditional telephone services. The users of the services are located in many places, often over large distances. Personal computers are included when they are utilized as terminals in one or many networks, not when they serve only as local word processors.

The fact that technology is rapidly changing and how, thanks to a number of "new" applications such as intelligent networks, computer-to-computer networks, new switches, powerful workstations, and so on, will not be developed in this report.

Objective

The objective of the project is to draw an up-to-date picture of the users' situation - their experiences, reactions, needs and wishes, as well as their methods of interaction with the telecommunications authorities, with suppliers of equipment and services, and with competitors, in some European countries.

Moreover, this report is intended to convey an idea of how far the applications of advanced telecommunications and related services have reached. The contents are intended to serve as background information for users in Sweden and elsewhere, needing a platform to start discussions about and planning for their own future applications of the technology.

The objective of the report is not to give a full picture of the general situation in Europe, but rather to provide qualitative "snapshots", an instant portrait of the situation of the corporations and organizations interviewed. Some efforts have been made to find out if and how the new technology does influence the competitive situation, the markets, the organizational structure, decision making, and work content. We also tried to find out how consciousness of the changing situation has advanced, and what the differences are between industries and countries.

We believe this report may serve as follows:

- as background information for the planning of new "telematics systems"
- as providing checklists of possible problems and developments of importance in future utilization of telecommunications
- as offering guidance and descriptions of actual experiences, for discussions on internal strategies for telematics.

TARGET GROUP

Our target group is primarily corporations and organizations, busying themselves with planning and strategies for new and advanced telecommunications equipment/services.

WORKING METHODS

In order to pick and choose the most interesting organizations to interview and also to receive the most interesting responses possible from the large users, we started out by exploring existing contacts, of which we have quite a few dating back from earlier TELDOK projects. First of all, we were allowed to pick the brains of the past president of INTUG, the International Telecommunications Users Group, Mr Ernst Weiss. As

always, helpful and knowledgeable, he pointed us towards the various associations for industry and users, since long existing in France. So our first set of interviews were carried out in Paris. This gave us a good picture of the French situation. Moreover it allowed us to test our battery of questions, and, finally, we were put in contact with experts, earlier unknown to us.

The second set of interviews were based on the responses and contacts we received in Paris. This time, we found our respondees in Western Germany, Switzerland, Belgium, Holland, and the United Kingdom. Those countries along with France will have to represent Europe in this context - although very rapid and interesting developments are presently going on in Italy as well as in Spain!

For both sets of interviews, a battery of questions were put together in order to lead and control the discussions. In this manner it also turned out to be fairly easy to compare the answers and reach conclusions.

Some of the organizations interviewed asked us not to use their names related to specific responses, others did not want to appear at all. We want to respect these requests from our collaborators. Thus we will not report on each single interview, but only on anonymous responses and general conclusions. All responses are related to industries, countries or users of certain equipment.

THE ORGANIZATIONS INTERVIEWED

In total, we interviewed 17 organizations representing (also note the subsequent table):

- 12 industries in
- 11 cities in
- 5 countries.

Each interview lasted a minimum of two hours.

We had been correct in our choice and really did meet with large users. Thirteen of the seventeen organizations we talked to appear on the Fortune 500 list of the world's largest corporations. The thirteen large corporations employ

- 1,420 million people

and have a total turnover* of
- 267,107 million US dollars.

This means the average turnover* per employee amounts to approx

- 188,000 US dollars.

* For banks, we have used total savings figures.

Our ambition has been to choose large users, which in most cases also means large corporations. Moreover, we have concentrated our efforts on those industries, known to apply advanced telecommunications technology. Organizations having large resources are, of course, the most interesting ones, as well as those industries, to which advanced telecommunications are prerequisites for success.

Unfortunately the air travel industry is missing. Our journey had already started, when Lufthansa as well as British Airways had to back out for reasons unforeseen. It turned out impossible to include new dates into the program, by then rather full.

It also turned out that the insurance industry was difficult to reach and the most advanced users would not make themselves available, which accounts for why they are missing in this report.

Strategic planning and questions related to competition and competitive utilization of telecommunications are, of course, very sensitive questions. Because of this, our report has many limitations, not least regarding the possibilities to estimations of future applications related to specific industries.

<u>Industry</u>	<u>Total</u>
Banks	2
Hotels	1
Non-profit organizations	1
Chemical	1
Financial institutions	1
Computer equipment manufacturers	2
Pharmaceutical	3
Multinational consumer goods	1
Manufacturing control	1
News agencies/information providers	1
Petrochemical	1
Automobiles	2
TOTAL:	17

<u>Country</u>	<u>Total</u>
Belgium	2
England	5
The Netherlands	2
Switzerland	4
Western Germany	4
TOTAL:	17

COMPETITION - PRIME MOTOR OF INVESTMENTS

Who Invests in What, Why, When, and How Much?

The reasons for organizations in different industries to invest in advanced telecommunications, also offering opportunities for data transmission via different networks, are superficially many. But behind most of them, there is in reality only one single explanation, holding forth also in the long run: increased competitiveness.

Who?

Once you decide to analyze the picture of who invests, it becomes a necessity to find out who has a need to communicate. And - with whom is it necessary for an organization to communicate and for what reason? Some industries, take banks and news agencies, survive only by offering their clients certain services. Others survive by manufacturing goods for different markets. For these organizations information becomes a tool for a more efficient production process.

In many service industries - but not in all - the business idea is to supply information packaged in one way or other. News agencies and similar information providers use information as their final product. The same is, as a matter of fact, true for banks.

Banks normally operate their own information systems, accessible only to authorized employees to allow them to serve clients. The client interfaces with a banking organisation, in which the services are carried out by the employees. The exceptions are automated tellers and videotex applications. When interfacing with these, the client specifically asks for services, for instance information on his or her bank balance. So far, experiences from videotex-based services have not been all that positive - clients seem to refrain from using the services offered.

Information knows no borders, neither does money. The international money flow is ten times larger than total trade. In order to assist clients as well as possible, many banks have decided to build an international and global network based on a dense and reliable system for communication.

Banks basically have two types of clients. In the long run, they want to cut the costs of all services rendered to the average individual client with one savings and check account by providing electronic "do-it-yourself-services" often remote from the client's home. On the other hand, the banks want to tie large clients closely to their services, fearing that the very large users will start their "own" banks, should the existing banking systems not be global or efficient enough.

The news agencies and information providers normally offer a network and one kind of videotex-service or other. The user leases a terminal and pays for a selection of services, through which he or she can choose what information to buy.

One consequence of these services are high demands on the flexibility, the cost effectiveness and global distribution of the telecommunication networks utilized.

Satellite communications play an important role in some cases, in particular so when services must be provided in distant and only with difficulty accessible areas. On top of that, satellite technology fullfills all demands on flexibility.

Different organizations within the manufacturing industries apply differing communications structures, depending on their needs for external or internal communications. Communication structures are also influenced by, for instance, the geographical distribution of the R&D organization, and the manufacturing units, as well as by the organization of sales and methods and equipment for communications.

What kind of systems for internal communications that is finally chosen, depends on the degree to which the manufacturing corporation is located in only one city or region, or has units distributed all over a country or a continent. When a company is strongly concentrated to one location, telephone contacts are intense, as are personal contacts, which is not

the case for a company, geographically dispersed over several continents. It turns out that human beings tend to take advantage of geographical closeness - it is after all easier for a design engineer to walk down the hall to explain an unclear detail to a production engineer than to convey the same message by an electronic or CAD-based system. Video conferences seem to serve best in organizations where many but short meetings are needed and distance large.

Organizations depending on frequent external communication, most frequently with clients or independent sales organizations, utilize various kinds of systems for reporting, videotextsystems or just plain, ordinary telex, telefax and/or electronic mail systems.

What?

In general terms, most of the organizations we interviewed had already carried out or planned for the near future investments in hardware and software for one or all of the following services:

1. digitalization of the telephone system
2. private telephone nets
3. telefacsimile networks

Differences between the organizations were rather large in the following fields:

4. integration of the telex function into the Local Area Network (LAN)
5. word processing and document handling systems including communications
6. electronic mail systems
7. personal computers in LANs
8. video conferencing systems
9. voice mail systems.

The following table is an attempt to show the relations between industries and systems invested in. It must be stressed, however, that only relations that clearly appeared during our interviews have been included. Because of this, it would be wrong to conclude that issues not mentioned also means that a specific industry has no interest in that very issue. To the contrary, this is only an indication of priorities.

Industry	Has invested	Is investing	Investment planned
Banks	1, 2, 3, 4, 6, 7, 8	3, 6, 7, 8	Increased capacity, ISDN
Chemical	2, 3, 4, 6, 7	1, 2, 6, 7	
Computer equipment manufacturers	1, 2, 3, 4, 5, 6, 7, 8, 9	4, 5, 6, 7, 8	5
Medical	1, 2, 3, 6, 7	6, 7	5
Multinational consumer goods	2, 3		1, 5, 6
Manufacturing control	1, 2, 3, 4, 5, 6, 7		
News agencies/ information providers	2, 6, 7	Increased capacity	Increased capacity
Petrochemical	1, 2, 3, 4, 5, 6, 7		8
Automobiles	1, 2, 3, 7	7, 8	5 ISDN

When?

There are two basic situations, when investments are required:

1. Old equipment is substituted by new
2. New equipment/new services are added to existing ones.

Generally speaking, it seems from our interviews as if old equipment in the sense hardware is exchanged for new but very rarely the service it provides. Not one of the persons we interviewed could think of one single example of a service having been suppressed. In a few cases, we were told "that services which had not been accepted by the users have been withdrawn", but all of these cases refer to highly specialized applications and were in no case related to the advanced telecommunications equipment itself.

Transgression to a new standard, for instance X.25 or X.400 were given as reasons for the exchange of old equipment to new, also containing certain software. But, in all cases, it is a matter of hardware exchange.

The exact timing for investments in new services or new equipment is decided by a number of factors, such as:

- budget available
- old equipment has been written off
- a user or a group of users have asked for a new service
- major competitors have invested in similar services/equipment, making them able to deliver more efficient services, extend assistance programs or a more reliable service to their clients
- new equipment and applications have been made available in the market place
- agreement on one standard has made software available

- laws are changed
- cost savings.

In most cases, the user is the initiator of projects that more often than not end up in an investment in advanced telecommunications systems. In "our" organizations, the routine is that the specialist departments for EDP and/or Telecommunication analyse the specific needs and wishes of the users, and, based on their responses, propose solutions. The user scrutinizes the proposals, giving his/her reactions. And, if the reasons for the investment are considered to save enough money - or there are other good reasons - the decision is positive, and results in a new network, a new application - and new equipment.

So far, budgets have been the primary "decision-maker" for when a system or some equipment will be installed. This is still the case. Thus we found with one of the organizations we interviewed in France, that all resources available until the end of 1989 had already been used for investments in new PABX systems. This means that they will not invest in anything at all until 1990, when more PABX systems are planned!

Interestingly, our interviews show that it is fairly unimportant at what time new equipment and new applications become available in the marketplace. Many of the large users mentioned that they would like to start to use systems for electronic file

transfers, EFT, but they found this impossible currently, since there is not one single standard existing. There is a need, but so far no equipment or software.

The situation in the legal and regulatory fields is somewhat similar. So far, in Europe, it is still not permitted to utilize equipment compressing speech or data for transmission over the same lines. Everybody expects changes in the legislation, and thus a number of projects are prepared for such a day. One good example of this is the recent liberalization of modem sales. This triggered an explosion of PC users trying to get their own modems, a development stressed by several of the persons we talked to.

Why?

Increased competitive power is, consciously or unconsciously, the major reason for all decisions on investments. To estimate the exact value of increased competitive power is not only difficult, but impossible, since no tools are available, at least not to our knowledge. The future is equally unpromising.

Thus, the majority of our responses are not related to increased competitive power as a direct result of a decision to invest in advanced telecommunications technology. Rather, we were provided with a number of reasons, such as:

- time savings
- increased productivity
- rationalisation
- reduction of time consuming, manual work
- expansion without recruitment
- fast and accessible information on, for instance, financial data, sales figures, budget comparisons
- access to always up-to-date data
- increased capacity of existing communications systems
- cost savings
- increased profits
- increased quality
- increased contacts with the environment
- decreased time differences
- decreased geographical distances.

All of these factors are regarded as contributing to increased competitive power, not only productivity, rationalization, and savings.

Trying to convey our impressions of the amount of money each industry invests in telematics, is risking to elevate subjectivity to objectivity since facts are not available. We tried all the same to convey our "gut feeling", based on the interviews, whatever the conclusions of the following table may be.

Industry	Investment in advanced telecommunications technology
----------	--

Banks	+++
Hotels	++
Non-profit organizations	++
Chemical	-
Money institutions	+
Equipment manufacturers	+++
Medical	++
Multinational consumer goods	---
Production control	+++
News agencies/information providers	+++
Petrochemicals	+++
Automobiles	++

Evaluation scale:

+++	very large investment in relation to the total investment of the organization
++	large
+	not large
-	rather insignificant
--	insignificant
---	non-existent

THE COMPETITIVE SITUATION

Generally speaking, the interviewed organizations displayed a high level of consciousness of the fact that new telecommunications technology influences and changes their competitive situation. Interestingly enough, most of them expressed the belief that so far other industries but their own had been hit by this change. Their own industry and, in particular, their own company, had not been influenced yet. Industries representing obvious changes in competitive situation, induced by telematics, are, according to the interviewees:

- banks
- airlines
- insurance companies.

The banks confirm this, in their own replies to our questions as well as in their own investments and the high level of penetration of advanced telecommunications in their organizations. They gave the following reasons for their investments:

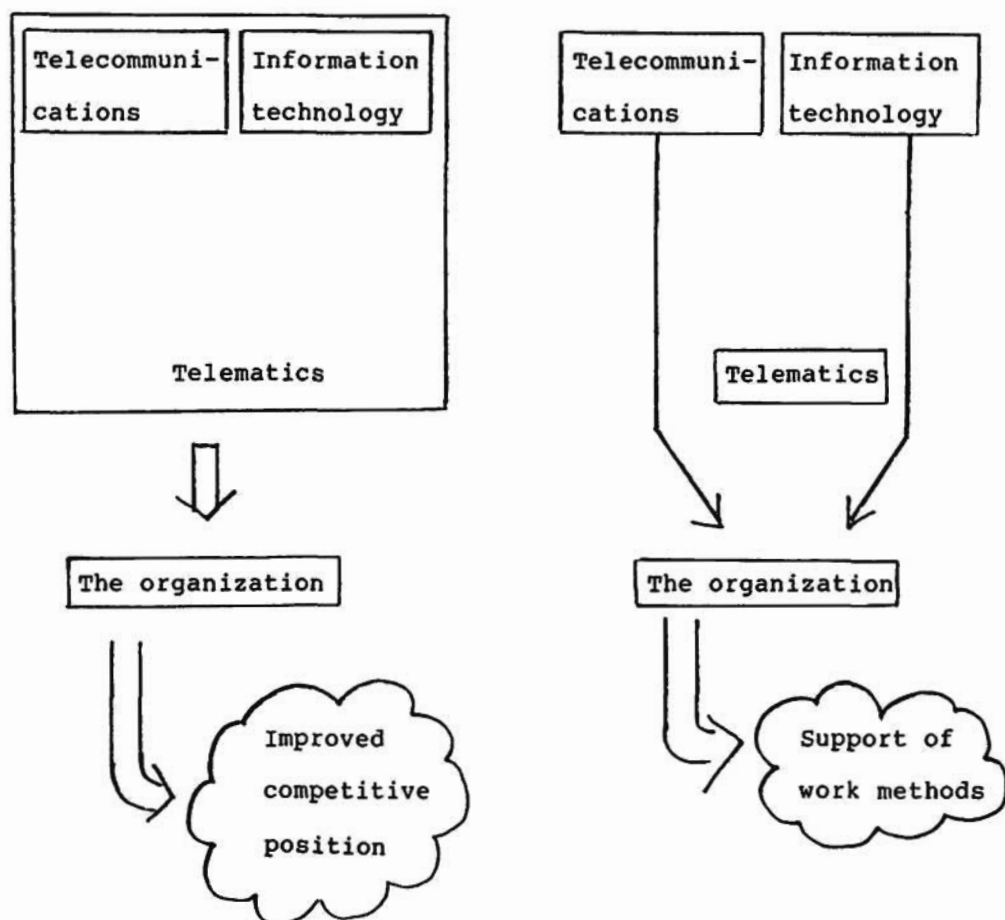
- time gains
- increased product quality
- rationalization
- possibilities for internationalization
- expansion in foreign markets
- increased sales support.

All of these reasons are closely connected to a desire to improve competitive situation. But simultaneously, it is stressed that the competitive situation represents the total motivation. We have reason to ask, if the actual investments are made in such small steps that consciousness of their effects have not yet surfaced, or that it exists, but is not expressed explicitly. Or - there may well be strategic reasons to hide the level of in-house consciousness?

In the first case, consciousness is suppressed, because decision-makers "don't see the forest for all the trees". The market works as a constant regulator of the competitive situation through specific, limited decisions, tests generating increased profit, etc.

In the second case, an explicitly expressed consciousness would demand more calculations after installation, better strategic studies, and so forth. It is also quite possible that there exists an organizational discrepancy between who is the strategic decision-maker, excluding telecommunications, and who "only" solves problems related to telecommunications by imitating competitors, by listening to arguments from manufacturers, or by accepting users' demands, in spite of the fact that these decisions influence competitive situation as well as long term strategy.

The experts responsible for telecommunications tend to look upon telecommunications and information technology as two wholly separated entities. They have little insight in the synergies, generated by the two technologies. Availability of telecommunications allows by far bigger and wider applications than those made possible by information technology within the limits of the organization. It is important to the planning that this is made clear, in order to avoid suboptimizing. The following figure mirrors this view for those who understand the possible synergies, as well as for those who do not see them at all:



Optimalization of the
total process:

- shortened product cycles
- higher product quality
- differentiated products,
services
- expansion
- larger profits

Supoptimalization within certain
parts:

- automatization of manual work
- document production for certain
staff
- information gathering, limited
utilization of information

The Market Mix

The ever increasing numbers of advanced telecommunications applications are influencing all activities to a larger and larger extent. The level of consciousness about this fact differs highly from organization to organization - sometimes it does not even exist at all.

Thus the market mix is used to build a model, dividing all activities into four basic policies, each of which is influenced by advanced telecommunications technology.

According to this model, the market mix consists of these policies:

- I Product policy
- II Pricing policy
- III Communications policy
- IV Distribution policy

The product policy includes research, development, design, and production. In all of these fields, telecommunications, as well as information technology, are of decisive importance. CAD/CAM systems, logistics systems, and different production systems are interconnected in advanced networks;

The pricing policy is, of course, all related to the pricing of a product. Here there is a lot of leeway. In order to price products correctly, a large number of facts are needed, all depending on exactly what you want to influence the price of your product. The price serves as a tool for market control, through price cuts, for instance. It also is a competitive weapon, and a means to target different niches. But sales systems, systems for cost follow-up, etc are other important factors, based on the function and the reliability of the communication system.

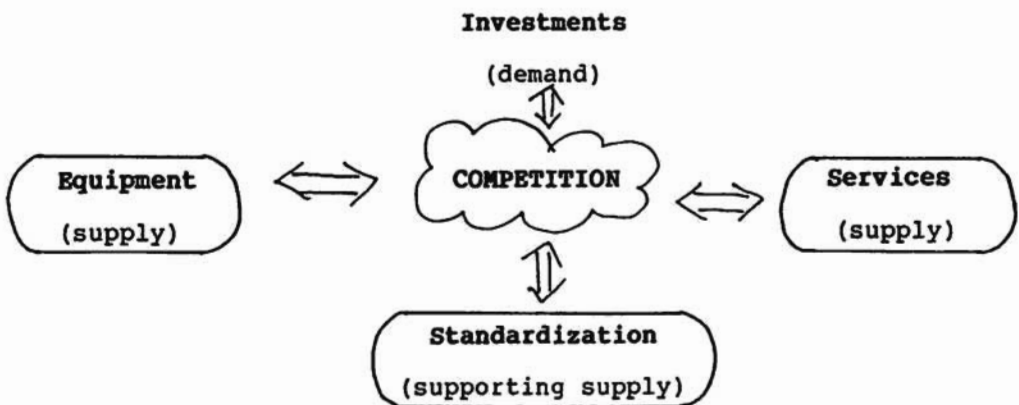
The communications policy decides how customer contacts should be treated. Quotation requests, advertising, marketing, and order handling are important elements, which may be affected by telecommunications. Some videotex applications have been installed (and interaction between cable-television has been tried). However, the much talked-about ISDN-network offers the greatest expectations to many organizations trying to decide their communications policy. To be able to transfer pictures of high quality along with all kinds of complementary information at high speeds is certainly a dream of many sales people as well as customers.

The distribution policy states how the products are to be delivered. Order handling systems take care of all paper-work related to product delivery, and sees to it that products are delivered at the right place at the right time. Sometimes, expert systems are required in order to make certain that all forms, installation and user manuals, etc are available for a complex, customized system. Drawings are transferred between design firms and manufacturing units via private or public networks, replacing courier services running magnetic tapes from one unit to another one. The same goes for installations of software. Enciphered information is transmitted from one point to another, in place of being conveyed by magnetic tapes. Such information can be the microcode of a software package.

The Influence of Competitive Power

If telecommunications technology offers increased competitive power under certain circumstances, does this become a sales argument for the manufacturers of telecommunications systems? And, in its turn, how does competition influence the telecommunications market?

In order to build structure into this question, we divided the market activities into supply related ones and demand related ones. Supply is in this case made up by the market offering of systems, equipment, and services, while demand in general consists of investments and investment plans. The work on common standards will little by little generate a larger demand for new telecommunications. The following diagram visualizes the interdependency between these elements in the telecommunications market.



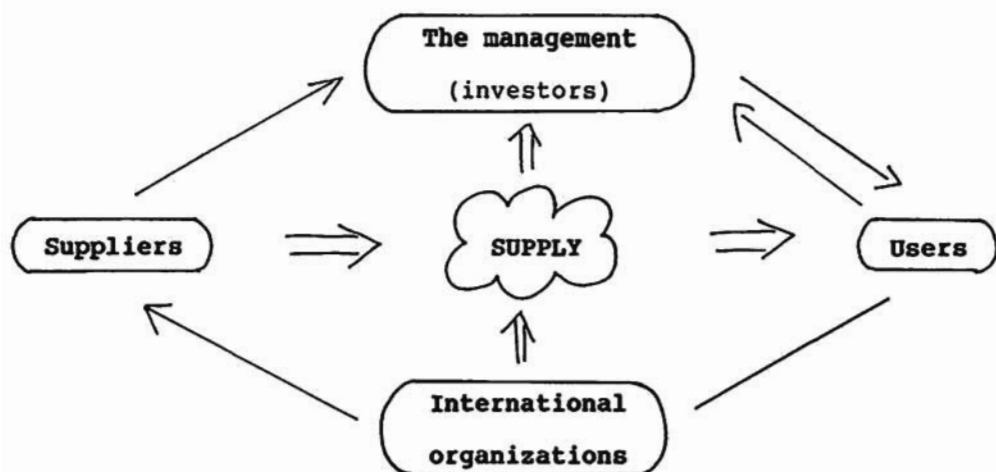
The supply of equipment provides a natural framework for the types of investments chosen. Resources can only be invested in technology available on the market. But a certain delay effect, generated by competition from the future exists, partly caused by progressing standardization - or description - of a new technology, not yet reduced to practice. Technology in this sense can be hardware equipment in its purest sense, as well as investments in very large networks, covering a total nation. Equipment supply changes as standardization progresses, and thus the circle is closed. This connection is illustrated by the filled arrows in the diagram.

Simultaneously, there exists a very strong interdependency between the different market elements and competition. The possibilities to influence competition also control the supply of equipment and services, and moreover cause investments and standardization efforts. The situation is dynamic since the competitive situation is changing continuously through the creation of new equipment, new services and standards, and through, sometimes considerable, changes in investment plans by corporations as well as by entire nations. These interdependencies are illustrated by the filled arrows.

The Influence of Demand on the Actors of the Market

Once we consider the actors of the telecommunications market, the previous diagramme must be exchanged for the following one. The suppliers are behind the equipment, investments are

decided by the management of the organization, the services are utilized by the users, and the work on standards is in practice carried out by international organizations for standardization - influenced by suppliers and users alike. The supply of equipment and service is the focal point. The following diagram shows the influence of the supply on the actors.



Our interviews show clearly, however, that the supply is totally decided by the suppliers only. Of course the supply is influenced by the international organizations for standardization, through the acceptance of new standards. But, almost without exception, it is the supply deciding what users can invest in and what applications they can implement. This is shown by the arrows.

The suppliers try to influence what equipment will be used and invested in through their contacts with the clients' organizations. Management offers the users different choices, demanding profitability and cost responsibility. The users forward their wishes and demands of what services they need and prefer, and also stay in touch with international standard organizations through interest associations, among others. Through these standard organizations, users influence the suppliers by demanding standard solutions.

Control of Investments and the Competitive Situation

Since investments in telecommunications often influence the competitive situation directly, the users should, after all, check that their investments really give requested and expected advantages and effects. How do they control that their investments really are advantageous?

Only in a few cases, the individuals we interviewed have an outspoken opinion of this situation. In general, they compare costs before and after the investment. When costs have decreased according to expectations, everybody is satisfied. In all other cases they decide to make further changes in order to improve the situation. There are in reality only very small possibilities to judge to what extent any qualitative objectives have been fulfilled.

Qualitatively oriented questions never appear - consequently neither answers to them! Has an increased number of contacts between individuals really resulted in better products and time saved because people are more accessible thanks to electronic mail, for instance? Another example - has the connection to the videotex network really meant an abundance of new customers?

It is almost impossible to respond to such questions. The reason is, of course, that telecommunications projects in particular often are but parts of much larger projects, which means that evaluations of sub-projects are next to impossible to carry out. Often they are integrated into a combination of different activities that together generate reasonable effects.

Another way of expressing the same thing would be to say that when new telematics systems are implemented, so many changes go with them, that it is not possible to compare effects before and after, within the very framework of one single organization. A proper research effort, carried out by external specialists, would be needed.

Or, the investments are made with the back against the wall, since the competition starts using the new technology, and forces everybody else in a particular industry to go along. It is, in reality, a strategic question, but nobody sees it this way, only as something they are forced to do. An evaluation is of no interest, since there has been no choice.

Finally, it is also possible to describe the problem of comparison from the point-of-view that "after" is amiss. The communications system is in a state of constant change, not only from a technological point-of-view, but also through a process of organizational learning. You only perceive a "before" but no end to the process of change.

Because of these factors, a majority of the persons we interviewed admitted that a large number of their investments in reality often are based on "gut feeling", and that they only rarely have factual knowledge as to what extent the changes have resulted in fulfilled expectations. In theory, it would be possible to actually invest in systems that are unprofitable, even causing direct losses. However, all interviewees thought this would be very unlikely to happen.

Competition as per Industry

Banking

Banks being service organizations, closely related to information handling, they compete mainly by offering their clients new or more efficient services. Access to communications with the bank free of charge is appreciated by the large users, while the private users want longer business hours, and more and differentiated services, such as buying theater-tickets at the

bank counter. Trading at all hours, day and night, is a service for the immediate future, which will increase competition. In this case, telecommunications are of central importance.

More doubtful, but feasible, new services would be buying gold bullions and changing currencies in automatic telling machines. You insert your credit card in the machines, and within a few seconds you walk away with your bullion, your gold bar! These services actually exist - not very practical, but they generate publicity, which is the main objective.

Hotels

For hotels, offering a service which primarily is not information but housing for the night, it is a matter of being able to provide fast and correct response to questions and requests from the client and to guarantee bookings all over the world.

Non-profit organizations

There is no competition within this "industry". The one dominating interest is to convey information as simply, rapidly, and cheaply as possibly.

The "products" of the institution are negotiations and other types of information work, and it all has to work in an international environment.

Chemical industry In this industry, the short term competitive situation has not changed, since telecommunications are used, almost without exception, internally only. Long term, however, the response seems to be "yes", but nobody has a too clear picture of what the changing competitive situation might mean and how it should be expressed, except for in better products.

Money institutes The present competitive situation will stay and remain unchanged. Those having advantages will hang on to them: it is necessary to draw on all advantages, and to continuously develop existing services. Once more, the "product" - and its quality - is directly related to the information.

Computer

manufacturers The competitive situation of the computer manufacturers will of course be influenced by developments within telecommunications and the information subsequently accessible.

Expectations are high on products and services, as well as for the sales organization. The typical feature of this competition, based on research and development, is that it returns to the starting point relatively rapidly and thus everything is as before. Regarding service and maintenance, telecommunications have made remote service and fault analysis possible. And this means a high quality service to lower costs, thanks to less travel, quicker repairs, etc. The manufacturers experience a permanent change because internal work and production have been rationalized regarding time, costs, and flexibility. The network of suppliers can be widely distributed and at the same time controlled more strictly.

In spite of the fact that the computer manufacturers belong to the telematics industry, the future tends to control itself - it is not possible to plan and act - rather they are forced to react.

Pharmaceuticals

In the pharmaceutical industry, the competitive situation only changes very slowly. It is true that the installation of advanced telecommunications results in shorter

time for product development, lower costs, and improved quality, all of which mean competitive advantages. But the long time required for product development also means that success is only visible over the long term. Telecommunications are basically used for internal rationalization and communications enhancement, which do not mean immediate visible external changes.

**Multinational
consumer goods
producer**

Within this industry, the subsidiaries are the heaviest users of technology, which has resulted in certain changes in competitive situations.

**Production systems
control**

"Our" corporation is so totally dominating, that in reality it does not even have to consider its competitors. The responsible managers are in the US, deciding what to do and what not to. But, again, this corporation lives on its "information work", and thus telecommunications are central tools. Thanks to its dominating market position, the corporation might

regard these tools as nothing but tools for optimal cost efficiency.

News agencies

It is rather difficult to talk of competition for an organization, perceiving itself as gigantic in relation to its competitors. In many aspects, they compete with the local telecommunications authorities and videotex organizations - on an international level. This situation is caused by advanced telecommunications - that is to say, it has opened a very wide market, and changed competitive structure.

Petrochemicals

Advanced telecommunications have not changed the competitive situation for the oil industry, since the normal status is that everybody is watching everybody else. Time gains along with the response that "we need telecommunications, because that is the way we make business nowadays", are the only responses available. Those who do not use modem communications will lose competitive advantages in the future.

Automotive

The automotive industry pays a lot of attention to advanced telecommunications to be used in the sales organization,

in research and development, and in design. By hooking up the customer to the production lines early, and more closely to the sales organization, the customer can have his/her car tailored in detail, without having to decide at a very early stage what extras to add.

STRATEGIES AND TACTICS

From the very outset, one of our objectives was to find strategies for different industries and decide if these strategies really differ. If they do, for what reasons, and do the users think that existing strategies should be changed for the future? Had they maybe already changed earlier?

It turned out to be difficult to achieve our objective. The word "strategy" is frequently used by the interviewees, but it is used synonymously with a large number of other words and concepts. Thus, "strategy" may well mean "goal", "objective", "reason", "application area", "investments criteria", "activity plan", and so forth. Sometimes the word is also used as equivalent to **tactics**. Tactics normally mean that the ideas of the strategies are turned into real life activities related to all the inertia of reality, its surprises and restrictions. Tactics are often designed and realized on a lower level of the organizational hierarchy. It also spans a shorter time.

The responses we got to our strategy-related questions on investments in telecommunications were all related to tactics! The following covers the few strategies we encountered. They are not always contrary to one another, but rather complementary.

Capacity

Within banking, the general strategy is to invest in very large capacity in order to ensure that the systems are flexible at the very moment flexibility is needed. The fundamental reason for installing capacity is to build credibility for the internal communications system among large users. Banks, after all, sell credibility when installing capacity. And banks sell credibility, because often competition is just the capacity of other banks, it may as well be the investments in in-house systems of clients. Credibility along with more and satisfied clients result in a strong balance sheet even if the large network capacity is not motivated per se.

Large capacity also works as an incentive to creativity, to the development of new services. Moreover, it allows the user to get accustomed to extra capacity in such a way that the user grows into a larger, meaningful, and resourceful system.

Transmission costs become cheaper per unit, if you, for instance, replace four 14.4 kbit cables with one single 64 kbit cable.

The situation is similar for the news agencies.

Within banks, large investments also go into speed. Systems and transmissions have to be very fast since clients never accept long response times.

Integration

A different strategy is to work towards full integration of all services. As a result, white collar employees become very mobile within their organization, and they have access to different systems, external and internal information centers, global telex networks, and so forth, from literally any terminal anywhere in the organization, at any time.

Many specialists think of and talk about integration as something actually saving money. One network with integrated services is cheaper than several concurrent ones - maintenance costs are by far much larger for many separate systems and networks. Moreover, it becomes very cumbersome having to house and handle more than one terminal per desk.

Large users are particularly so much better off managing one network for all kinds of transmission, for data, pictures, and text, on top of voice communication. Instead of converting in a completely new network, or instead of connecting to a public one as new services become available, they already have sufficient capacity as well as the right media.

Standardized Equipment Equivalent to Compatibility

One more strategy, important to large users, is to consistently invest only in telecommunications equipment and services, developed according to internationally recognized standards. The

objective of choosing this strategy is to avoid compatibility problems and to create possibilities to expand the network freely for different future applications, such as X.400, corresponding to all seven levels of the OSI protocol, and X.25, corresponding to the three lowest levels according to the OSI protocol. These are the most utilized and searched for among all standards available today.

To work towards an international standard leads to integration, since, evidently, lack of standards stops different services and equipment from integration.

Standardization work can be carried out at two levels

1. for applications.
2. for networks.

By applying international standards, it is possible to develop and convert existing software in order to make it OSI compatible on all seven levels, which in practice means X.400 compatibility.

Regarding networks, the tendency right now is towards integration and adaptation to one common standard, the three lowest OSI levels, corresponding to the X.25 interface.

One of the pharmaceutical companies we interviewed is applying this very strategy. But the X.400 standard not being finally settled, it is currently possible to adapt networks and systems to X.25 only - and this is a cumbersome and costly task.

Tie-in to Hardware Manufacturers

One frequently mentioned aspect of strategies, is the choice of hardware manufacturers, when buying equipment. One of the representatives of the pharmaceutical companies made a clear distinction:

IBM equipment is most frequently utilized for commercial applications, while Digital Equipment (DEC) is more frequent in research and development environments. DEC seems to be frequent also for database applications. Hewlett Packard has its strength in applications for graphics and plotters.

One of the bank representatives had divided the equipment manufacturers as follows:

DEC	- is utilized for trading in securities and metals
IBM	- is for applications related to management support, marketing information, and electronic mail
Unisys	- provides accounting systems for top management
WANG	- is a specialist in word processing and electronic mail

Our research shows that all large users stay with the large equipment manufacturers. The basic reasons for this are: they are well established in the market place, they can deliver, install and maintain worldwide, and they are expected to offer service as well as compatible equipment in the future as well.

Externally Developed Software Replaces Programs Developed In-house

Altogether, in the software field there are as many trends and ideas as there are large users - the picture is far from uniform. Most of the representatives we met seem to be convinced that for all applications software should be bought if at all available in the market place. But the picture is very varied, depending on the complexity and specialization of the application.

Decisions whether to buy standard software packages or to develop your own, customized, seem to depend on the type and character of the application - the size of the application and its competitive relevance are two important factors. Banking and financial institutions along with manufacturing companies are more active in developing their own applications programs than corporations looking for solutions to their general communications problems only.

Moreover, there are differences between programs for telecommunications and other applications. It seems as if large telecommunications users develop programs in-house for telecommunications rather than for applications.

Towards an Open System

Many large users stress their need for an open system, making it possible for the external world to tie in to the organization. Open systems are achieved through the implementation and application of international standards. This fact becomes evident when listening to representatives of the hotel, credit, and banking organizations, to the computer manufacturers, the pharmaceutical companies and the automotive industry. The way they see it, at least customers and suppliers will in the future get an opportunity to hook up to the internal communications systems and databases of these organizations.

Costs

With some organizations, the importance of costs was stressed. Studies of efficiency, analysis of costs, and studies of the information flow are parts of important basic information scrutinized when decisions to invest in new telecommunications systems are made.

Judging from our interviews, the cost factors make up the most important strategic point, of great relevance for the planning of the future. There are, however, some exceptions: one automotive corporation and one pharmaceuticals company stated

the necessity of being able to invest in pilot projects without expectations of reduced costs. Often, in such cases, other advantages never foreseen by the planners appear, making these pilot projects particularly important.

The Total Situation

In banking it turned out to be of particular importance to have a general overview of the total situation in order to avoid solutions that would not be efficient in the long run. The need for communications is, in most cases, closely tied to business strategies and objectives. Because of this, investments and strategies must fit well together in order to prioritize the best solutions for the whole organization. Reasons having their roots in tactics must not be confused with strategic ones.

Strategies for Implementation - One Example

The specialists of the non-profit organization provided us with their officially announced strategy for the implementation of systems for information and telecommunications. Their strategy turned out to be applicable to a number of the other organizations visited. This is a summary of the strategy, freely translated and not directly quoted:

In order to implement a communication architecture in a successful and balanced way, a strategy is necessary. The strategy should secure that standards are created as well as adhered to, for present as well as future applications of information technology. The following aspects are especially important:

- * The process, through which standards are developed, must be accelerated. Our institution as well as its members have already prioritized this, as well as industry has. It is of particular importance that the work carried out by CEPT is closely followed.
- * The collaboration between the institution and different manufacturers of information technology related products and services should continue and be extended to new areas, in order to ensure that new standard solutions to problems are developed and that all solutions for existing products are made available for all the market.
- * The collaboration between the telecommunications authorities of different countries must be strengthened in order to allow identical implementations of standards within different public areas. Without this collaboration, the intercommunication will be inefficient and expensive - high costs for communications, even for the most standardized solutions, will be typical.

- * The collaboration between the member organizations should be continued through new, common projects within the areas of standardization and internal communications. This is particularly important for the efforts towards integrated solutions, which must not result in a separate integrated network, outside the national public one.
- * The customer relations within and of the member organizations, specifically regarding the utilization of telecommunications, should be evaluated so as to result in a policy, based on information and specifications from all parties involved. Compatible equipment and options should be chosen and systems tests should be possible to carry out in a systematic fashion, making the results comparable.
- * Simplified and well known routines for the assistance on problems related to hardware and software should be implemented for future needs. This should result in:
 - Distribution of the tasks of up-dating. Specifications serving as the basis of the institution policy;
 - Possibilities to introduce new products and to enhance existing architectures, when news are introduced to the market;
 - Reduced work-load for the manufacturers related to assistance and support of the users;
 - Simplified routines for the testing of products, dissemination of the testing procedures;

- Dissemination of this policy and of new standards, to the manufacturers as well as to suppliers;
 - Careful and specific information regarding demands of importance for future assistance functions.
-
- * The users must be made aware of the fact that the strategy has been developed and adopted in order to strengthen the process of standardization, and that instructions for the utilization of hardware and software must exist;
 - * Equipment not concurrent with the common strategy and network architecture must be exchanged. New equipment not fulfilling the demands of the strategy must not be installed. This is the only way in which standard solutions can be supported.

A strategy leads to concrete choices in practical situations. One representative of the pharmaceutical industry formulated a number of practical solutions in the following way:

- Not quite adequate solutions are accepted in order to support the strategy;
- Standards only may be used, even if non-standard solutions today offer better solutions;
- Preliminary standards should be supported, for example FTP, TCP/IP and future adaptations of these;
- An unambiguous position towards the manufacturers must be achieved;

- Look for collaboration with exterior users;
- All efforts towards standards should be supported actively,
for instance MAP/EMUG, DFN, DIN
(EMUG = European MAP Users' Group; DFN = Deutsche Forschungs-
netz)
- Convince those who work on short term solutions of the
importance of the long term strategy.

Planning for the Future

Planning for the future, in our context, covers the time frame on which the interviewed organizations believe they can a specific and detailed opinion. Naturally, there are differences from corporation to corporation, from industry to industry, even from country to country.

There is also an individual element. Depending on whom you ask within an organization the answers differ. We believe a number of factors cause this: position within the organization, experience, personality, and the number of years employed are a few of these factors, influencing the way an individual approaches the question.

Remarkably many tie their response to the budget planning cycle and mention a period between 12 months and five years. In those cases when ten years were mentioned, the descriptions the long run planning results becomes vague. One common part of the interviews is, however, that ISDN is looked upon as a last resort symbolizing whatever will happen long term.

Many make it clear that it is very difficult to have exact opinions about the future, in particular so, when they are asked about events that they are expected to act upon. This requires a wide knowledge and a deep involvement, which most simply do not find the time for.

To conclude and generalize, large users are relatively poor at planning for the future. They do not predict any specific developments, which they intend to use and exploit. To the contrary, they are of the opinion that an innovation needs five years anyway, to become established and commercially exploited. And this is used as a reason why it is not all that vital to plan for the future. One example often mentioned is telefacsimile technology, which has required a very long time to become accepted, despite the fact that the technology has been available for a long time.

There are, however, exceptions, which are commented on in the following pages.

The Combination of Satellite Communications and Fiber Optics

News agencies are already heavy users of satellite communications combined with local fiber optic networks. They are convinced that this development will be reinforced. Satellites will to a larger extent than today be used to reach regions, difficult to access otherwise, while regions with a good infrastructure will be covered by fiber optic networks. This is likely to result in an increased combination of satellite and fiber optics, and this is also what the manufacturers in the industry are planning for. Moreover, many expect a lot from the trans-atlantic fiber optics cable and are planning to connect to it.

Telecommunications and Electronic Data Processing

The computer manufacturers stress the closer relations between telecommunications and electronic data processing (EDP). According to some specialists, electronic data processing will become increasingly important, while telecommunications will lose importance. One reason is that the telecommunications networks of tomorrow will be completely expanded, which they are not today. Today is a period of expansion. The need for electronic data processing will continue to increase, also increasing the utilization of the established public networks.

The conclusion of this approach is, that the investments of the future will to a larger extent be dedicated to EDP rather than to telecommunications. According to this view, almost everything in telecommunications has been invented already, and accordingly there is no great need for as large resources as previously. What remains to be done is standardization, which means finding ways of agreeing on how innovations should be applied. The resources are thus needed for applications development.

Planning for the Future in a Banking Project

One of the concrete projects we encountered will serve as an excellent example of how planning for the future can be done. It concerns a banking project, which was introduced during a seminar on networks in banking. The seminar took place during the first quarter of 1987.

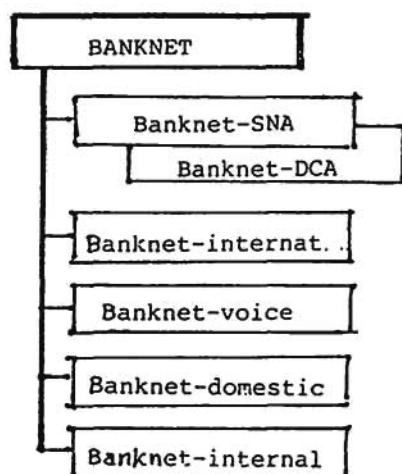
The multi-owner banking network, BANKNET (an invented name), is a privately owned network, serving as a back-bone for worldwide communications. The network integrates voice, text, data, and picture, as well as video. It supports the operating online system for electronic data processing, a nationally developed system, as well as the equivalent international system. An integrated "Management and Office Support System" works via BANKNET as well. The project is one of four key projects for building the world-wide, jointly owned banking network.

The objectives for BANKNET are:

- to offer communications facilities
 - * for all to all
 - * through standardized protocols
- to offer transmission links
 - * immediately
 - * at minimal costs
 - * whenever they are needed

- to ensure connectivity to all existing and future standards in order to realize a policy of free choice of manufacturers
- to guarantee the integration of communications services.

The following figure demonstrates how the project is divided into sub-projects:



BANKNET-DOMESTIC was implemented in 1986. It is exclusively based on digital transmission links of capacities of 64 kbit/s or 2 Mbit/s.

Today, multiplexors of the Timeplex type are installed throughout the network. All old, analog cables have been exchanged for new, digital ones. Among the advantages are very fast and good access possibilities and large cost savings.

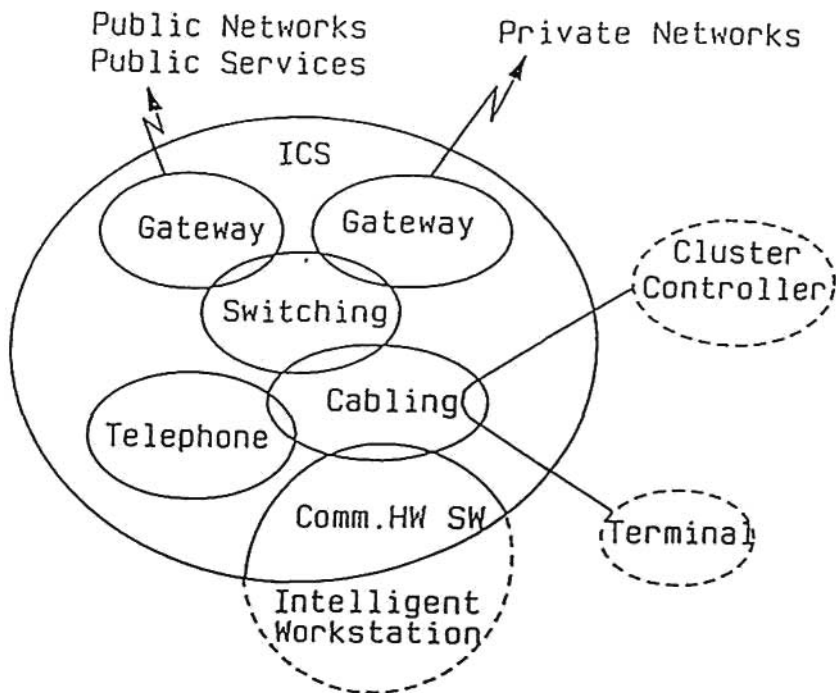
BANKNET-DOMESTIC is already a private integrated digital network - IDN - and lends itself easily to a conversion to ISDN. Until December 31, 1986, the following types of cables had been installed:

capacity	number of cables
34 Mbit/s	1
2 Mbit/s	10
64 kbit/s	113
9,6 kbit/s	1,238

BANKNET-INTERNATIONAL is a worldwide computer communications network, based on packet-switching. X.25 is the common standard protocol. The next step will be an integrated network for voice, text, and data transmission. Thus the bank will have a private ISDN network.

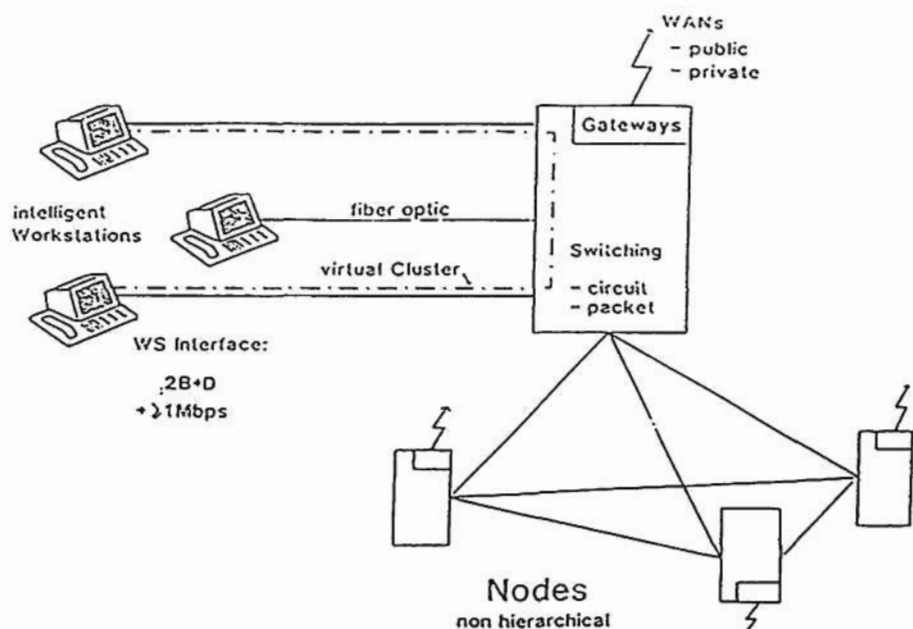
BANKNET-INTERNAL will become the focal point for future telecommunications systems. The Internal Communications System will be the center for the jointly owned telecommunications system, supplying internal communications facilities as well as gateways to private and public regional networks. In order

to define long range strategies, intense studies have been carried out over the past year. Among other things, the major suppliers worldwide have been asked to come up with their proposals for possible strategies, covering all functions that can be integrated into an internal communications system. Functions such as packet-switched and circuit connected communication, gateways to private and public networks, cabling, simple telephones, hardware and software for communications adapted for intelligent workstations, should be considered.



Once the manufacturers had given their suggestions, the bank started to work on the definitions for the final configuration. The system should be based on integrated servers, distributed at a high level, but non-hierarchially, in order to offer high flexibility, possibilities for expansion, high reliability, and survival capacity. All these key demands relate to the communications needs of any bank.

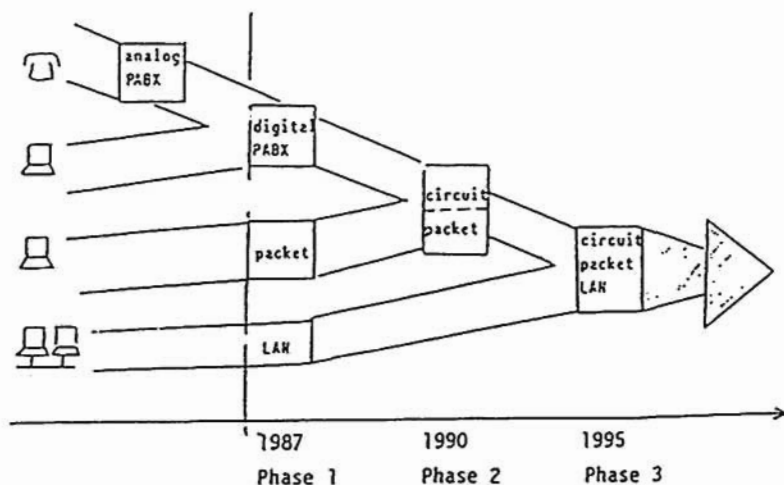
Each server must connect to circuits as well as packet-switching, and moreover, to what the bank describes as "virtual LANs", for instance Ethernet. But these have to be integrated in the packet-switching node and work over the same cables.



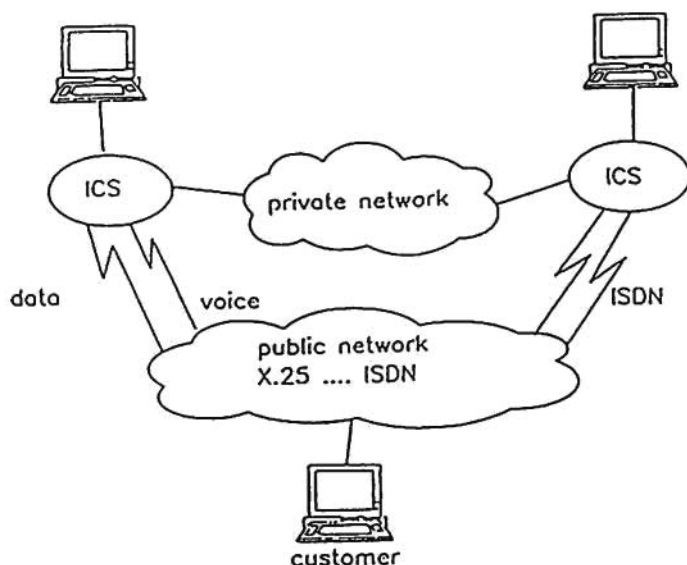
Once the demand for adherence to common standards was fulfilled, it was obvious that X.25 and ISDN were needed. The information received from the manufacturers resulted in these conclusions:

- it is possible to build the final configuration now
- all equipment needed is not available today, but will be
- thus, a "conversion plan" will be needed
- all manufacturers involved have said they accept ISDN.

The first step in the conversion plan is to connect all voice applications and all existing computer users, normally on a management level, by electronic private switches. An X.25-interface will be installed for the professional computer users. The integration of circuit switched and packet-switched services will happen towards the end of the 1980s, while the virtual LAN not will be realized as a commonly accepted standard until the mid-90s, as shown in the following figure:



The Internal Communications System, ICS, as the center for all future communications, will be the basis for the interfaces and gateways to international users and private and public networks.



The interfaces between the internal communications system ICS and the public network must be standardized. They will leave the analogue voice communication and the database communications systems of today, interfacing to X.25 via X.31 in order to reach ISDN. The hope is, that in the future, ISDN will be the only standard interface for telebanking, electronic mail, and electronic funds transfer. Because of this, all banks need to keep a close eye on all ISDN trends continuously.

Within the bank, the need for ISDN services is limited to 144 kbit/s, which does not cover all needs, however. The bank has already installed cables of 2 Mbit/s and 34 Mbit/s between a limited number of host computers. In a way, the second step has already started - the one making the bank a user of **broadband ISDN**.

THE EFFECTS OF INVESTMENTS

One aspect we wanted to know more about is the ways in which investments in advanced telecommunications technology have changed

- the structure of the organization
- the decision making process
- the work situation
- the need for training

within different organizations in various industries. The answers we received were very varied, maybe not so surprisingly.

The Work Situation

When we speak about the "work situation", we have in mind the ways in which individuals interface and interact with new technologies and the new environments created by new telecommunications technology.

Should we make a general statement, it would be that obviously quite a lot of telecommunications tools and information technology are used, but the users tend to see them as tools only, not as instruments enabling them to delegate work tasks to be solved at "lower" levels of the hierarchy.

It is also obvious, that a change in what tools are being used has taken place. One such general trend is away from telex towards telefax and electronic mail systems.

Below, we will draw a detailed picture of the situation - industry for industry - on how investments in current telecommunications technology have influenced the work situation and, along with it, the ways in which information technology is utilized.

Banking

The work itself has not changed very much, in spite of the new technology. The same kinds of operations and transactions as before are carried out - although almost all of them are executed by terminals of one kind or another.

It is the methods of working that have changed rather than work itself. All payments are made by so called on-line systems, real-time banking. Operations like trading in shares and money certificates, in currencies as well as in bullion, are all carried out from terminals. But - all users stress that for security reasons there is no total integration regarding information access.

Against all beliefs, the number of telephone calls, telex and telefax messages are increasing, in spite of the high level of automatization due to the computer systems. This can partly be explained by the growing market and the international expansion. The other part of the explanation is that the systems generate an increasing number of detailed questions, and moreover, one may assume, that there is a rather high level of uncertainty among the users about what the systems really can do. We did not look into these factors, though.

According to one banker, the work load per individual has increased due to the fact that the new tools make it possible to work much faster, and to carry out many more tasks than earlier.

Hotels

Hotel service, generally speaking, has become international thanks to the computerised booking systems - most questions can be answered via terminals. Earlier you had to rely on letters sent by mail or telex.

Letters and telexes have been replaced by electronic mail. The future will see even more of this. The booking systems will continue to be developed, and more and more functions will be added - and integrated.

Computer equipment manufacturing

The organizations we interviewed describe the situation differently.

One of them says very explicitly that document handling, such as word and text processing together with graphics applications, frequently used, because every employee produces his/her own documents. The marketing department is in many cases the pioneer - in this department there is one terminal for every two employees. Within the total corporation, 30 percent of all employees having expressed a need for a terminal, have one on their own desks. The production of diagrams, tables and other graphics materials have been made much simpler.

Another manufacturer has studied the need for terminals in detail, and provides each employee with the exact equipment everybody wants and needs. This has caused a rather unusual situation regarding the word, text and graphics treatment. About 50 percent of all employees at headquarters have a personal secretary, looking after typing and production of graphics. These materials are checked and corrected - exactly as in the good old days. The change is that today four people may well share one secretary, since the secretarial work tools have become so much more efficient. The rationales behind this situation are two - costs and the difficulties related to change in personal habits.

Chemicals

A change in production methods is predicted for the future through the implementation of CAD and CAM systems. These will cause the following organizational changes:

Research work is changing to some extent:

- Numerical values from different measuring tools are processed by computers. Thanks to new discoveries being made, analysis is becoming more exact;
- Researchers produce all their documentation on word processing and advanced filing systems. The idea is that all researchers on the same level should have access to the information. But there is a conflict of interest among two opposites:

- * free information dissemination

- against

- * security

The very same conflict caused by the new information technology generates quite a few problems. Where should boundaries be drawn? When does internal information become external? Who has and who should have access to the information? Is it possible

for competitors to get access to strategic data?

Moreover, people jealously keeping their own area from intrusion by others is another problem that may well be related to the internal boundaries created by the organization.

The solution to this specific problem is in reality only a massive set of negotiations and, eventually, a more flexible system.

Financial Institutions

Continuous change and improvement generated by the implementation of new services, systems, and networks make it necessary to span over a period of two years. Today's users are totally unlimited regarding geographical location, which is new. Integration is fairly advanced, which, in turn, has generated a rather high level of flexibility.

Pharmaceuticals

The situation within this industry does not differ substantially from the others. One representative tells us that the ways in which tasks are carried out have changed radically:

- Access to information and accessibility of information have increased, everything is much simpler;

- Documentation exists to a by far larger degree;
- Information about the products from your own company as well as about those from the competition can be retrieved from data bases;
- Sales statistics are available in data bases;
- Terminals are available all over the organization, which means decentralization. A certain type of work is not bound to one specific desk;
- Secretarial pools and filing functions have disappeared
 - all typing is done directly via terminals.

A second pharmaceutical firm found, to the contrary, that work tasks had not changed very much and that telecommunications only serve as support. The fact that telex, telefax, and different electronic mailbox systems are used has not changed the ways in which the individuals work. Word processing and photocopying have certainly meant much more for the daily work than the possibility to get hold of individuals and information via new systems for communication.

A third representative for this industry expressed the view that work content had not changed at all. However, all work is carried out supported by telecommunications equipment. As one example, the X.400 protocols were mentioned - they help cutting the number of telexes, while mailbox systems cut down the number of telephone calls.

Multinational Food Producer

The timing for our interview turned out a bit unfortunate for this specific organization. They had taken a decision to build a database within two years for information about all their subsidiaries. The parent organization will change once this has happened, and new work routines will be implemented.

Word processors have to some extent already changed the tasks of secretaries, but they do not communicate between themselves over their systems. Communication is still carried out by telephones, mail, and telex.

Manufacturing Control Systems

It is not the telecommunications technology changing the organization in this particular case, rather to the contrary. But there is no doubt that the practical work has changed. Terminals have replaced manual labour. Messages are written by each single employee and distributed directly to the receiver, all via electronic mail and telex, services integrated with the internal production system.

Petrochemicals

Information technology is most frequently used by the EDP department employees. Electronic mail as well as the integrated telex service are the most frequently used functions internally. Within the head office, "utilization is increasing exponentially" as one representative explained it. Within two years, every employee having any reason whatsoever to use a terminal, will have access to a work station on his/her desk.

Automotive Industry

In this industry, tasks have been made simpler as well as more efficient:

- The control functions of budget and project management are carried out by computer-aided functions;
- Accounting and book-keeping have been reduced to input of figures to the system, which produces all reports needed;
- Systems for sales and ordering of spare parts give the customers easy access to information about the status of their orders and also facilitates changing these;
- Stricter payment control with less work becomes feasible.

Working with terminals as tools have replaced many different manual tasks.

NEED FOR TRAINING AND THE LABOUR MARKET

Training - A Matter of Who You Are

Training is generally regarded as very important. But our interviews yielded one large inhibition. Training is important when telecommunications are implemented, but all training efforts are temporary only. The most important thing is that the employees have a good basic and rather general education.

A new employee will normally be trained on how to utilize existing systems for telecommunications and information. When a new service is installed, all persons involved will be trained to whatever extent is needed.

The largest need for training is expressed by the departments for running and maintaining the systems. The development of new technology, at present being very fast, generates greater demands on the skills of engineers. Training of experts thus becomes most important.

Moreover, basic education on how to utilize computer systems - computer literacy - becomes more and more important. This is specifically applicable to expert systems. The following table illustrates the need for training according to one manufacturer:

Systems	Training
voice-based systems	low
office automation systems	low
video systems	low
computer systems	high

The amount of training actually offered to the users varies from industry to industry and from company to company.

One computer manufacturer, seeing himself as a pioneer regarding the utilization of information technology and trying to sell fully integrated systems, said that the employees on an average are trained for one to two weeks a year.

A representative for one of the pharmaceuticals companies, said that their average employee is trained during two days a year in the use of information systems. He regarded this as a lot of training.

A representative of the petrochemicals industry told us that those who need to be trained are sent to the central training department. This is done by request of the employees themselves only - and this system works well. The corporation always works in this way - everybody is free to chose.

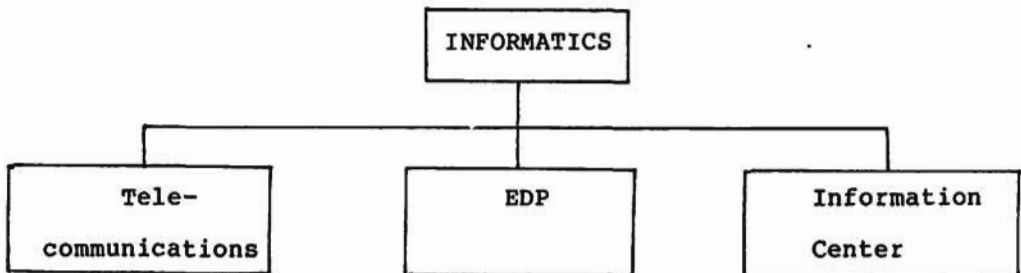
The Labour Market Cannot Provide Manpower

One consequence of the expansion many corporations are experiencing, coupled to the rapid technology development, is that there is a shortage of certain groups of skilled people in the labour market. Training in the utilization of telecommunications technology cannot bring down this shortage. To the contrary, telecommunications have contributed to the creation of this shortage - because it has made it possible to expand very rapidly into new markets.

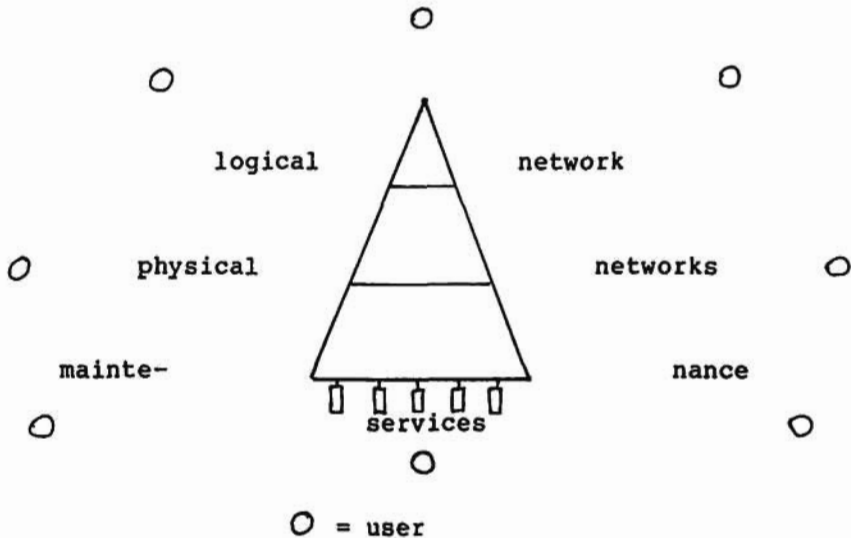
ORGANIZATIONAL CHANGES

The question to what extent there has been changes within the organizations, caused by the implementation of advanced telecommunications technology, generates a large number of responses, as expected. However, some general conclusions can be drawn:

- The organization of the user is **not** changed just with the goal to utilize new technology more efficiently. To the contrary, the new technology adapts completely to the organization already existing. It is exactly this quality which is regarded as specifically advantageous with this new technology.
- In most cases, the EDP department has been integrated with the departments for telecommunications and user support. The new, enlarged department may be named "Informatics", the design of which is shown below. Obviously, the telecommunications, the data processing, and the user support functions, have so much in common, that they have to be integrated.



- The department for informatics takes on the function of supplier to all users within the organization. Consequently, the "customer", i.e. the user within the organization, addresses his/her wishes regarding services, equipment or assistance in the implementation of a software package to that department. The following figure shows how the tasks of the informatics department can be divided into different levels, and where the user belongs:



The communication can be divided into different levels:

- * logical networks - types of networks
- * physical networks - the expansion and nodes of the network
- * maintenance - control and function of the network

- * services - possible applications
- * users - people actually utilizing the services

The informatics department plans, and realizes the different levels, and sees to it that everything works according to plans. It is also the specific task of the informatics department to develop alternative solutions, and to advise the client/user as to which solution is the best. Depending on the power of conviction of the department, the client/user accepts one alternative, and along with it, the full financial responsibility for the service, the network, or the equipment. In this way, it is believed to be possible to control the effects of the investments in the best way, as well as to control the return on investments and keep it positive enough;

- Even if the total organization is not affected, the departments for maintenance of the systems, networks, services, and equipment change radically. The changes in technology and new solutions make it necessary to adapt existing organizations to the new network architectures and services. The presently rapid technology development generates personal recruitment problems as well as possibilities to expand into new markets - and this, in turn, may cause similar changes in other departments;

- Project-based organizations must be planned and adapted to the new circumstances.

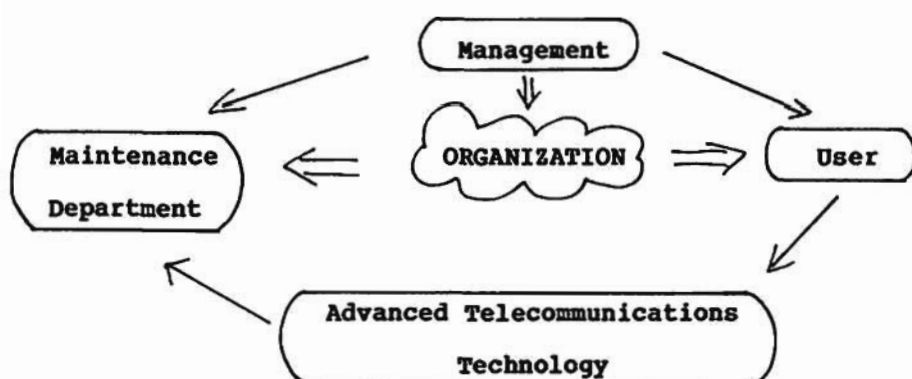
There is a general consensus among most organizations, that the user environment is not changed and neither should be changed.

But, there are exceptions, of course. Four among the organizations interviewed, expressed a consciousness of the fact, that the adaptation process of new communications technologies to the organization is a mutual one. This is particularly obvious within "service organizations", such as hotel, financial, consumer goods, and automotive corporations.

Everybody also made clear that whatever the organizational processes are, they are very slow, and thus radical and rapid change should not be expected. Within the petrochemical industry, some thinking has been going on as to how the new telecommunications technology might influence and change the organization. Some even seem to be planning for changes, but these plans are still very recent and in the process of consideration. The one industry representative did not want to be more explicit, the situation being a sensitive one.

The Interaction of the Organization with Its Environment

We have tried to demonstrate how the organization interacts with the telecommunications technology in the diagramme below. It shows who is influencing whom. It depicts the general situation of today.



Management instructs the maintenance department as well as the users on what technology is appropriate, considering the overall objectives and strategies of the organization. It may well happen that for instance centralization or decentralization and/or a changed decision making policy are recommended.

The maintenance department and the users decide, each on their own behalf, what kind of telecommunications equipment or service might help fulfill the objectives as well as the expectations - or whether this is at all possible. If not - and this is the most common case - they will consider the advantages as well

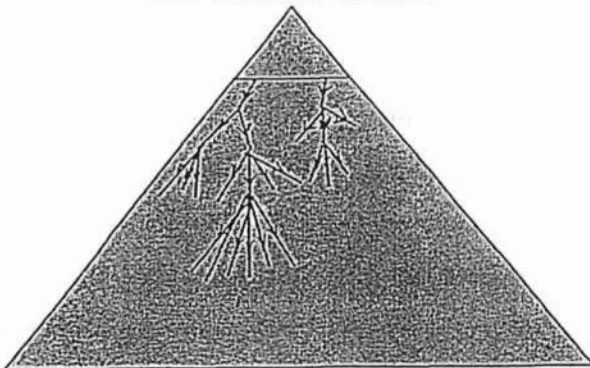
as the disadvantages of the advanced technology in the short term. The filled arrows in the diagram indicates this.

In real life, an organization is created and decided upon by management - including one historical consideration: past managements and their ideas. This is decisive as to how the maintenance department as well as the users are organized. Generally, there is no connection between the organization and the advanced telecommunications technology. The ways in which the new technology is adapted to the organization is transplanted down the organization. It is decided by top management, demanding their subordinates to carry out the decisions.

The Future Cooperation within the Organization - a Dream Only?

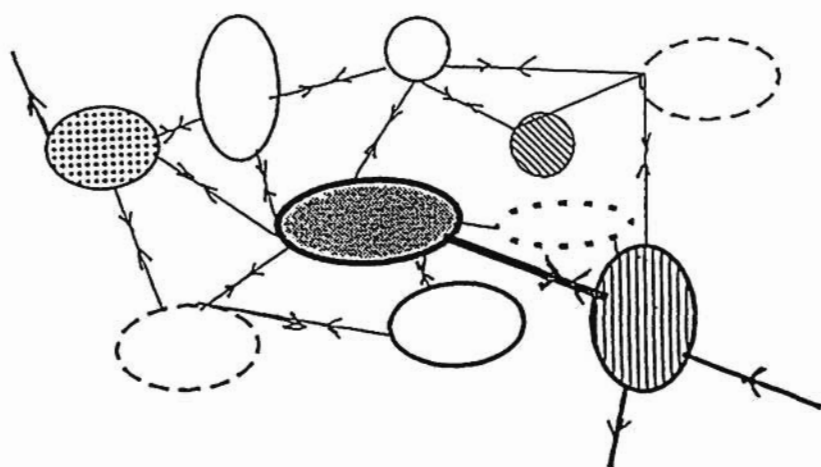
Today's situation is frequently compared to the "pyramid society", characterized by the existence of many and well defined management levels. The function of the boss is to know "best" and to distribute instructions on how the tasks shall be carried out.

THE PYRAMID SOCIETY



The information society differs - see the following figure. Its organization is that of a visible or invisible network, connecting different tasks related to knowledge and to knowledge workers. The function of the leader is no longer to "know everything", but to keep in efficient contact with all the nodes in the network in order to extract relevant information for decision making. So far, only very few organizations and large users have expressed an interest in operating like this after the installation of new telecommunications systems, services, and equipment.

THE INFORMATION SOCIETY



c. Stig Hagstrom, 870105-3

The communications structures of the pyramid society as well as of the information society are made explicit by a number of researchers, one of them being professor Stig B Hagström of the Stanford University of California, U.S.A. They all call attention to the incapability of organizations to adapt to the new tools provided by advanced telecommunications and information technology. Not understanding these opportunities is in reality equivalent to not utilizing their full potential and built-in theoretical effectiveness.

Regarding the figure above, demonstrating how information technology and organization interact today, provides a starting point for a diagram on how the relations conceivably ought to be, considering the emerging structure of the information society:



Management should be freer to state objectives without having to decide on the exact organization. The network would organize itself. Or, it is possible to choose freely, without historical

or technical blocks, an organization adapted to the particular objective to be achieved - maybe even several different organizational structures for several objectives?

This approach is making progress, which is proven by the changed position of the petrochemicals company, and a few representatives of other industries. Some said that it is too early to look for organizational effects, since most advanced systems for telecommunications are under construction and expansion. Maybe we will see measurable effects within two years, telecommunications being the core of a process, influencing all parties, and making more satisfactory solutions available, as demonstrated in the diagram above.

Urgently needed are models and examples, liberated from established ideas of how organizations "should be".

One Small Organizational Change - A Case Study

We actually have just one example of how a change in organization and responsibility can happen. However, it is a rather insignificant one, but maybe an indicator of future trends:

Office Automation Systems make it possible to book conference rooms rapidly and with immediate feedback. These booking systems are handled by secretaries who have taken over responsibility from their managers. The secretaries keep records of bookings,

changes, and print out the weekly schedules. After the week has passed, he/she passes the schedules for signature to the boss.

The system allows for immediate changes, the schedule is not printed out until after the event, the manager wanting correct information. Thus the signature of management approval happens after the event, which means that in reality the secretaries have taken over the real responsibility, without anybody paying attention to it.

The office automation system has generated a change of responsibility. There are numerous examples of this. But unless managements understand this and change the internal approval policies accordingly, permitting their subordinates to take on certain responsibilities, the organization loses money. Each approval cycle is costly.

CHANGES IN DECISION MAKING PHILOSOPHY?

So far, the possibilities offered by the new telecommunications technology have hardly been used for organizational development. The same applies to decision making. Hardly anybody has even started to think in new terms and patterns.

To forsake to utilize and take advantage of the possibilities to delegate tasks as well as responsibility to "lower" levels,

giving access to enormous quantities of information, and thus tools to control capital flow, budgets, and sales in order to enhance the planning instruments of the future and to draw trend scenarios, seem to the researcher to be nothing but a waste of resources. Telecommunications offer, after all, more and better opportunities to implement more applications, to process more and better up-dated information, and to generate and maintain more new contacts - faster and simpler.

Some of the persons interviewed were of the opinion that the lack of changes in the decision making philosophy is related to the general policies of the organizations. Below some quotations:

- We have seen a certain centralization, in particular regarding investments in telecommunications technology. The demands on compatibility and security have resulted in decisions on investments being made at a higher level than previously;
- The level of decision making has not changed. The decisions made, however, are supported by statistical information from proprietary data bases, making decisions easier;
- The formal flow of information has not changed, only the demands for speed and lower costs;

- The structure of decision making and responsibility have not changed. People in a certain position must always have the right to decide, because only they have the total overview. The new technology does not generate sufficient overview to change the decision making hierarchy.

The discussions regarding centralization versus decentralization are phenomena reappearing periodically. Because of this it is impossible to predict whether the new technology will result in the one or the other, according to one specialist. We will never have the "correct" answers.

THE IMPLEMENTATION AND SERVICES OF TELEMATICS SYSTEMS

Implementation Problems

There are quite a few and varied problems, related to the implementation of new telecommunications technology, such as telematics systems. In our interviews, we did not, though, find any problems, related to one specific industry only. Below is a listing of the most relevant problems. But we have also listed a few expected problems, which never occurred, as well as advantages, expected and unexpected. The figures within brackets indicate how many interviewees who actually brought up that specific point.

Problems that Occurred

- Bad service regarding availability of lines, long waiting lists, long installation periods by the telecommunications authorities (2).
- Delays caused by insufficient personnel and financial resources.
- Large efforts by in-house specialists required to check out the quality of the information. This is particularly relevant to service organizations, surviving as information providers.

- Double sets of equipment needed, as well as networks being designed in such a way that there always are alternative communications facilities, should one piece of equipment or cable fail. Reliability is everything. (2)
- The software is of so low a quality, that it has to be thoroughly tested. The same goes for the hardware. (8)
- The users frequently "misuse" the new systems by sending too large and too complex documents left and right through the system. The result is that short and important messages never get through. In the worst cases, the total system collapses. (2)
- Doubts about so called compatibility between products and manufacturers make checking procedures unnecessarily cumbersome. Better standard adherence is required. (2)
- The need for user training is badly underestimated.
- Differences in the legal and regulatory structures between countries cause difficulties as well as severe delays of installations of worldwide networks and global systems.
- The complexity of the systems is underestimated.
- Change of manufacturer causes unnecessary installation

problems such as increased costs. The result is delays.

- Tools - software - for control and checking out of the network workload are not available. Thus it is impossible to check if the given guidelines really are adhered to.
- Availability of a large network requires checklists of when one or several parts are out of operation and which ones they are, this in order to avoid the risks of overcrowding and blocking the total network.
- A large system causes the address lists and directories to age rapidly.

Interestingly, quite a few of these "problems" are caused by the systems being "too good" and thus "too frequently" utilized.

Expected Problems that Never Occured

- New systems were accepted with evident enthusiasm by large majorities of the users, which was surprising - acceptance problems had been expected. (3)
- The systems functioned better than expected.
- Unplanned for and unknown user needs were discovered.

WHAT ABOUT THE ADVANTAGES?

Advantages that Did Occur

- Thanks to the fact that the Systems Operations Department surveys the workload constantly, is it possible to switch the traffic between public and private networks, according to where the lowest prices are.
- Faster access to and availability of financial information, sales statistics, etc.
- Expansion without increase in staff, difficult to recruit.
- Communications are easier and simpler.
- Thanks to PC menus it is fast and easy to find persons as well as information needed.
- Manual tasks could be reduced more than anticipated.
- More time for creativity - the systems take over the execution of monotonous, time consuming, and unqualified

- Specific advantages are ascribed to systems for electronic messaging:
 - * Highly improved possibilities for discussions
 - * Individuals feel freer to communicate - status and titles have lost some of their importance, creating a more informal climate
 - * The possibilities to produce high quality presentation materials have increased quality as well as design, generating better understanding among audiences
 - * Information on products and spare parts being available from databases makes planning easier.

Advantages that Never Occured

- Products as well as services badly needed are missing. One example is software for electronic file transfers.
- The high transmission capacities of some PC networks cannot be utilized effectively, since communication with host computers only happen at lower transmission speeds.
- External communications have not improved since the system has no or very little distribution outside the organization - the island dilemma.

One of the persons we interviewed, produced a separate list of disadvantages he had found in electronic messaging systems:

- Users have no awareness of facts such as the very long time required to transfer long documents with graphics included. As a result, many large documents are sent this way and that way, consuming all capacity and blocking off brief but important messages. In the case of this particular user, the number of pages for any document has been fixed, and all documents require a minimum transmission time of six hours;
- Voice messaging is overlapping with electronic messaging. This makes it difficult to plan in detail for the future;
- Europe is at great disadvantage due to the prohibition to join two nodes with one public and one private line. It is not allowed to transfer from a private network to a public one. Because of this, voice messaging systems cannot be used in places not covered by the private network;
- Presently, the users do not want too many services on their terminals. It is a matter of cost. And those who really need many services are equipped with highly priced, fully integrated workstations.

CHECK LIST FOR THE IMPLEMENTATION OF TELEMATICS SYSTEMS

What is important to consider when implementing new telematics systems? What problems are related to such installations. We have collected knowledge and information in a checklist of the most important points project managers and decision makers ought to consider before the implementation of a telematics system. We also tried to get information from the people we interviewed, since this task really requires hands-on experience. But we found very little consensus among the interviewees. Either they provided us with extremely detailed action plans, backed up by a considerable amount of statistics, which is impossible to condense. Or, we were told that each project was *unique*, and because of this it was impossible to make general overviews.

In the end, we were given a concise checklist, used by one of the organizations. We have completed it with other important points of view for the benefit of our readers, whom we think will get a rather complete picture of where the critical points of the implementation of telematics systems are.

The most important properties are in two areas:

1. Reliability
2. Cost-effectiveness

Decisions to install a system can be taken based on concrete facts related to each of these two factors. Our checklist is based on facts, generated in this way:

- a) Analyze the total need for capacity. It is important to include also future needs, because such estimations are influenced by such a multitude of factors. But - should this prognosis be completely wrong, the whole project is in jeopardy.
- b) How a large cable capacity is needed and what is available? When will the capacity required be available?
- c) To what extent is the planned system "legal"? Is the network legal as planned? Is all equipment legal and allowed to be connected? Will the network be allowed with all its planned extensions? What transmission technology must be used, according to rules and regulations? Obviously, it is very important to be able to read and understand laws and regulations and their applications.
- d) For multinational networks and systems - does all equipment adhere to local requirements, and is it accepted by local telecommunications authorities in each country? Is it compatible with existing equipment with those you need to communicate with? How do different subsystems in your own system interconnect? It turns out that manufacturers know dismally little or nothing about these important factors, particularly so in cases where they have no local representation.

- e) Coordination between the purchase and installation of equipment and installation of connections is a must.
- f) Differences in requirements for in-house resources for national and international communications - installation, operation, finance. These differences should be clear before negotiations on service, maintenance, equipment, and legal matters start.
- g) Service and maintenance contracts - who is responsible for what, when, for how long, at what cost? Additional terms and conditions?
- h) Training of the users, the operators, the in-house service and maintenance people? In those cases where the computer literacy level is high, there normally are no or very few problems in using the new equipment.

TIME PLANNING

Almost all persons interviewed agreed that the time planning of the introduction of telecommunications systems caused no problems whatever. We met two extremes - those who always kept within their time schedules, and those who were constantly overdrawing their schedules, convinced that this is a second

nature of the systems. Most frequently, projects tend to be prolonged because of new requests from users.

A frequently reported situation on delays is when all equipment and the network are installed, but the application software is not yet developed.

More reasons for delays are:

- Problems within the project organization, i e:
 - * too weak management
 - * lack of experience and expertise
 - * different opinions of hardware and software manufacturers
 - * etc
- Bugs in the hardware and software, which have to be straightened out;
- Changes of mind of customers as well as in add-on services;
- Misunderstandings between the buyer and the supplier;
- The long processing time of local telecommunications authorities;
- The differing national laws and regulations, making the project more expensive and more complex;

- The often very high complexity of the systems, causing internal staff resources to become insufficient.

The planning cycle depends to a large extent on the mentality of those involved and their understanding of a number of psychological aspects. For instance, in cases when no timeframe is explicitly expressed, projects tend to never be finished. Thus it is in most cases better to settle on a reasonable date, keeping in mind that **something will** happen. In this way a project gets a good take off and reaches almost to the finish line within a reasonable time.

One of the experts interviewed stated that those responsible for planning never must allow earlier-than-schedule installation of subprojects, since this also causes a lot of confusion and direct delays of other parts of the system.

VALUABLE AND NON-VALUABLE SERVICES

We also asked the large users about their appreciation of the communications services offered or available in the near future.

Large users with a telex network integrated into their local area networks and those hooked up to electronic mail systems do not regard telefacsimile as important as those not having

any of these services. Telefacsimile transmission is most frequently used for external contacts and when pictures have to be transmitted.

Telex services are still very widely used. Nobody would like abstain from them. The one particular advantage of telex is that texts can be worked over and re-relayed to new recipients, which is not possible with telefacsimile. New telex services offer the possibility to link telex to personal computers.

Teletex is a service heavily criticized. The major argument against this service is that word processing linked to telex is already part of all systems integrating telex. Moreover, the total number of users is low.

Telebox was mentioned by one interviewee only. He is based in West Germany, where the interest apparently is not very large and the users very few.

020-numbers seems to many to be an easy-to-use and interesting function. It is seen as positive to be able to offer clients almost free telephone calls with the company.

Diary Functions, integrated into many systems, seem to be of no value whatsoever. The individual situation of the parties involved is vital. Thus it seems to occur that certain persons fill their electronic diaries with fake bookings just to look

busy. Anybody, wanting to book a meeting with that particular person, has to contact him/her anyway, which results in more bookings and re-bookings than would be the case if the diaries were operated manually.

File Handling Systems are of little value. Whether files are kept in order and up-dated is entirely up to the individual. These systems have not offered anything new in spite of the many who wish to believe so.

The judgement on **videotex** varies widely from industry to industry. Banks and automotive companies are convinced that videotex contributes to improved customer relations. Information dissemination to bank clients is a very positive thing, and the banks are looking to ISDN for improved services.

Order handling and spare parts requests are very important to the automotive industry.

Less consumer oriented industries and organizations see no advantages in videotex - they rather tend to regard it as a mistake. There is also a lot of malcontent with the incompatibility between national videotex systems. The French and the German ones are, for example, totally incompatible.

Voice Mail Systems were even mentioned by two interviewees only. One was rather sceptical to their usefulness, while

the other had some personal experience. His opinion is briefly: A voice mail system works like an answering machine, which you manipulate remotely through your pushbutton telephone. For sales people, constantly on the road, and without possibilities of carrying heavy equipment, this function is of value. The voice mail system can be tapped at any time by its users.

Telephone Conferencing is a somewhat out-dated service in comparison to videoconferencing. Technical problems caused by echoes and delays by satellite connections are considered very irritating. Moreover, the discipline required for successful telephone conferencing is regarded as a negative factor.

Video Conferencing is, interestingly, used as well as tested widely by large users. The advantage is that more informal and brief meetings can be conducted. To be able to show pictures and sketches is important and considered positive by for instance the design departments of the car industry. The banks appreciate the possibility to get immediate reactions and facial expressions during important negotiations.

Travel seems to decrease, but so far only marginally. The great advantage is that the number of contacts increases, which generates higher quality results and decisions. Many users found the service forbiddingly expensive, but once prices decrease, it will definitely be an interesting alternative.

ISDN is highly regarded by most people interviewed. They are looking forward to being able to use it, although it is very unclear exactly for what it will be used.

Generally, some of the critics claimed, that it is impossible to adapt large users' demands to security, reliability, capacity, service level, etc. Each organization has different demands on voice, text, picture, and data communications, which will end up in them using private networks, which today are under construction for this kind of communications. In their opinion, ISDN is a service mainly for the consumers and, to a limited extent, for small organizations.

FUTURE SERVICES/EQUIPMENT

Unfortunately we cannot provide you with a very clear picture of what is going to be the real hit in the near future, when it comes to new communications services and equipment. There is no consensus on what may change the daily tasks radically. Some indicated, however, that they have high expectations for some alternative equipment and services.

Electronic File Transfer between different systems is a much asked for service, which does not exist today. New and proprietary ways to find solutions to the problem are investigated. Hopes are high that the standardization efforts will result in systems for electronic file transfers. This service appears at the top of the wishing lists of many organizations.

Scanners are not widely used today. Some large users are convinced that they will play an important role for future personal computer applications. To some extent, they will be a development of the facsimile technology.

Colour Terminals and high resolution terminals will be more frequently used. It is expected that prices will decrease, which automatically will result in dramatically increased investments in these colour graphics terminals.

Desktop Publishing will be commonly available in the future. Already, many large users have installed such systems, but so far they function in isolation rather than integrated in networks. It has to be said, though, that desktop publishing systems are tools for experts only. Users without specialist graphics knowledge will still produce second rate results.

Mouse Handling for terminal and keyboard interface is by far the fastest tool for menu access.

The Personal Computer may well become even more important in the future. New LAN connectivity facilities will provide it with mainframe power via connections to host computers. The combination of this and the possibility to use your own applications stored on discettes, may turn it into a highly competitive tool.

Voice Mail is likely to become more widely accepted, particularly so by people spending most of their time away from their offices.

Video Conferencing will grow in direct relation to prices decreasing.

TRADE-OFFS - DO THEY EXIST?

"One you win, and one you loose" - the old saying is a good way of describing how trade-offs work. To find and well define actual trade-offs in telematics systems is difficult, and becomes more so once you have to find advantages also causing some disadvantages.

The responses from our interviewees were all dominated by how **good** the telecommunications systems are, and how **well** the advanced telecommunications and information technologies function. The only draw-back, or direct disadvantage they could find, turned out to be the high costs.

Below are listed the advantages and disadvantages of the new technology, as rendered by the interviewed experts:

Advantages

- + time savings
- + increased speed
- + easier to handle negative messages - no defence is needed
- + time differences caused by geographical distances are easily bridged
- + informal exchange of information
- + increased flexibility regarding work tasks, geographical location, and time frames
- + more time free for creativity
- + information gains - more good ideas can be handled and processed, and information really made accessible

Mixed Blessings

- +/- Increased specialization results in more narrow but deeper knowledge.

Disadvantages

- personal contacts lost
- information may be lost due to too poor language
- high initial costs
- high costs when improved results are required
- increased complexity decreases transparency and overview.

INTERNATIONAL COLLABORATION AND LOBBYING**How Strong is the Consciousness of Standardization?**

Standardization efforts have high priority with all organizations we interviewed. But the direct support of these efforts and the actual application of existing standards, differ largely from organization to organization.

Some large users proclaim explicitly that only standard solutions are accepted, while others choose non-standard solutions in cases where standard solutions do not fulfill their demands for quality and reliability. "We must not become enslaved by standard", is one view expressed.

Everybody is expecting much from the OSI protocol and most are positive to a common European ISDN standard.

INTUG - The International Telecommunications User Group

A few of the large users are members of INTUG, The International Telecommunications User Group, which is an international association, carrying out studies, participating in the standardization work, operating as a forum for information exchange, and initiating certain lobbying activities, in order to influence authorities, PTTs, and standards. The objectives of INTUG:

- INTUG actively supports the interest of the international telecommunications users, and ensures that their points of views are properly and effectively heard during discussions and policymaking sessions.

INTUG takes a special interest in the following questions:

Controlling the rules and a monopoly situation is not the same thing. The problems are complex and all aspects are carefully studied. In any case, monopolies should not hit more and new areas.

Discrimination of users regarding access to communications networks is actively resisted. All users, regardless of size, shall have equal service and access to cost effective and reliable networks.

Full freedom to choose equipment is an item close to the heart of INTUG. Any obstacles to the free utilization of available equipment will be forcefully resisted.

Collaboration between institutions and corporations is actively supported. If public authorities and corporations work towards the same ends, the results of these efforts should be better and cheaper networks and services for the user.

The large users are of the opinion that it is important to stand united in front of PTTs and other authorities, while at the same time the very large users collaborate closely with local telecommunications authorities.

For this reason, a number of national organizations exist, striving to unite the users and to influence local authorities. In France, we visited with three of those organizations, all of them having objectives similar to those of INTUG.

But there the similarities stop. The local representatives seem to concentrate almost entirely on telephone systems. One feasible reason for this is that France in less than ten years turned from being a truly underdeveloped telephone nation into one of the most advanced ones in the world.

European Competitive Power

Some large users pointed to the fact that Europe has an excellent opportunity to increase its competitive power over the US. Common rules and regulations and common standards result in more effective and cheaper communications facilities.

Typical of the US of today is the large number of incompatible equipments and systems, which, at best cases, may communicate via gateways. Thus, the gateway market is considerable and ties down large resources. These resources could be used for

more meaningful and creative work. After all, a whole market survives only because it offers something not needed if international standards were available.

Europe could turn into an advantage the fact that the continent, because of all local restrictions, so far has not been flooded by incompatible equipment to the same extent as in the USA. Thus, the standardization work is very important - and potentially very rewarding - to Europe.

LOBBYING

The large users carry out their lobbying efforts mainly by participating in and supporting users' organisations, such as INTUG. One of the explicit objectives of INTUG is to lobby by representing the users at international conferences, offering possibilities for informal discussions. This is in reality the only way to build consciousness with PTTs and telecommunications authorities.

Outside the users' organizations, very large users also have opportunities to negotiate directly with the PTTs, and sometimes with the equipment manufacturers as well. Very large users have a relatively strong position in that they combine being large users and large customers, and thus stand a chance to influence specialists and PTT employees. Direct contacts are most frequently employed when organization specific objectives are to be achieved.

Thanks to these contacts, large users can negotiate favourable prices and agreements, as well as they will receive advance information on policies and intentions of local telecommunications authorities.

When we asked about how it is possible to measure the results of these direct contacts, the response was that success is directly related to the terms and conditions of the negotiations, as well as to the fact that each time this particular large user calls his local authority, the top man is always available!

WISH LIST OF IMPROVEMENTS

When asked about priorities for improvements, the interviewed persons for once expressed more or less the same views. Their "wish list" looks like this:

- liberalization of the right to utilization of common equipment and common cables
- improved transfer facilities between national and international cables
- lower tariffs
- improved transfer facilities between different public networks

- increased speed with the extension of fiber optic networks for, among other things, video conferencing
- common rules for utilizing services and equipment to build global networks
- guarantees for quality and maintenance
- improved access to carriers; private ones are not always guaranteeing access, since local regulations stop an efficient utilization
- standardization of equipment and software
- faster introduction of ISDN
- faster transfer speeds between countries
- improved coding systems for banks, via cards, for instance
- fewer delays in the installations of telecommunications equipment and cables from country to country
- higher reliability in public communications
- improved collaboration between national and international authorities

- the tariff policies must become more logic and transparent. It should not pay off to fix "smart solutions", tapping public resources
- standardization of administrative systems
- faster services from the PTTs
- the language barriers must be overcome one way or the other since these often cause conflicts and problems.

WHO CONTROLS DEVELOPMENT?

The large users have identified five different types of actors, influencing telecommunications development. These are:

1. The politicians, creating laws
2. The telecommunications authorities, having all the experts
3. The manufacturers of hardware and software - also in their roles as users
4. The users not related to equipment manufacturing
5. The trade unions, organizing the work force within the organization as well as within telecommunications authorities.

The politicians play a very important role. They create possibilities and the framework within in which the other actors have to act. But the politicians are, in their turn, influenced by their electorate - at least in a democracy. At the same time they are depending upon information, provided by the experts. These experts also belong to universities and research organizations as well as to telecommunications authorities.

It often seems as if the telecommunications authorities collaborate closely with the state, particularly so if the telecom people have the status of "state authority", overtly or covertly, or as a private but de facto monopoly, narrowly regulated.

In those cases where the PTT is a publicly held corporation, with the state as the only share-holder, the connection is still there, but less strong.

The PTTs of most countries are very large organizations. The experts have often organized themselves into trade unions, opposing liberalization such as easing monopolies. Because of this, trade unions have grown very influential within the public authorities.

According to a French report, the politicians and the top executives of the PTTs are equally afraid of actions which may generate political problems, initiated by the trade unions. Even when politicians and top managementss have the ambition, willpower, and knowledge that liberalization is a must for long-term survival, they are stopped from taking action. They

are stopped by the trade unions, fearing suppression of jobs for their members.

In many countries, the collaboration between large users and telecommunications authorities is very close and positive in particular so in small countries. Here it is obvious that the chances for survival of a heavily industrialized small nation are far better if telecommunications are efficient as well as effective.

The equipment manufacturers have become pioneers in the sense that they feel they should be good examples as users of their own equipment. Development in reality just having started, there is a tendency that certain departments within these companies become virtual wonderland islands for applied advanced telecommunications.

The users are also developing new services, simplifying usage and making expansion possible. Manufacturers as well as users depend on current laws.

The trade unions within the users' organizations are generally positive to new developments. The interviewed persons saw them as partners, always willing to negotiate. Of course, it sometimes happens that local unions oppose a specific project, but generally they see changes as positive, since they are keenly aware of the need for an efficient infra structure, without which a country, or a company, cannot compete.

Differences Between Liberalization and Privatization

Many users stressed the fact that liberalization and privatization are in no ways related. The intention of liberalization is to inhibit all monopolies and let the users choose for themselves whatever equipment they believe best responds to their specific demands.

The intention of privatization is to change the ownership, and results in the state losing certain influencing powers and possibilities to take, e g, regional policies into consideration. The competitive situation and the monopoly situation are not influenced by the fact that the authority goes private.

Monopoly, Liberalization, and other Questions to be Negotiated

Monopoly and liberalization efforts are almost contrary to one another. Almost all large users look forward to arrend to monopoly. But some pointed out that increased compatibility problems may be one consequence. Some laws and rules are better liked by certain users than by others! One bank expressed the opinion that it was rather good that there was a law against sharing leased lines after all. That makes the offer from the bank of free communications to its clients seem much more valuable. Obviously, monopolies and inhibitions generate competitive advantages - sometimes!

Finally, the tariff policies are not, according to some of the persons interviewed, a matter of negotiations, but rather a question of liberalization. According to them, lower tariffs as well as a united tariff policy would be forced by increased competition.

Appendix 1: On those interviewed and how they responded

This is a summary of some general impressions from interviews and discussions. Viewpoints and reactions related here are of a very general and broad character.

Who were representing those "large users"?

The letter we sent out to brief the interviewees stresses the user perspective. All large users were represented solely by telecommunications specialists, however, primarily network planners and people responsible for network maintenance. Many of them were thus technically oriented and particularly knowledgeable as to hardware, software or network planning/maintenance. Typically, they also knew less about how their networks were used and for what purposes. They had a number of perceptions, however, believing, guessing, presuming, or denying as to how work had changed and was organized.

How were our questions perceived?

Broadly speaking, the interviewees were uncomfortable with the general character of the questions. Sometimes it took time to convince them that focus should be on user oriented experiences, rather than on technical questions.

In one company the respondents looked upon the questions as manipulative and biased, indicating implicit answers. Their spontaneous reaction was that telecommunication after all is a tool pure and simple which in its entity should be adapted to objectives, organization, and tasks. They also felt that the question whether the prerequisites and conditions had changed with the introduction of new telecommunications was all wrong.

Our impression, however, remains: one cannot see telecommunication as an isolated tool, one hundred per cent adjusted to objectives and tasks. That would be to lose many opportunities, given by the new technology, and thus to lose competitive advantages.

Telematics - would that be telecommunications and data communications?

On paper, many organizations attest to the fact that tele- and data communications are merging into one field, i e telematics. It seems doubtful, however, whether this belief has been more widely spread and implemented.

Judging from interview answers, network planners fail to understand that users actually see telecommunications features as important to data communications. This is not to deny that everyone knew for sure that telecommunications networks gave

access to enormous amounts of information, computer power, and terminals for, e g, electronic mail, independent of place and time.

There is still this distinction between automatic data processing and telecommunications, furthering a belief that everything is unproblematic once there is a telecommunications connection - or, for those who hold this view, the rest is none of their responsibility. To see to it that networks are utilized effectively and all over the organization is instead the responsibility of the users and the data processing departments.

Also, those responsible for telecommunications do not always realize that planning and maintenance of their networks might be ceased if networks are used intelligently and in a cost-effective way, safeguarding against overcrowding. Gains might be lower installation costs and installations according to time plans.

Competence

Those responsible for network planning are highly competent, a competence concentrated to the fields of bytes, switches, gateways, multiplexes, etc, or, alternatively, cost reductions, rationalisation, time table gains, and competitive edges. This compartmentalization is somewhat surprising, given the fact that many of those interviewed had been project managers for very specific but also broad-ranging projects, and thus might

have been equipped with examples. (A possible explanation might be that the fast pace of development requires so much constant renewal of, say, technical experts that specialization is inevitable.)

Vision

It might also be of interest to report the lacking perception as to future developments. The question whether ISDN was something worthwhile and longed for gained positive responses, but ISDN was also the closest to a vision that was offered.

It might be that visions are developed and formulated in other parts of the organizations than with telecommunications planning departments. Those attached to those departments are not involved and their competence not relied upon. But perhaps visions have to be formulated at a distance from practice not to be instantly overshadowed - already at the formulating stage - by pure practical problems. In one company the response was: "We have no idea as to the expectations for our electronic mail system. Those were probably nailed down in the US a decade ago."

Appendix 2: Visit Summaries, One by One

Bank # 1

The interviewee is employed by the department for information handling and telecommunications, within the planning group for

- systems
- strategy development
- market surveys
- product tests
- installation tests

He is a consultant on equipment application and especially hardware-software coordination. The department acts as a supplier to the users, who order various services and equipment.

This bank can safely forecast a steep increase in communication volume in the near future. Therefore the bank has installed a broadband network between world cities in the US, Europe, and Asia. Within the bank, X.25 and SNA are the networks installed. In addition, multiplexors will allow for the transmission of voice and data communication over the broadband network. There is also an internal telex network which is frequently employed for initiating transactions. The system tests automatically whether the "control key" is in accordance with a complicated algorithm. The telex network sends and receives telexes over a personal computer.

Bank # 2

The interviewee belongs to the department for telex and data communications. This is subdivided into

- logical networks
- SNA
- physical networks
- transport networks
- maintenance

He is working particularly with physical net configurations and was project manager for the installation of a large and comprehensive communications network.

All bank applications are on-line and therefore it is a must that systems and networks function at all times and with all features. Applications include, among others, security brokerage, currency exchange, credit information, etc. For such purposes, the bank works on a project which aims at establishing a communications network with transmission speeds of between 9.6 kbits/s and 34 Mbit/s. It conforms with X.25 standards and will integrate voice and data.

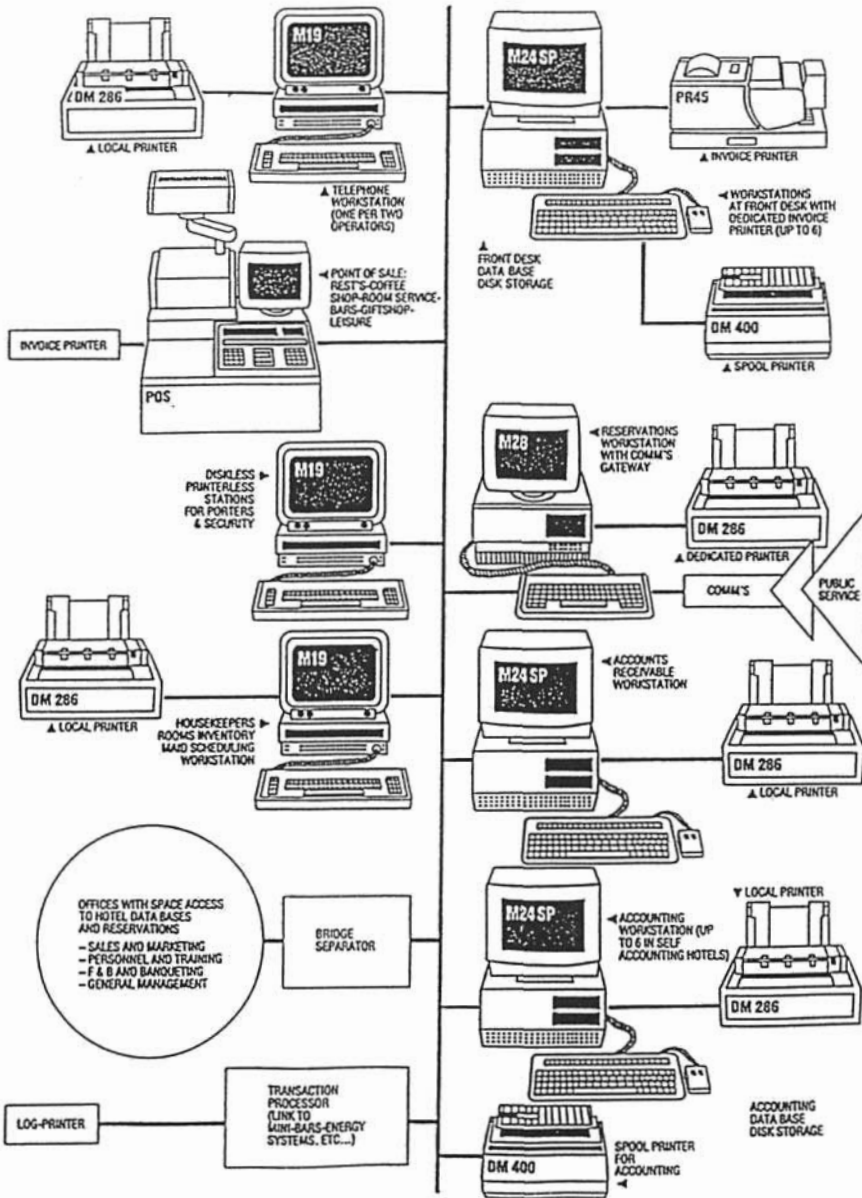
The network will become worldwide and features extension to Hongkong, Sydney, Singapore, the US, and Europe already. Applications are, to a certain extent, linked to specific suppliers.

The Hotel Chain

The interviewee at the hotel chain is responsible within "the region Europe, Middle East, and Africa" for planning and controlling the networks employed for the worldwide booking system. An important task is negotiations in conjunction with the installation of new software and also with telecommunications administrations in the various countries.

All individual hotels are linke to a central computer in the US. This records all available data on all reservations as well as room and other condition at all individual hotels. The adjacent figure depicts the typical net configuration and what equipment is used.

TYPICAL HOTEL MANAGEMENT SYSTEM NETWORK CONFIGURATION



Local networks are installed at some locations, mostly in the US so far. Other applications in use include:

- personnel
- customer service
- marketing and financial
- video conferencing

Within the hotel chain, emphasis is on further development of systems and application. Routines for paying and debiting are to be authorized even more in the future.

The Non-profit Institution

Here we met with a manager at the central administration's department for informatics, in a group called "computer center". He is planning telecommunications networks as well as systems for distributed information processing. 2,500 work stations are in use.

Ownership to the network is somewhat special. According to a special agreement with the telecommunications administration of the country where the institution is located, this administration is in charge of maintenance and service, but the non-profit institution has the exclusive right of using the lines. Thus

it is a combination of a private and an open network.

The Chemicals Company

This company, as so many others, is at a point of breakthrough for new telecommunications applications:

- analog connections will soon be substituted by digital
- a local glass fibre network is being installed for LAN and mainframe communication. The network will consist of 6 - 18 fibres and connect places up to 10 km (6 miles) away from each other.
- the ISDN philosophy is being applied, i e the same workstation may be utilized for text, voice, and data, even simultaneously
- video monitoring has been introduced, test with video conferencing have been performed
- communication etc over Ethernet
- certain CAD applications
- security devices, e g against fire and burglary.

The company features extensive internal communications but relatively little external communications. For those internal links some 35,000 B-channels are demanded, but so far only 16,000 have been provided, of which half are electromechanical. So, a large effort to install simple and also more sophisticated

telephone connections remains.

Such plans are judged to be fulfilled within a five-year period.

Financial Credits

The interviewee is the company's representative in law-making, not least internationally. His job is to follow everything of importance in telecommunications developed, since this is judged critical to the corporation. The goal is to convey the users' needs and requirements to actors such as law-makers, suppliers etc.

The major application is an SNA-based electronic mail system. There is also a telex-supported system for authorizing credits - a core task - and for external communications. This system is a guarantee that brief messages will reach their destination, a must in this business.

Computer Supplier # 1

The interviewee is at the marketing department, finding and defining new markets for the company's line of data and telecommunications equipment.

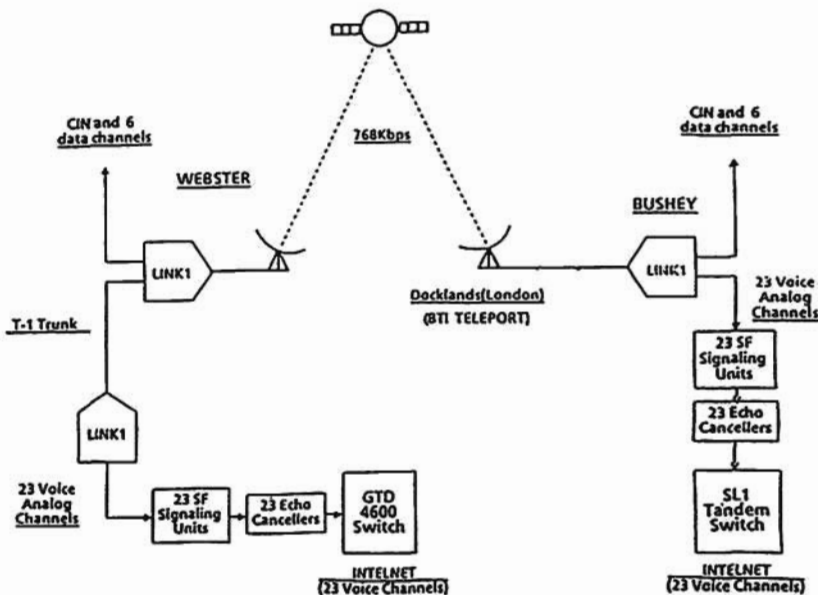
This corporation commands all telecommunications equipment

that can be envisaged. Marketing is the department which is the most advanced user of integrated text and graphics. Internal documents such as meetings announcements, letters, memos and other written texts are produced. Relatively few users have been linked to the system so far, if the whole, large corporation is taken into account. Marketing is the pioneering function.

Computer Supplier # 2

The interviewee is technically oriented, working mostly with strategic aspects of telecommunications technology and applications.

The corporate communications system is world-wide, relying upon leased lines via satellite and cable for text, voice and data. See picture.



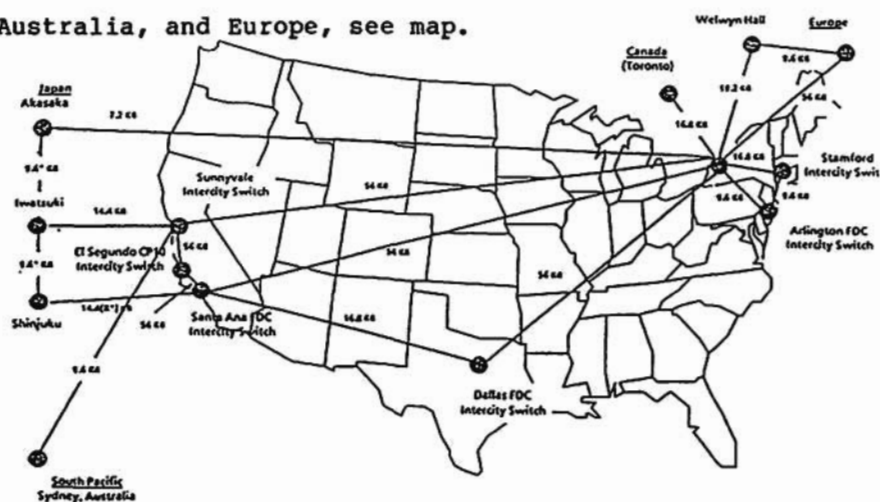
There is a well established internal network, competing with public facilities, since users are free to choose. 50,000 telephones are connected to the proprietary network, and it is calculated to save twelve per cent, compared to exclusive reliance on the public network.

The regular, existing voice messaging system works as a telephone answering machine, where codes and control commands are given by means of the push button set. The message is recorded digitally and re-played on request. The system has the advantage that the user needs no equipment and may access it wherever he is, all over the world. This function is much appreciated by salesmen "on the move" and difficult to reach.

This corporation has also an advanced office information system, employing "home grown" work stations. They are integrated in local networks, LANs. Messages and documents may be exchanged between these work stations at will and wherever.

Currently there are about 13,000 work stations in North America,

Australia, and Europe, see map.



Video conferencing is also comparably well developed. There are six studios established in the US, whereas one is planned for Europe. Most video conferencing takes place between the East and West Coasts of the US, see picture.

Videoconferencing Network XTV



Furthermore, there is an SNA data network. In the US, the X.25 protocol is employed. This network allows for, i a, computations and data base searches.

Pharmaceuticals Company # 1

Here, telecommunications tools are regarded as a top priority. Thus, there is a central corporate staff dedicated to ADP and communications. This department is subdivided into:

- hardware/equipment choice
- software/program choice
- information management/user assistance
- communications/network planning

The interviewee belongs to the communications unit, which serves as a supplier to the corporation's users.

Almost all existing equipment and services are utilized. Examples:

- videotex for order handling and customer information
- mailbox system, easily accessible through, e g, local area networks in various buildings (fifteen such networks exist).

Pharmaceuticals Company # 2

The interviewee is responsible for hardware procurement, installation and maintenance, including functionality when it comes to communication between all different networks.

The firm has a large number and variety of networks and equipment in use, such as:

- Ethernet	appr. 2,500 terminals
- X.25 network	appr. 900 terminals
- Broadband for LAN	
- PC nets	appr. 20
- Misc.	appr. 2,000 terminals

TOTAL:	appr. 5,000 terminals

Experiences of time-sharing (General Electric) are profound, but after eight years the importance of this service is diminishing, under the PC onslaught.

There are systems for finance and economic reporting, for warehousing, and for searching external data bases for research oriented information. There is host communication on leased lines between Switzerland, the US, West Germany, France, and the UK.

Pharmaceuticals Company # 3

This corporation has chosen the strategy to stay behind the pioneers and has no application development program, even given the results of forerunners. There is, however, one department chartered to coordinate telecommunications utilization and

all information technology, and to advise users.

The relative spearhead is the R&D department.

Today, the following applications are in use:

- a pharmacological project control system
- a marketing system, including sales statistics
- a research system for molecule identification
- medical documentation
- financial reporting
- electronic mail

Plans exist for

- product quality control
- clinical research
- environmental and security problems, related to products
- purchasing
- budgeting
- electronic data interchange

Multinational Consumer Non-Durables Manufacturer

The corporation has a large number of product and market oriented subsidiaries. We visited with the central group for computers and communications which is geared at

- formulating policies for computer implementation and usage
- formulating telecommunications policies
- advising subsidiaries in formulating their own computerisation strategies
- advising corporate headquarters on their utilization of and strategic development for computerization.

Strategy development has started fairly recently, when decentralized computerization has started to impact centrally; previously, no urgency was felt needed for headquarter's own sake.

Thus each subsidiary has its own systems and networks, and communications outside those are very limited. Electronic mail is used just in a network shared by the research laboratories.

Contacts between producing companies and their customers are seen as the internal business of each company, and the decentralization is so strict that headquarters do not even know what systems, equipment, standards are used. Those customers are most often wholesalers, doing business in large quantities with a limited range of products, something which diminishes the utility of, e g, videotex.

The need for document transfer is substantial. Today, mail, telex, and telefax are the means established. An electronic mail system to link subsidiaries and mother company is in

the making, but so far, few companies have been tied in. Depending upon speed of development, regional headquarters might be hooked up, too. So far, reporting and communication depend upon the telephone- and face-to-face meetings.

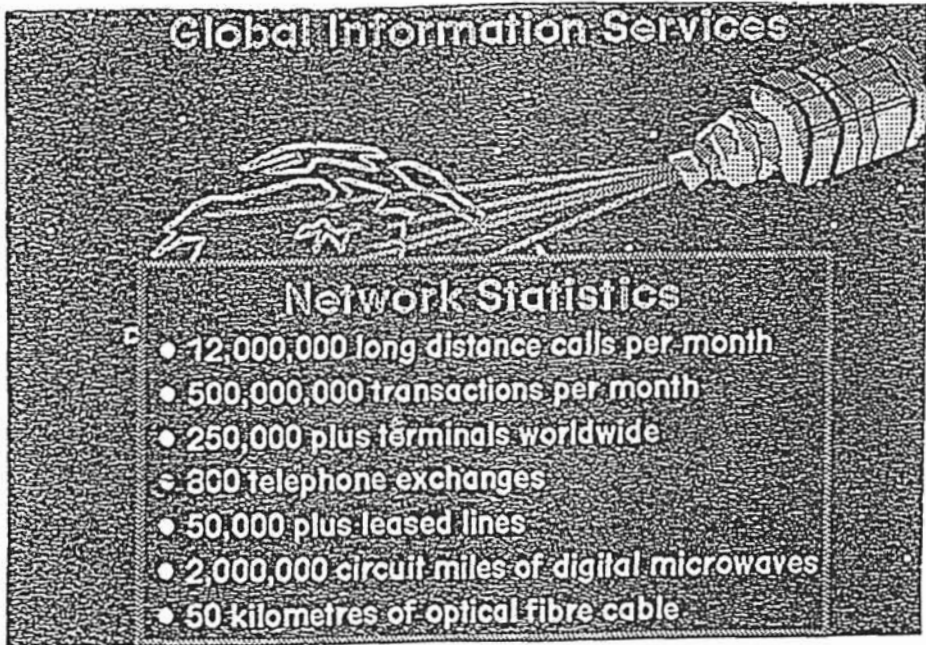
Servicing Computerized Production Systems

This particular enterprise undertakes to establish and maintain appropriate data and telecommunications systems for other companies, preferably with large, demanding, and specialized requirements, often in industrial production. One example is the maintenance and control of the CAD/CAM system for a large automotive manufacturer. Internal communications are sizable.

One of the interviewees leads telecommunications development and plans networks and their equipment. The other represents computer operations and especially data communications services.

The corporate network is SNA, linking together the whole world, and the largest connection is between Europe and the US, where a 1.5 Mbit link is established via satellite. This gives access to information banks and data from all over the world.

Electronic mail has been in use for a long time, and letter writing has decreased drastically. This mail system is linked also to telex.



News Agency

The interviewee is working at the Corporate Technical Group, which is subdivided into profit centers responsible for different geographical areas. These independent units have been given the task to introduce new telecommunications means and also to formulate related strategies.

Telecommunications dominate over computation. Satellites are heavily employed, but supplementary broadband links are being planned to ease data communication.

This well established network is utilized to deliver economic

and financial information. General news forms a small share, emphasis is on stock quotations, currency exchange values, precious metals prices, options, bonds, etc. In the future, the network ought to be employed also for business transactions, such as the transfer of money and the acquisition of stock.

This company looks upon itself as a service provider, with lots of external communication though relatively little internal communication flow. Today, some 130,000 terminals with customers are hooked up to this agency's network.

This penetration has created the basis for the captive development of terminals as well as software development and production. The philosophy is that it is simpler and cheaper to design and

produce something which fits what the customer needs, rather than relying upon intermediaries. The terminal is also adapted to the needs of each individual customer.

Petrochemicals Company

The interviewee is with the Information Center, chartered to cater for service and advice to internal users. His task is world wide network planning.

Subsidiaries are very autonomous. That is why there are several

local networks, but there is also an integrated network linking together all LANs through an international DEC-net. Any PC, hooked up to this network, may be used to send messages, send and receive telexes and to reach data bases all over the world. A big load is carried through the company's private telephone network which is based on leased lines.

Car Manufacturer # 1

This company is just making the transfer from traditional to advanced telecommunications. Telephone and telex are complemented with videotex, local networks, and other information systems. Analog systems are being substituted with digital.

ISDN oriented pilot projects have been started, where voice and data communication may take place simultaneously, over the same channel. The project is in the early stage, the goal being to see what functions may be integrated into one single work station, and what technical and human limitations exist.

Another pilot project is video conferencing. At the pilot stage, communications take place between two rooms in two different locations. Broadband allows live pictures, synchronized with voice transmission.

The advantage is higher quality communications, enlarged and supplemented communications rather than travel substitution. Video

conferencing is seen as resulting in faster decision making and development. Faster and better decisions improve competitiveness. Visualization with the aid of pictures of various kinds is the major difference to telephone communication.

Car Manufacturer # 2

The interviewee is with the department responsible for information technology and telecommunications. His particular field is short range planning for and implementation of new telecommunications systems. Responsibilities are also geographically divided, and in this structure strategic, operational, and implementation oriented problems are treated.

When a new system has been installed and implemented, responsibility is transferred to the computer department.

Examples of important applications in use are:

- logistics systems
- purchasing systems
- office automation systems (Wang)
- electronic mail (installed recently)
- video conferencing

Those systems are used all over Europe, but management is shared between different countries, for different systems.

TELDOK was initiated by the Board of Televerket (Swedish Telecommunications Administration) to facilitate *early and easy-to-read documentation on the use of telecommunicating information systems*.

TELDOK's aims include: to...

- Document, as early as possible, working applications of new telecommunicating information systems at work
- Publish, distribute, and—where needed—translate to Swedish and compare to the Swedish situation, information on the use of new telecommunications systems in the workplace
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